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# Amazon Comprehend

## Developer Guide



## Amazon Comprehend: Developer Guide

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# What is Amazon Comprehend?

Amazon Comprehend uses natural language processing (NLP) to extract insights about the content of documents. It develops insights by recognizing the entities, key phrases, language, sentiments, and other common elements in a document. Use Amazon Comprehend to create new products based on understanding the structure of documents. For example, using Amazon Comprehend you can search social networking feeds for mentions of products or scan an entire document repository for key phrases.

You can access Amazon Comprehend document analysis capabilities using the Amazon Comprehend console or using the Amazon Comprehend APIs. You can run real-time analysis for small workloads or you can start asynchronous analysis jobs for large document sets. You can use the pre-trained models that Amazon Comprehend provides, or you can train your own custom models for classification and entity recognition.

All of the Amazon Comprehend features can analyze UTF-8 text documents as the input files. In addition, custom entity recognition can analyze image files, PDF files, and Word files.

Amazon Comprehend can examine and analyze documents in a variety of languages, depending on the specific feature. For more information, see [Languages supported in Amazon Comprehend \(p. 35\)](#). Amazon Comprehend's [Dominant language \(p. 12\)](#) capability can examine documents and determine the dominant language for a far wider selection of languages.

## Topics

- [Amazon Comprehend insights \(p. 1\)](#)
- [Amazon Comprehend Custom \(p. 2\)](#)
- [Document clustering \(topic modeling\) \(p. 2\)](#)
- [Examples \(p. 2\)](#)
- [Benefits \(p. 2\)](#)
- [Amazon Comprehend pricing \(p. 3\)](#)
- [Are you a first-time user of Amazon Comprehend? \(p. 3\)](#)

## Amazon Comprehend insights

Amazon Comprehend uses a pre-trained model to examine and analyze a document or set of documents to gather insights about it. This model is continuously trained on a large body of text so that there is no need for you to provide training data.

Amazon Comprehend gathers the following types of insights:

- **Entities** – References to the names of people, places, items, and locations contained in a document.
- **Key phrases** – Phrases that appear in a document. For example, a document about a basketball game might return the names of the teams, the name of the venue, and the final score.
- **Personally Identifiable Information (PII)** – Personal data that can identify an individual, such as an address, bank account number, or phone number.
- **Language** – The dominant language of a document.
- **Sentiment** – The dominant sentiment of a document, which can be positive, neutral, negative, or mixed.
- **Targeted sentiment** – The sentiments associated with specific entities in a document. The sentiment for each entity occurrence can be positive, negative, neutral or mixed.
- **Syntax** – The parts of speech for each word in the document.

For more information, see [Insights \(p. 4\)](#).

## Amazon Comprehend Custom

You can customize Amazon Comprehend for your specific requirements without the skillset required to build machine learning-based NLP solutions. Using automatic machine learning, or AutoML, Amazon Comprehend Custom builds customized NLP models on your behalf, using data you already have.

**Custom classification** – Create custom classification models (classifiers) to organize your documents into your own categories.

**Custom entity recognition** – Create custom entity recognition models (recognizers) that can analyze text for your specific terms and noun-based phrases.

For more information, see [Amazon Comprehend Custom \(p. 28\)](#).

## Document clustering (topic modeling)

You can also use Amazon Comprehend to examine a corpus of documents to organize them based on similar keywords within them. Document clustering (topic modeling) is useful to organize a large corpus of documents into topics or clusters that are similar based on word frequency. For more information, see [Topic modeling \(p. 29\)](#).

## Examples

The following examples show how you might use the Amazon Comprehend operations in your applications.

### Example 1: Find documents about a subject

Find the documents about a particular subject using Amazon Comprehend topic modeling. Scan a set of documents to determine the topics discussed, and to find the documents associated with each topic. You can specify the number of topics that Amazon Comprehend should return from the document set.

### Example 2: Find out how customers feel about your products

If your company publishes a catalog, let Amazon Comprehend tell you what customers think of your products. Send each customer comment to the DetectSentiment operation and it will tell you whether customers feel positive, negative, neutral, or mixed about a product.

### Example 3: Discover what matters to your customers

Use Amazon Comprehend topic modeling to discover the topics that your customers are talking about on your forums and message boards, then use entity detection to determine the people, places, and things that they associate with the topic. Finally, use sentiment analysis to determine how your customers feel about a topic.

## Benefits

Some of the benefits of using Amazon Comprehend include:

- **Integrate powerful natural language processing into your apps** – Amazon Comprehend removes the complexity of building text analysis capabilities into your applications by making powerful and accurate natural language processing available with a simple API. You don't need textual analysis expertise to take advantage of the insights that Amazon Comprehend produces.
- **Deep learning based natural language processing** – Amazon Comprehend uses deep learning technology to accurately analyze text. Our models are constantly trained with new data across multiple domains to improve accuracy.
- **Scalable natural language processing** – Amazon Comprehend enables you to analyze millions of documents so that you can discover the insights that they contain.
- **Integrate with other AWS services** – Amazon Comprehend is designed to work seamlessly with other AWS services like Amazon S3, AWS KMS, and AWS Lambda. Store your documents in Amazon S3, or analyze real-time data with Kinesis Data Firehose. Support for AWS Identity and Access Management (IAM) makes it easy to securely control access to Amazon Comprehend operations. Using IAM, you can create and manage AWS users and groups to grant the appropriate access to your developers and end users.
- **Encryption of output results and volume data** – Amazon S3 already enables you to encrypt your input documents, and Amazon Comprehend extends this even farther. By using your own KMS key, you can not only encrypt the output results of your job, but also the data on the storage volume attached to the compute instance that processes the analysis job. The result is significantly enhanced security.
- **Low cost** – With Amazon Comprehend, there are no minimum fees or upfront commitments. You pay for the documents that you analyze and custom models that you train.

## Amazon Comprehend pricing

There is a usage charge for running real-time or asynchronous analysis jobs. You pay to train custom models, and you pay for custom model management. For real-time requests using custom models, you pay for the endpoint from the time that you start your endpoint until you delete the endpoint.

For the rates and additional detailed information, see <http://aws.amazon.com/comprehend/pricing>.

## Are you a first-time user of Amazon Comprehend?

If you are a first-time user of Amazon Comprehend, we recommend that you read the following sections in order:

1. [How it works \(p. 4\)](#) – This section introduces Amazon Comprehend concepts.
2. [Setting up \(p. 37\)](#) – In this section, you create an IAM user and set up the AWS CLI.
3. [Getting started with Amazon Comprehend \(p. 39\)](#) – In this section, you run a Amazon Comprehend analysis job.
4. [Tutorial: Analyzing insights from customer reviews with Amazon Comprehend \(p. 226\)](#) – In this section, you perform sentiment and entities analysis and visualize the results.
5. [API reference \(p. 254\)](#) – In this section you'll find reference documentation for Amazon Comprehend operations.

AWS provides the following resources for learning about the Amazon Comprehend service:

- The [AWS Machine Learning Blog](#) includes useful articles about Amazon Comprehend.
- [Amazon Comprehend Resources](#) provides useful videos and tutorials about Amazon Comprehend.

# How it works

Amazon Comprehend uses a pre-trained model to gather **insights** about a document or a set of documents. This model is continuously trained on a large body of text so that there is no need for you to provide training data.

You can use Amazon Comprehend to build your own **custom models** for custom classification and custom entity recognition.

Amazon Comprehend provides **topic modeling** using a built-in model. Topic modeling examines a corpus of documents and organizes the documents based on similar keywords within them.

Amazon Comprehend provides synchronous and asynchronous **document processing modes**. Use synchronous mode for processing one document or a batch of up to 25 documents. Use an asynchronous job to process a large number of documents.

Amazon Comprehend works with AWS Key Management Service (AWS KMS) to provide enhanced encryption for your data. For more information, see [KMS encryption in Amazon Comprehend \(p. 187\)](#).

## Key concepts

- [Insights \(p. 4\)](#)
- [Amazon Comprehend Custom \(p. 28\)](#)
- [Topic modeling \(p. 29\)](#)
- [Document processing modes \(p. 31\)](#)

# Insights

Amazon Comprehend can analyze a document or set of documents to gather insights about it. Some of the insights that Amazon Comprehend develops about a document include:

- [Entities \(p. 5\)](#) – Amazon Comprehend returns a list of entities, such as people, places, and locations, identified in a document.
- [Events \(p. 6\)](#) – Amazon Comprehend detects specific types of events and related details.
- [Key phrases \(p. 11\)](#) – Amazon Comprehend extracts key phrases that appear in a document. For example, a document about a basketball game might return the names of the teams, the name of the venue, and the final score.
- [Personally identifiable information \(PII\) \(p. 83\)](#) – Amazon Comprehend analyzes documents to detect personal data that identify an individual, such as an address, bank account number, or phone number.
- [Dominant language \(p. 12\)](#) – Amazon Comprehend identifies the dominant language in a document. Amazon Comprehend can identify 100 languages.
- [Sentiment \(p. 16\)](#) – Amazon Comprehend determines the dominant sentiment of a document. Sentiment can be positive, neutral, negative, or mixed.
- [Targeted Sentiment \(p. 17\)](#) – Amazon Comprehend determines the sentiment of specific entities mentioned in a document. The sentiment of each mention can be positive, neutral, negative, or mixed.
- [Syntax analysis \(p. 26\)](#) – Amazon Comprehend parses each word in your document and determines the part of speech for the word. For example, in the sentence "It is raining today in Seattle," "it" is identified as a pronoun, "raining" is identified as a verb, and "Seattle" is identified as a proper noun.

## Entities

An *entity* is a textual reference to the unique name of a real-world object such as people, places, and commercial items, and to precise references to measures such as dates and quantities.

For example, in the text "John moved to 1313 Mockingbird Lane in 2012," "John" might be recognized as a PERSON, "1313 Mockingbird Lane" might be recognized as a LOCATION, and "2012" might be recognized as a DATE.

Each entity also has a score that indicates the level of confidence that Amazon Comprehend has that it correctly detected the entity type. You can filter out the entities with lower scores to reduce the risk of using incorrect detections.

The following table lists the entity types.

Type	Description
COMMERCIAL_ITEM	A branded product
DATE	A full date (for example, 11/25/2017), day (Tuesday), month (May), or time (8:30 a.m.)
EVENT	An event, such as a festival, concert, election, etc.
LOCATION	A specific location, such as a country, city, lake, building, etc.
ORGANIZATION	Large organizations, such as a government, company, religion, sports team, etc.
OTHER	Entities that don't fit into any of the other entity categories
PERSON	Individuals, groups of people, nicknames, fictional characters
QUANTITY	A quantified amount, such as currency, percentages, numbers, bytes, etc.
TITLE	An official name given to any creation or creative work, such as movies, books, songs, etc.

Detect entities operations can be performed using any of the primary languages supported by Amazon Comprehend. This includes only predefined (non-custom) entity detection. All documents must be in the same language.

You can use any of the following API operations to detect entities in a document or set of documents.

- [DetectEntities \(p. 341\)](#)
- [BatchDetectEntities \(p. 260\)](#)
- [StartEntitiesDetectionJob \(p. 416\)](#)

The operations return a list of [Entity \(p. 516\)](#) objects, one for each entity in the document. The `BatchDetectEntities` operation returns a list of `Entity` objects, one list for each document in the batch. The `StartEntitiesDetectionJob` operation starts an asynchronous job that produces a file containing a list of `Entity` objects for each document in the job.

The following example is the response from the `DetectEntities` operation.

```
"Entities": [
  {
    "Text": "today",
    "Score": 0.97,
    "Type": "DATE",
    "BeginOffset": 14,
    "EndOffset": 19
  },
  {
    "Text": "Seattle",
    "Score": 0.95,
    "Type": "LOCATION",
    "BeginOffset": 23,
    "EndOffset": 30
  }
],
"LanguageCode": "en"
}
```

## Events

Use *event detection* to analyze text documents for specific types of events and their related entities. Amazon Comprehend supports event detection across large collections of documents using asynchronous analysis jobs. For more information about events, including example event analysis jobs, see [Announcing the launch of Amazon Comprehend Events](#)

### Entities

From the input text, Amazon Comprehend extracts a list of entities that are related to the detected event. An *entity* can be a real-world object, such as a person, place, or location; an entity can also be a concept, such as a measurement, date, or quantity. Each occurrence of an entity is identified by a *mention*, which is a textual reference to the entity in the input text. For each unique entity, all mentions are grouped into a list. This list provides details for each location in the input text where the entity occurs. Amazon Comprehend detects only the entities associated with supported event types.

Each entity associated with a supported event type returns with the following related details:

- **Mentions:** Details for each occurrence of the same entity in the input text.
  - **BeginOffset:** A character offset in the input text that shows where the mention begins (the first character is at position 0).
  - **EndOffset:** A character offset in the input text that shows where the mention ends.
  - **Score:** The level of confidence that Amazon Comprehend has in the accuracy of the entity's type.
  - **GroupScore:** The level of confidence from Amazon Comprehend that the mention is correctly grouped with other mentions of the same entity.
  - **Text:** The text of the entity.
  - **Type:** The entity's type. For all supported entity types, see [Entity types \(p. 8\)](#).

## Events

Amazon Comprehend returns the list of events (of supported event types) that it detects in the input text. Each event returns with the following related details:

- **Type:** The event's type. For all supported event types, see [Event types \(p. 8\)](#).
- **Arguments:** A list of arguments that are related to the detected event. An *argument* consists of an entity that is related to the detected event. The argument's role describes the relationship, such as *who did what, where and when*.

- **EntityIndex:** An index value that identifies an entity from the list of entities that Amazon Comprehend returned for this analysis.
- **Role:** The argument type, which describes how the entity for this argument is related to the event. For all supported argument types, see [Argument types \(p. 9\)](#).
- **Score:** The level of confidence that Amazon Comprehend has in the accuracy of the role detection.
- **Triggers:** A list of triggers for the detected event. A *trigger* is a single word or phrase that indicates the occurrence of the event.
  - **BeginOffset:** A character offset in the input text that shows where the trigger begins (the first character is at position 0).
  - **EndOffset:** A character offset in the input text that shows where the trigger ends.
  - **Score:** The level of confidence that Amazon Comprehend has in the accuracy of the detection.
  - **Text:** The text of the trigger.
  - **GroupScore:** The level of confidence from Amazon Comprehend that the trigger is correctly grouped with other triggers for the same event.
  - **Type:** The type of event that this trigger indicates.

## Detect events results format

When your event detection job completes, Amazon Comprehend writes the analysis results to the Amazon S3 output location that you specified when you started the job.

For each detected event, the output provides details in the following format:

```
{  
    "Entities": [  
        {  
            "Mentions": [  
                {  
                    "BeginOffset": number,  
                    "EndOffset": number,  
                    "Score": number,  
                    "GroupScore": number,  
                    "Text": "string",  
                    "Type": "string"  
                }, ...  
            ]  
        }, ...  
    ],  
    "Events": [  
        {  
            "Type": "string",  
            "Arguments": [  
                {  
                    "EntityIndex": number,  
                    "Role": "string",  
                    "Score": number  
                }, ...  
            ],  
            "Triggers": [  
                {  
                    "BeginOffset": number,  
                    "EndOffset": number,  
                    "Score": number,  
                    "Text": "string",  
                    "GroupScore": number,  
                    "Type": "string"  
                }, ...  
            ]  
        }  
    ]  
}
```

```
    }, ...
}
```

## Supported types for entities, events, and arguments

### Entity types

Type	Description
DATE	Any reference to a date or time, whether specific or general.
FACILITY	Buildings, airports, highways, bridges, and other permanent man-made structures and real estate improvements.
LOCATION	Physical locations such as streets, cities, states, countries, bodies of water, or geographic coordinates.
MONETARY_VALUE	The value of something in US or other currency. The value can be specific or approximate.
ORGANIZATION	Companies and other groups of people defined by an established organizational structure.
PERSON	The names or nicknames of individuals or fictional characters.
PERSON_TITLE	Any title which describes a person, which is usually an employment category (such as CEO) or honorific (such as Mr.).
QUANTITY	A number or value and the unit of measurement.
STOCK_CODE	A stock ticker symbol, such as AMZN, an International Securities Identification Number (ISIN), Committee on Uniform Securities Identification Procedures (CUSIP), or Stock Exchange Daily Official List (SEDOL).

### Event types

Type	Description
BANKRUPTCY	A legal proceeding involving a person or company unable to repay outstanding debts.
EMPLOYMENT	Occurs when an employee is hired, fired, retired, or otherwise changes employment state.
CORPORATE_ACQUISTION	Occurs when a company obtains the possession of most or all of another company's shares or physical assets to gain control of that company.

Type	Description
INVESTMENT_GENERAL	Occurs when a person or company purchases an asset with the prospect of generating future income or appreciation.
CORPORATE_MERGER	Occurs when two or more companies unite to create a new legal entity.
IPO	An initial public offering (IPO) of shares of a private corporation to the public in a new stock issuance.
RIGHTS_ISSUE	A group of rights offered to existing shareholders to purchase additional stock shares, known as subscription warrants, in proportion to their existing holdings.
SECONDARY_OFFERING	An offer of securities by a shareholder of a company.
SHELF_OFFERING	A Securities and Exchange Commission (SEC) provision that allows an issuer to register a new issue of security and sell portions of the issue over a period of time without re-registering the security or incurring penalties. Also known as a shelf registration.
TENDER_OFFERING	An offer to purchase some or all of shareholders' shares in a company.
STOCK_SPLIT	Occurs when a company's board of directors increases the number of shares that are outstanding by issuing more shares to current shareholders. This event also applies to reverse stock splits.

## Argument types

### Argument types for BANKRUPTCY

Argument type	Description
FILER	The person or company filing the bankruptcy.
DATE	The date or time of bankruptcy.
PLACE	Location or facility where (or nearest to where) the bankruptcy took place.

### Argument types for EMPLOYMENT

Type	Description
EMPLOYEE	The person employed by a company.
EMPLOYEE_TITLE	The title of the employee.

Type	Description
EMPLOYER	The person or company employing the employee.
END_DATE	The start date or time of the employment.
START_DATE	The end date or time of the employment.

#### Argument types for CORPORATE\_ACQUISITION, INVESTMENT\_GENERAL

Type	Description
AMOUNT	The monetary value associated with the transaction.
INVESTEE	The person or company associated with the investment.
INVESTOR	The person or company investing in the asset.
DATE	The date or time of the acquisition or investment.
PLACE	Location where (or nearest to where) the acquisition or investment took place.

#### Argument types for CORPORATE\_MERGER

Type	Description
DATE	The date or time of the merger.
NEW_COMPANY	The new legal entity resulting from the merger.
PARTICIPANT	The company involved in the merger.

#### Argument types for IPO, RIGHTS\_ISSUE, SECONDARY\_OFFERING, SHELF\_OFFERING, TENDER\_OFFERING

Type	Description
EXPIRE_DATE	The expiration date or time of the offering.
INVESTOR	The person or company investing in the asset.
OFFEREES	The person or company receiving the offering.
OFFERING_AMOUNT	The monetary value associated with the offering.
OFFERING_DATE	The date or time of the offering.
OFFEROR	The person or company initiating the offering.
OFFEROR_TOTAL_VALUE	The total monetary value associated with the offering.
RECORD_DATE	The record date or time of the offering.

Type	Description
SELLING_AGENT	The person or company facilitating the sale of the offering.
SHARE_PRICE	The monetary value associated with the share price.
SHARE_QUANTITY	The number of shares associated with the offering.
UNDERWRITERS	The company associated with the underwriting of the offering.

### Argument types for STOCK\_SPLIT

Type	Description
COMPANY	The company issuing shares of the stock split.
DATE	The date or time of the stock split.
SPLIT_RATIO	The ratio of the increased new number of shares outstanding to the current number of shares before the stock split.

## Key phrases

A *key phrase* is a string containing a noun phrase that describes a particular thing. It generally consists of a noun and the modifiers that distinguish it. For example, "day" is a noun; "a beautiful day" is a noun phrase that includes an article ("a") and an adjective ("beautiful"). Each key phrase includes a score that indicates the level of confidence that Amazon Comprehend has that the string is a noun phrase. You can use the score to determine if the detection has high enough confidence for your application.

Detect key phrases operations can be performed using any of the primary languages supported by Amazon Comprehend. All documents must be in the same language.

You can use any of the following operations to detect key phrases in a document or set of documents.

- [DetectKeyPhrases \(p. 345\)](#)
- [BatchDetectKeyPhrases \(p. 263\)](#)
- [StartKeyPhrasesDetectionJob \(p. 425\)](#)

The operations return a list of [KeyPhrase \(p. 541\)](#) objects, one for each key phrase in the document.

The `BatchDetectKeyPhrases` operation returns a list of `KeyPhrase` objects, one for each document in the batch. The `StartKeyPhrasesDetectionJob` operation starts an asynchronous job that produces a file containing a list of `KeyPhrase` objects for each document in the job.

The following example is the response from the `DetectKeyPhrases` operation.

```
{
    "LanguageCode": "en",
    "KeyPhrases": [
        {
            "Text": "today",
            "Score": 0.89,
        }
    ]
}
```

```

        "BeginOffset": 14,
        "EndOffset": 19
    },
    {
        "Text": "Seattle",
        "Score": 0.91,
        "BeginOffset": 23,
        "EndOffset": 30
    }
]
}

```

## Dominant language

You can use Amazon Comprehend to examine text to determine the dominant language. Amazon Comprehend identifies the language using identifiers from RFC 5646 — if there is a 2-letter ISO 639-1 identifier, with a regional subtag if necessary, it uses that. Otherwise, it uses the ISO 639-2 3-letter code. For more information about RFC 5646, see [Tags for identifying languages](#) on the [IETF Tools](#) web site.

The response includes a score that indicates the confidence level that Amazon Comprehend has that a particular language is the dominant language in the document. Each score is independent of the other scores — it does not indicate that a language makes up a particular percentage of a document.

If a long document, like a book, is written in multiple languages, you can break the long document into smaller pieces and run the `DetectDominantLanguage` operation on the individual pieces. You can then aggregate the results to determine the percentage of each language in the longer document.

Amazon Comprehend can detect the following languages.

Code	Language
af	Afrikaans
am	Amharic
ar	Arabic
as	Assamese
az	Azerbaijani
ba	Bashkir
be	Belarusian
bn	Bengali
bs	Bosnian
bg	Bulgarian
ca	Catalan
ceb	Cebuano
cs	Czech
cv	Chuvash
cy	Welsh

<b>Code</b>	<b>Language</b>
da	Danish
de	German
el	Greek
en	English
eo	Esperanto
et	Estonian
eu	Basque
fa	Persian
fi	Finnish
fr	French
gd	Scottish Gaelic
ga	Irish
gl	Galician
gu	Gujarati
ht	Haitian
he	Hebrew
ha	Hausa
hi	Hindi
hr	Croatian
hu	Hungarian
hy	Armenian
ilo	Iloko
id	Indonesian
is	Icelandic
it	Italian
JV	Javanese
ja	Japanese
kn	Kannada
ka	Georgian
kk	Kazakh
km	Central Khmer

<b>Code</b>	<b>Language</b>
ky	Kirghiz
ko	Korean
ku	Kurdish
lo	Lao
la	Latin
lv	Latvian
lt	Lithuanian
lb	Luxembourgish
ml	Malayalam
mt	Maltese
mr	Marathi
mk	Macedonian
mg	Malagasy
mn	Mongolian
ms	Malay
my	Burmese
ne	Nepali
new	Newari
nl	Dutch
no	Norwegian
or	Oriya
om	Oromo
pa	Punjabi
pl	Polish
pt	Portuguese
ps	Pushto
qu	Quechua
ro	Romanian
ru	Russian
sa	Sanskrit
si	Sinhala

<b>Code</b>	<b>Language</b>
sk	Slovak
sl	Slovenian
sd	Sindhi
so	Somali
es	Spanish
sq	Albanian
sr	Serbian
su	Sundanese
sw	Swahili
sv	Swedish
ta	Tamil
tt	Tatar
te	Telugu
tg	Tajik
tl	Tagalog
th	Thai
tk	Turkmen
tr	Turkish
ug	Uighur
uk	Ukrainian
ur	Urdu
uz	Uzbek
vi	Vietnamese
yi	Yiddish
yo	Yoruba
zh	Chinese (Simplified)
zh-TW	Chinese (Traditional)

You can use any of the following operations to detect the dominant language in a document or set of documents.

- [DetectDominantLanguage \(p. 338\)](#)
- [BatchDetectDominantLanguage \(p. 257\)](#)

- [StartDominantLanguageDetectionJob \(p. 411\)](#)

The `DetectDominantLanguage` operation returns a [DominantLanguage \(p. 503\)](#) object. The `BatchDetectDominantLanguage` operation returns a list of `DominantLanguage` objects, one for each document in the batch. The `StartDominantLanguageDetectionJob` operation starts an asynchronous job that produces a file containing a list of `DominantLanguage` objects, one for each document in the job.

The following example is the response from the `DetectDominantLanguage` operation.

```
{  
    "Languages": [  
        {  
            "LanguageCode": "en",  
            "Score": 0.9793661236763  
        }  
    ]  
}
```

## Sentiment

Use Amazon Comprehend to determine the sentiment of a document. For example, you can use sentiment analysis to determine the sentiments of comments on a blog posting to determine if your readers liked the post.

You can determine sentiment for documents in any of the primary languages supported by Amazon Comprehend. All documents in one job must be in the same language.

Sentiment determination returns the following values:

- **Positive** – The text expresses an overall positive sentiment.
- **Negative** – The text expresses an overall negative sentiment.
- **Mixed** – The text expresses both positive and negative sentiments.
- **Neutral** – The text does not express either positive or negative sentiments.

You can use any of the following API operations to detect the sentiment of a document or a set of documents.

- [DetectSentiment \(p. 350\)](#)
- [BatchDetectSentiment \(p. 266\)](#)
- [StartSentimentDetectionJob \(p. 434\)](#)

The operations return the most likely sentiment for the text as well as the scores for each of the sentiments. The score represents the likelihood that the sentiment was correctly detected. For example, in the example below it is 95 percent likely that the text has a **Positive** sentiment. There is a less than 1 percent likelihood that the text has a **Negative** sentiment. You can use the `SentimentScore` to determine if the accuracy of the detection meets the needs of your application.

The `DetectSentiment` operation returns an object that contains the detected sentiment and a [SentimentScore \(p. 560\)](#) object. The `BatchDetectSentiment` operation returns a list of sentiments and `SentimentScore` objects, one for each document in the batch. The `StartSentimentDetectionJob` operation starts an asynchronous job that produces a file containing a list of sentiments and `SentimentScore` objects, one for each document in the job.

The following example is the response from the `DetectSentiment` operation.

```
{  
    "SentimentScore": {  
        "Mixed": 0.030585512690246105,  
        "Positive": 0.94992071056365967,  
        "Neutral": 0.0141543131828308,  
        "Negative": 0.00893945890665054  
    },  
    "Sentiment": "POSITIVE",  
    "LanguageCode": "en"  
}
```

## Targeted sentiment

*Targeted sentiment* provides a granular understanding of the sentiments associated with specific entities (such as brands or products) in your input documents.

The difference between targeted sentiment and [sentiment \(p. 16\)](#) is the level of granularity in the output data. Sentiment analysis determines the dominant sentiment for each input document, but doesn't provide data for further analysis. Targeted sentiment analysis determines the entity-level sentiment for specific entities in each input document. You can analyze the output data to determine the specific products and services that get positive or negative feedback.

For example, in a set of restaurant reviews, a customer provides the following review: "The tacos were delicious and the staff was friendly." Analysis of this review produces the following results:

- **Sentiment analysis** determines whether the overall sentiment of each restaurant review is positive, negative, neutral, or mixed. In this example, the overall sentiment is positive.
- **Targeted sentiment analysis** determines sentiment for entities and attributes of the restaurant that customers mention in the reviews. In this example, the customer made positive comments about "tacos" and "staff").

Targeted sentiment provides the following outputs for each analysis job:

- Identity of the entities mentioned in the documents.
- Classification of the entity type for each entity mention.
- The sentiment and a sentiment score for each entity mention.
- Groups of mentions (co-reference groups) that correspond to a single entity.

You can use the [console \(p. 47\)](#) or the [API \(p. 72\)](#) to run targeted sentiment analysis. To run targeted sentiment, you start an asynchronous analysis job; real-time analysis is not available for targeted sentiment.

Amazon Comprehend supports targeted sentiment for documents in the English language.

For additional information about targeted sentiment, including a tutorial, see [Extract granular sentiment in text with Amazon Comprehend Targeted Sentiment](#).

### Topics

- [Entity types \(p. 18\)](#)
- [Co-reference group \(p. 18\)](#)
- [Output file organization \(p. 19\)](#)
- [Targeted sentiment example \(p. 21\)](#)

## Entity types

Targeted sentiment identifies the following entity types. It assigns entity type OTHER if the entity doesn't belong in any other category. Each entity mention in the output file includes the entity type, such as "Type": "PERSON".

### Entity type definitions

Entity Type	Definition
PERSON	Examples include individuals, groups of people, nicknames, fictional characters, and animal names.
LOCATION	Geographical locations such as countries, cities, states, addresses, geological formations, bodies of water, natural landmarks, and astronomical locations.
ORGANIZATION	Examples include governments, companies, sports teams, and religions.
FACILITY	Buildings, airports, highways, bridges, and other permanent man-made structures and real estate improvements.
BRAND	Organization, group, or producer of a specific commercial item or line of products.
COMMERCIAL_ITEM	Any non-generic purchasable or acquirable item, including vehicles, and large products that had only one item produced.
MOVIE	A movie or television show. Entity could be the full name, a nickname, or a subtitle.
MUSIC	A song, full or partial. Also, collections of individual music creations, such as an album or an anthology.
BOOK	A book, published professionally or self-published.
SOFTWARE	An officially released software product.
GAME	A game, such as video games, board games, common games, or sports.
PERSONAL_TITLE	Official titles and honorifics such as President, PhD, or Dr.
EVENT	Examples include festival, concert, election, war, conference, and promotional event.
DATE	Any reference to a date or time, whether specific or general, whether absolute or relative.
QUANTITY	All measurements along with their units (currency, percent, number, bytes, etc.).
ATTRIBUTE	An attribute, characteristic, or trait of an entity, such as the "quality" of a product, the "price" of a phone, or the "speed" of a CPU.
OTHER	Entities that don't belong in any of the other categories.

## Co-reference group

Targeted sentiment identifies co-reference groups in each input document. A co-reference group is a group of mentions in a document that correspond to one real-world entity.

## Example

In the following example of a customer review, "spa" is the entity, which has entity type **FACILITY**. The entity has two additional mentions as a pronoun ("it").

```
I enjoyed visiting the spa. It was very comfortable. But it was also expensive.
```

## Output file organization

The targeted sentiment analysis job creates a JSON text output file. The file contains one JSON object for each of the input documents. Each JSON object contains the following fields:

- **Entities** – An array of entities found in the document.
- **File** – The file name of the input document.
- **Line** – If the input file is one document per line, **Entities** contains the line number of the document in the file.

The following example shows **Entities** for an input file with three lines of input. The input format is **ONE\_DOC\_PER\_LINE**, so each line of input is a document.

```
{ "Entities": [
    {entityA},
    {entityB},
    {entityC}
  ],
  "File": "TargetSentimentInputDocs.txt",
  "Line": 0
}
{ "Entities": [
    {entityD},
    {entityE}
  ],
  "File": "TargetSentimentInputDocs.txt",
  "Line": 1
}
{ "Entities": [
    {entityF},
    {entityG}
  ],
  "File": "TargetSentimentInputDocs.txt",
  "Line": 2
}
```

An entity in the **Entities** array includes a logical grouping (called a co-reference group) of the entity mentions detected in the document. Each entity has the following overall structure:

```
{"DescriptiveMentionIndex": [0],
  "Mentions": [
    {mentionD},
    {mentionE}
  ]
}
```

An entity contains these fields:

- **Mentions** – An array of mentions of the entity in the document. The array represents a co-reference group. See [the section called "Co-reference group" \(p. 18\)](#) for an example. The order of mentions in the **Mentions** array is the order of their location (offset) in the document. Each mention includes the

sentiment score and group score for that mention. The group score indicates the confidence level that these mentions belong to the same entity.

- **DescriptiveMentionIndex** – One or more index into the Mentions array that provides the best name for the entity group. For example, an entity could have three mentions with **Text** values "ABC Hotel," "ABC Hotel," and "it." The best name is "ABC Hotel," which has a DescriptiveMentionIndex value of [0,1].

Each mention includes the following fields

- **BeginOffset** – The offset into the document text where the mention begins.
- **EndOffset** – The offset into the document text where the mention ends.
- **GroupScore** – The confidence that all the entities mentioned in the group relate to the same entity.
- **Text** – The text in the document that identifies the entity.
- **Type** – The type of the entity. Amazon Comprehend supports a variety of [entity types \(p. 18\)](#).
- **Score** – Model confidence that the entity is relevant. Value range is zero to one, where one is highest confidence.
- **MentionSentiment** – Contains the sentiment and sentiment score for the mention.
- **Sentiment** – The sentiment of the mention. Values include: POSITIVE, NEUTRAL, NEGATIVE, and MIXED.
- **SentimentScore** – Provides model confidence for each of the possible sentiments. Value range is zero to one, where one is highest confidence.

The **Sentiment** values have the following meaning:

- **Positive** – The entity mention expresses a positive sentiment.
- **Negative** – The entity mention expresses a negative sentiment.
- **Mixed** – The entity mention expresses both positive and negative sentiments.
- **Neutral** – The entity mention does not express either positive or negative sentiments.

In the following example, an entity has only one mention in the input document, so the DescriptiveMentionIndex is zero (the first mention in the Mentions array). The identified entity is a PERSON with the name "I." The sentiment score is neutral.

```
{"Entities": [
  {
    "DescriptiveMentionIndex": [0],
    "Mentions": [
      {
        "BeginOffset": 0,
        "EndOffset": 1,
        "Score": 0.999997,
        "GroupScore": 1,
        "Text": "I",
        "Type": "PERSON",
        "MentionSentiment": {
          "Sentiment": "NEUTRAL",
          "SentimentScore": {
            "Mixed": 0,
            "Negative": 0,
            "Neutral": 1,
            "Positive": 0
          }
        }
      }
    ]
  }
]
```

```
        },
    ],
    "File": "Input.txt",
    "Line": 0
}
```

## Targeted sentiment example

The following example shows the output file from a targeted sentiment analysis job. The input file consists of three simple documents:

```
The burger was very flavorful and the burger bun was excellent. However, customer service
was slow.
My burger was good, and it was warm. The burger had plenty of toppings.
The burger was cooked perfectly but it was cold. The service was OK.
```

The output file from analysis of this input file

```
{"Entities":[
  {
    "DescriptiveMentionIndex": [
      0
    ],
    "Mentions": [
      {
        "BeginOffset": 4,
        "EndOffset": 10,
        "Score": 0.999991,
        "GroupScore": 1,
        "Text": "burger",
        "Type": "OTHER",
        "MentionSentiment": {
          "Sentiment": "POSITIVE",
          "SentimentScore": {
            "Mixed": 0,
            "Negative": 0,
            "Neutral": 0,
            "Positive": 1
          }
        }
      }
    ]
  },
  {
    "DescriptiveMentionIndex": [
      0
    ],
    "Mentions": [
      {
        "BeginOffset": 38,
        "EndOffset": 44,
        "Score": 1,
        "GroupScore": 1,
        "Text": "burger",
        "Type": "OTHER",
        "MentionSentiment": {
          "Sentiment": "NEUTRAL",
          "SentimentScore": {
            "Mixed": 0.000005,
            "Negative": 0.000005,
            "Neutral": 0.999591,
            "Positive": 0.000398
          }
        }
      }
    ]
  }
]
```

```
        }
    ],
},
{
  "DescriptiveMentionIndex": [
    0
  ],
  "Mentions": [
    {
      "BeginOffset": 45,
      "EndOffset": 48,
      "Score": 0.961575,
      "GroupScore": 1,
      "Text": "bun",
      "Type": "OTHER",
      "MentionSentiment": {
        "Sentiment": "POSITIVE",
        "SentimentScore": {
          "Mixed": 0.000327,
          "Negative": 0.000286,
          "Neutral": 0.050269,
          "Positive": 0.949118
        }
      }
    }
  ]
},
{
  "DescriptiveMentionIndex": [
    0
  ],
  "Mentions": [
    {
      "BeginOffset": 73,
      "EndOffset": 89,
      "Score": 0.999988,
      "GroupScore": 1,
      "Text": "customer service",
      "Type": "ATTRIBUTE",
      "MentionSentiment": {
        "Sentiment": "NEGATIVE",
        "SentimentScore": {
          "Mixed": 0.000001,
          "Negative": 0.999976,
          "Neutral": 0.000017,
          "Positive": 0.000006
        }
      }
    }
  ]
],
"File": "TargetSentimentInputDocs.txt",
"Line": 0
}
{
  "Entities": [
    {
      "DescriptiveMentionIndex": [
        0
      ],
      "Mentions": [
        {
          "BeginOffset": 0,
          "EndOffset": 2,
```

```
        "Score": 0.99995,
        "GroupScore": 1,
        "Text": "My",
        "Type": "PERSON",
        "MentionSentiment": {
            "Sentiment": "NEUTRAL",
            "SentimentScore": {
                "Mixed": 0,
                "Negative": 0,
                "Neutral": 1,
                "Positive": 0
            }
        }
    }
],
{
    "DescriptiveMentionIndex": [
        0,
        2
    ],
    "Mentions": [
        {
            "BeginOffset": 3,
            "EndOffset": 9,
            "Score": 0.999999,
            "GroupScore": 1,
            "Text": "burger",
            "Type": "OTHER",
            "MentionSentiment": {
                "Sentiment": "POSITIVE",
                "SentimentScore": {
                    "Mixed": 0.000002,
                    "Negative": 0.000001,
                    "Neutral": 0.000003,
                    "Positive": 0.999994
                }
            }
        },
        {
            "BeginOffset": 24,
            "EndOffset": 26,
            "Score": 0.999756,
            "GroupScore": 0.999314,
            "Text": "it",
            "Type": "OTHER",
            "MentionSentiment": {
                "Sentiment": "POSITIVE",
                "SentimentScore": {
                    "Mixed": 0,
                    "Negative": 0.000003,
                    "Neutral": 0.000006,
                    "Positive": 0.999991
                }
            }
        },
        {
            "BeginOffset": 41,
            "EndOffset": 47,
            "Score": 1,
            "GroupScore": 0.531342,
            "Text": "burger",
            "Type": "OTHER",
            "MentionSentiment": {
                "Sentiment": "POSITIVE",
                "SentimentScore": {
```

```

        "Mixed": 0.000215,
        "Negative": 0.000094,
        "Neutral": 0.00008,
        "Positive": 0.999611
    }
}
]
},
{
    "DescriptiveMentionIndex": [
        0
    ],
    "Mentions": [
        {
            "BeginOffset": 52,
            "EndOffset": 58,
            "Score": 0.965462,
            "GroupScore": 1,
            "Text": "plenty",
            "Type": "QUANTITY",
            "MentionSentiment": {
                "Sentiment": "NEUTRAL",
                "SentimentScore": {
                    "Mixed": 0,
                    "Negative": 0,
                    "Neutral": 1,
                    "Positive": 0
                }
            }
        }
    ]
},
{
    "DescriptiveMentionIndex": [
        0
    ],
    "Mentions": [
        {
            "BeginOffset": 62,
            "EndOffset": 70,
            "Score": 0.998353,
            "GroupScore": 1,
            "Text": "toppings",
            "Type": "OTHER",
            "MentionSentiment": {
                "Sentiment": "NEUTRAL",
                "SentimentScore": {
                    "Mixed": 0,
                    "Negative": 0,
                    "Neutral": 0.999964,
                    "Positive": 0.000036
                }
            }
        }
    ]
},
{
    "File": "TargetSentimentInputDocs.txt",
    "Line": 1
}
{
    "Entities": [
        {
            "DescriptiveMentionIndex": [
                0
            ]
        }
    ]
}

```

```

],
"Mentions": [
{
    "BeginOffset": 4,
    "EndOffset": 10,
    "Score": 1,
    "GroupScore": 1,
    "Text": "burger",
    "Type": "OTHER",
    "MentionSentiment": {
        "Sentiment": "POSITIVE",
        "SentimentScore": {
            "Mixed": 0.001515,
            "Negative": 0.000822,
            "Neutral": 0.000243,
            "Positive": 0.99742
        }
    }
},
{
    "BeginOffset": 36,
    "EndOffset": 38,
    "Score": 0.999843,
    "GroupScore": 0.999661,
    "Text": "it",
    "Type": "OTHER",
    "MentionSentiment": {
        "Sentiment": "NEGATIVE",
        "SentimentScore": {
            "Mixed": 0,
            "Negative": 0.999996,
            "Neutral": 0.000004,
            "Positive": 0
        }
    }
}
],
{
    "DescriptiveMentionIndex": [
        0
    ],
    "Mentions": [
{
    "BeginOffset": 53,
    "EndOffset": 60,
    "Score": 1,
    "GroupScore": 1,
    "Text": "service",
    "Type": "ATTRIBUTE",
    "MentionSentiment": {
        "Sentiment": "NEUTRAL",
        "SentimentScore": {
            "Mixed": 0.000033,
            "Negative": 0.000089,
            "Neutral": 0.993325,
            "Positive": 0.006553
        }
    }
}
]
},
],
"File": "TargetSentimentInputDocs.txt",
"Line": 2
}

```

}

## Syntax analysis

Use syntax analysis to parse the words from the document and return the part of speech, or syntactic function, for each word in the document. You can identify the nouns, verbs, adjectives and so on in your document. Use this information to gain a richer understanding of the content of your documents, and to understand the relationship of the words in the document.

For example, you can look for the nouns in a document and then look for the verbs related to those nouns. In a sentence like "My grandmother moved her couch" you can see the nouns, "grandmother" and "couch," and the verb, "moved." You can use this information to build applications for analyzing text for word combinations that you are interested in.

To start the analysis, Amazon Comprehend parses the source text to find the individual words in the text. After the text is parsed, each word is assigned the part of speech that it takes in the source text.

Amazon Comprehend can identify the following parts of speech.

Token	Part of speech
ADJ	Adjective  Words that typically modify nouns.
ADP	Adposition  The head of a prepositional or postpositional phrase.
ADV	Adverb  Words that typically modify verbs. They may also modify adjectives and other adverbs.
AUX	Auxiliary  Function words that accompanies the verb of a verb phrase.
CCONJ	Coordinating conjunction  A coordinating conjunction connects words, phrases, or clauses in a sentence without subordinating one to the other.
CONJ	Conjunction  A conjunction connects words, phrases, or clauses in a sentence.
DET	Determiner  Articles and other words that specify a particular noun phrase.

Token	Part of speech
INTJ	Interjection  Words used as an exclamation or part of an exclamation.
NOUN	Noun  Words that specify a person, place, thing, animal, or idea.
NUM	Numeral  Words, typically determiners, adjectives, or pronouns, that express a number.
O	Other  Words that can't be assigned a part of speech category.
PART	Particle  Function words associated with another word or phrase to impart meaning.
PRON	Pronoun  Words that substitute for nouns or noun phrases.
PROPN	Proper noun  A noun that is the name of a specific individual, place or object.
PUNCT	Punctuation  Non-alphabetical characters that delimit text.
SCONJ	Subordinating conjunction  A conjunction that joins a dependent clause to a sentence. An example of a subordinating conjunction is "because".
SYM	Symbol  Word-like entities such as the dollar sign (\$) or mathematical symbols.

Token	Part of speech
VERB	Verb  Words that signal events and actions.

For more information about the parts of speech, see [Universal POS tags](#) at the *Universal Dependencies* website.

The operations return tokens that identify the word and the part of speech that the word represents in the text. Each token represents a word in the source text. It provides the location of the word in the source, the part of speech that the word takes in the text, the confidence that Amazon Comprehend has that the part of speech was correctly identified, and the word that was parsed from the source text.

The following is the structure of the list of syntax tokens. One syntax token is generated for each word in the document.

```
{
  "SyntaxTokens": [
    {
      "BeginOffset": number,
      "EndOffset": number,
      "PartOfSpeech": {
        "Score": number,
        "Tag": "string"
      },
      "Text": "string",
      "TokenId": number
    }
  ]
}
```

Each token provides the following information:

- `BeginOffset` and `EndOffset`—Provides the location of the word in the input text.
- `PartOfSpeech`—Provides two pieces of information, the `Tag` that identifies the part of speech and the `Score` that represents the confidence that Amazon Comprehend Syntax has that the part of speech was correctly identified.
- `Text`—Provides the word that was identified.
- `TokenId`—Provides an identifier for the token. The identifier is the position of the token in the list of tokens.

## Amazon Comprehend Custom

You can customize Amazon Comprehend for your specific requirements without the skillset required to build machine learning-based NLP solutions. Using automatic machine learning, or AutoML, Comprehend Custom builds customized NLP models on your behalf, using training data that you provide.

**Custom classification** – Create custom classification models (classifiers) to organize your documents into your own categories. For each classification label, provide a set of documents that best represent that label and train your classifier on it. Once trained, a classifier can be used on any number of unlabeled document sets. You can use the console for a code-free experience or install the latest AWS SDK. For more information, see [Custom classification \(p. 100\)](#).

**Custom entity recognition** – Create custom entity recognition models (recognizers) that can analyze text for your specific terms and noun-based phrases. You can train recognizers to extract terms like policy numbers, or phrases that imply a customer escalation. To train the model, you provide a list of the entities and a set of documents that contain them. Once the model is trained, you can submit analysis jobs against it to extract their custom entities. For more information, see [Custom entity recognition \(p. 125\)](#).

## Topic modeling

You can use Amazon Comprehend to examine the content of a collection of documents to determine common themes. For example, you can give Amazon Comprehend a collection of news articles, and it will determine the subjects, such as sports, politics, or entertainment. The text in the documents doesn't need to be annotated.

Amazon Comprehend uses a [Latent dirichlet allocation](#)-based learning model to determine the topics in a set of documents. It examines each document to determine the context and meaning of a word. The set of words that frequently belong to the same context across the entire document set make up a topic.

A word is associated to a topic in a document based on how prevalent that topic is in a document and how much affinity the topic has to the word. The same word can be associated with different topics in different documents based on the topic distribution in a particular document.

For example, the word "glucose" in an article that talks predominantly about sports can be assigned to the topic "sports," while the same word in an article about "medicine" will be assigned to the topic "medicine."

Each word associated with a topic is given a weight that indicates how much the word helps define the topic. The weight is an indication of how many times the word occurs in the topic compared to other words in the topic, across the entire document set.

For the most accurate results you should provide Amazon Comprehend with the largest possible corpus to work with. For best results:

- You should use at least 1,000 documents in each topic modeling job.
- Each document should be at least 3 sentences long.
- If a document consists of mostly numeric data, you should remove it from the corpus.

Topic modeling is an asynchronous process. You submit your list of documents to Amazon Comprehend from an Amazon S3 bucket using the [StartTopicsDetectionJob \(p. 444\)](#) operation. The response is sent to an Amazon S3 bucket. You can configure both the input and output buckets. Get a list of the topic modeling jobs that you have submitted using the [ListTopicsDetectionJobs \(p. 400\)](#) operation and view information about a job using the [DescribeTopicsDetectionJob \(p. 335\)](#) operation. Content delivered to Amazon S3 buckets might contain customer content. For more information about removing sensitive data, see [How Do I Empty an S3 Bucket?](#) or [How Do I Delete an S3 Bucket?](#).

Documents must be in UTF-8 formatted text files. You can submit your documents two ways. The following table shows the options.

Format	Description
One document per file	Each file contains one input document. This is best for collections of large documents.
One document per line	The input is a single file. Each line in the file is considered a document. This is best for short documents, such as social media postings.

Format	Description
	Each line must end with a line feed (LF, \n), a carriage return (CR, \r), or both (CRLF, \r\n). The Unicode line separator (u+2028) can't be used to end a line.

For more information, see the [InputDataConfig \(p. 539\)](#) data type.

After Amazon Comprehend processes your document collection, it returns a compressed archive containing two files, `topic-terms.csv` and `doc-topics.csv`. For more information about the output file, see [OutputDataConfig \(p. 546\)](#).

The first output file, `topic-terms.csv`, is a list of topics in the collection. For each topic, the list includes, by default, the top terms by topic according to their weight. For example, if you give Amazon Comprehend a collection of newspaper articles, it might return the following to describe the first two topics in the collection:

Topic	Term	Weight
000	team	0.118533
000	game	0.106072
000	player	0.031625
000	season	0.023633
000	play	0.021118
000	yard	0.024454
000	coach	0.016012
000	games	0.016191
000	football	0.015049
000	quarterback	0.014239
001	cup	0.205236
001	food	0.040686
001	minutes	0.036062
001	add	0.029697
001	tablespoon	0.028789
001	oil	0.021254
001	pepper	0.022205
001	teaspoon	0.020040
001	wine	0.016588
001	sugar	0.015101

The weights represent a probability distribution over the words in a given topic. Since Amazon Comprehend returns only the top 10 words for each topic the weights won't sum to 1.0. In the rare cases where there are less than 10 words in a topic, the weights will sum to 1.0.

The words are sorted by their discriminative power by looking at their occurrence across all topics. Typically this is the same as their weight, but in some cases, such as the words "play" and "yard" in the table, this results in an order that is not the same as the weight.

You can specify the number of topics to return. For example, if you ask Amazon Comprehend to return 25 topics, it returns the 25 most prominent topics in the collection. Amazon Comprehend can detect up to 100 topics in a collection. Choose the number of topics based on your knowledge of the domain. It may take some experimentation to arrive at the correct number.

The second file, `doc-topics.csv`, lists the documents associated with a topic and the proportion of the document that is concerned with the topic. If you specified `ONE_DOC_PER_FILE` the document is identified by the file name. If you specified `ONE_DOC_PER_LINE` the document is identified by the file name and the 0-indexed line number within the file. For example, Amazon Comprehend might return the following for a collection of documents submitted with one document per file:

Document	Topic	Proportion
sample-doc1	000	0.999330137
sample-doc2	000	0.998532187
sample-doc3	000	0.998384574
...		
sample-docN	000	3.57E-04

Amazon Comprehend utilizes information from the *Lemmatization Lists Dataset by MBM*, which is made available [here](#) under the [Open database license \(ODbL\) v1.0](#).

## Document processing modes

Amazon Comprehend supports three document processing modes. Your choice of mode depends on the number documents you need to process and how immediately you need to view the results:

- **Single-document synchronous** – You call Amazon Comprehend with a single document and receive a synchronous response, delivered to your application (or the console) right away.
- **Multi-document synchronous** – You call the Amazon Comprehend API with a collection of up to 25 documents and receive a synchronous response.
- **Asynchronous batch** – For a large collection of documents, put the documents into an Amazon S3 bucket and start an asynchronous job (using console or API operations) to analyze the documents. Amazon Comprehend stores the results of the analysis in the S3 bucket/folder that you specify in the request.

### Topics

- [Single-document processing \(p. 32\)](#)
- [Multiple document synchronous processing \(p. 32\)](#)
- [Asynchronous batch processing \(p. 34\)](#)

## Single-document processing

Single-document operations are synchronous operations that return the results of the document analysis directly to your application. Use single-document synchronous operations when you are creating an interactive application that works on one document at a time.

For more information about the synchronous API operations, see [Real-time analysis using the built-in models \(p. 40\)](#) (for console) and [Real-time analysis using the API \(p. 50\)](#).

## Multiple document synchronous processing

When you have multiple documents that you want to process, you can use the `Batch*` API operations to send more than one document to Amazon Comprehend at a time. You can send up to 25 documents in each request. Amazon Comprehend sends back a list of responses, one for each document in the request. Requests made with these operations are synchronous. Your application calls the operation and then waits for the response from the service.

Using the `Batch*` operations is identical to calling the single document APIs for each of the documents in the request. Using these APIs can result in better performance for your applications.

The input to each of the APIs is a JSON structure containing the documents to process. For all operations except `BatchDetectDominantLanguage`, you must set the input language. You can set only one input language for each request. For example, the following is the input to the `BatchDetectEntities` operation. It contains two documents and is in English.

```
{  
    "LanguageCode": "en",  
    "TextList": [  
        "I have been living in Seattle for almost 4 years",  
        "It is raining today in Seattle"  
    ]  
}
```

The response from a `Batch*` operation contains two lists, the `ResultList` and the `ErrorList`. The `ResultList` contains one record for each document that was successfully processed. The result for each document in the request is identical to the result you would get if you ran a single document operation on the document. The results for each document are assigned an index based on the order of the documents in the input file. The response from the `BatchDetectEntities` operation is:

```
{  
    "ResultList" : [  
        {  
            "Index": 0,  
            "Entities": [  
                {  
                    "Text": "Seattle",  
                    "Score": 0.95,  
                    "Type": "LOCATION",  
                    "BeginOffset": 22,  
                    "EndOffset": 29  
                },  
                {  
                    "Text": "almost 4 years",  
                    "Score": 0.89,  
                    "Type": "QUANTITY",  
                    "BeginOffset": 34,  
                    "EndOffset": 48  
                }  
            ]  
        }  
    ]
```

```

},
{
  "Index": 1,
  "Entities": [
    {
      "Text": "today",
      "Score": 0.87,
      "Type": "DATE",
      "BeginOffset": 14,
      "EndOffset": 19
    },
    {
      "Text": "Seattle",
      "Score": 0.96,
      "Type": "LOCATION",
      "BeginOffset": 23,
      "EndOffset": 30
    }
  ]
},
"ErrorList": []
}

```

When an error occurs in the request the response contains an `ErrorList` that identifies the documents that contained an error. The document is identified by its index in the input list. For example, the following input to the `BatchDetectLanguage` operation contains a document that cannot be processed:

```

{
  "TextList": [
    "hello friend",
    "$$$$$$",
    "hola amigo"
  ]
}

```

The response from Amazon Comprehend includes an error list that identifies the document that contained an error:

```

{
  "ResultList": [
    {
      "Index": 0,
      "Languages": [
        {
          "LanguageCode": "en",
          "Score": 0.99
        }
      ]
    },
    {
      "Index": 2,
      "Languages": [
        {
          "LanguageCode": "es",
          "Score": 0.82
        }
      ]
    }
  ],
  "ErrorList": [
    {

```

```
        "Index": 1,  
        "ErrorCode": "InternalServerException",  
        "ErrorMessage": "Unexpected Server Error. Please try again."  
    }  
]  
}
```

For more information about the synchronous batch API operations, see [Real-time batch APIs \(p. 63\)](#).

## Asynchronous batch processing

To analyze large documents and large collections of documents, use the Amazon Comprehend asynchronous operations.

To analyze a collection of documents, you typically perform the following steps:

1. Store the documents in an Amazon S3 bucket.
2. Start one or more analysis jobs to analyze the documents.
3. Monitor the progress of the analysis jobs.
4. Retrieve the results of the analysis from an S3 bucket when the job is complete.

For more information about using the asynchronous API operations, see [Running analysis jobs using the console \(p. 47\)](#) (console) and [Async analysis jobs using the API \(p. 68\)](#).

# Languages supported in Amazon Comprehend

Amazon Comprehend supports a wide variety of languages for its various features. The languages supported and the features that support them can be seen in the following tables.

## Topics

- [Supported languages \(p. 35\)](#)
- [Languages supported by Amazon Comprehend features \(p. 36\)](#)

## Supported languages

Amazon Comprehend (except the **detect dominant language** feature) supports the following languages for one or more features.

Code	Language
de	German
en	English
es	Spanish
it	Italian
pt	Portuguese
fr	French
ja	Japanese
ko	Korean
hi	Hindi
ar	Arabic
zh	Chinese (simplified)
zh-TW	Chinese (traditional)

### Note

Amazon Comprehend identifies the language using identifiers from RFC 5646 — if there is a 2-letter ISO 639-1 identifier, with a regional subtag if necessary, it uses that. Otherwise, it uses the ISO 639-2 3-letter code. For more information about RFC 5646, see the *IETF Tools* web site.

# Languages supported by Amazon Comprehend features

Feature	Supported languages
Dominant language (p. 12)	See <a href="#">Dominant language (p. 12)</a> .
Entities (p. 5)	All supported languages.
Key phrases (p. 11)	All supported languages.
Detecting PII entities (p. 83)	English.
Labeling PII entities (p. 88)	English.
Sentiment (p. 16)	All supported languages.
Targeted sentiment (p. 17)	English.
Syntax analysis (p. 26)	German (de), English (en), Spanish (es), French (fr), Italian (it), and Portuguese (pt).
Topic modeling (p. 29)	Not dependent on the language used. Does not support character-based languages such as Chinese, Japanese, and Korean.
Custom classification (p. 100)	German (de), English (en), Spanish (es), French (fr), Italian (it), and Portuguese (pt).
Custom entity recognition (p. 125)	German (de), English (en), Spanish (es), French (fr), Italian (it), and Portuguese (pt).

# Setting up

Before you use Amazon Comprehend for the first time, complete the following tasks.

## Setting up tasks

- [Sign up for AWS \(p. 37\)](#)
- [Create an IAM user \(p. 37\)](#)
- [Set up the AWS Command Line Interface \(AWS CLI\) \(p. 38\)](#)

## Sign up for AWS

When you sign up for Amazon Web Services (AWS), your AWS account is automatically signed up for all AWS services, including Amazon Comprehend. You are charged only for the services that you use.

With Amazon Comprehend, you pay only for the resources that you use. If you are a new AWS customer, you can get started with Amazon Comprehend for free. For more information, see [AWS free usage tier](#).

If you already have an AWS account, skip to the next section.

### To create an AWS account

1. Open <https://portal.aws.amazon.com/billing/signup>.
2. Follow the online instructions.

Part of the sign-up procedure involves receiving a phone call and entering a verification code on the phone keypad.

Record your AWS account ID because you'll need it for the next task.

## Create an IAM user

Services in AWS, such as Amazon Comprehend, require that you provide credentials when you access them. This allows the service to determine whether you have permissions to access the service's resources.

We strongly recommend that you access AWS using AWS Identity and Access Management (IAM), not the credentials for your AWS account. To use IAM to access AWS, create an IAM user, add the user to an IAM group with administrative permissions, and then grant administrative permissions to the IAM user. You can then access AWS using a special URL and the IAM user's credentials.

The Getting Started exercises in this guide assume that you have a user with administrator privileges, `adminuser`.

### To create an administrator user and sign in to the console

1. Create an administrator user called `adminuser` in your AWS account. For instructions, see [Creating your first IAM user and administrators group](#) in the *IAM User Guide*.
2. Sign in to the AWS Management Console using a special URL. For more information, see [How users sign in to Your Account](#) in the *IAM User Guide*.

For more information about IAM, see the following:

- [AWS Identity and Access Management \(IAM\)](#)
- [Getting started](#)
- [IAM User Guide](#)

## Set up the AWS Command Line Interface (AWS CLI)

You don't need the AWS CLI to perform the steps in the Getting Started exercises. However, some of the other exercises in this guide do require it. If you prefer, you can skip this step and go to [Getting started with Amazon Comprehend \(p. 39\)](#), and set up the AWS CLI later.

### To set up the AWS CLI

1. Download and configure the AWS CLI. For instructions, see the following topics in the *AWS Command Line Interface User Guide*:
  - [Getting set up with the AWS Command Line Interface](#)
  - [Configuring the AWS Command Line Interface](#)
2. In the AWS CLI config file, add a named profile for the administrator user:.

```
[profile adminuser]
aws_access_key_id = adminuser access key ID
aws_secret_access_key = adminuser secret access key
region = aws-region
```

You use this profile when executing the AWS CLI commands. For more information about named profiles, see [Named profiles](#) in the *AWS Command Line Interface User Guide*. For a list of AWS Regions, see [Regions and endpoints](#) in the *Amazon Web Services General Reference*.

3. Verify the setup by typing the following help command at the command prompt:

```
aws help
```

# Getting started with Amazon Comprehend

The following exercise uses the Amazon Comprehend console to create and run an asynchronous entity detection job.

## To create a entity detection job

1. Sign in to the AWS Management Console and open the [Amazon Comprehend console](#).
2. From the left menu, choose **Analysis Jobs** and then choose **Create job**.
3. Under **Job settings**, give the job a name. The name must be unique within the region and account.
4. For **Analysis Type**, choose **Entities**.
5. Under **Input data**, for **Data source**, choose **Example documents**. The console sets the S3 location to be the folder containing the public samples.
6. In the **Choose an IAM role** section, select **Create a new IAM role**. The console creates a new IAM role with the proper permissions for Amazon Comprehend to access the input and output buckets.
7. When you have finished filling out the form, choose **Create job** to create and start the topic detection job.

The new job appears in the job list with the status field showing the status of the job. The field can be **IN\_PROGRESS** for a job that is processing, **COMPLETED** for a job that has finished successfully, and **FAILED** for a job that has an error.

8. Choose the job to open the **Job details** panel.
9. Under **Output**, in **Output data location** choose the link to open the Amazon S3 console.
10. In the Amazon S3 console, choose **Download** and save the **output.tar.gz** file.
11. Decompress the file and save it as a Json file.
12. See [the section called “Entities” \(p. 5\)](#) for a description of the entity types and the fields for each detected entity.

# Analysis using the Amazon Comprehend console

You can use the Amazon Comprehend console to analyze documents in real-time or to run asynchronous analysis jobs.

Using real-time analysis with built-in models, you can recognize entities, extract key phrases, detect primary language, detect PII, determine sentiment, and analyze syntax.

You can run analysis jobs using the built-in models to find insights such as entities, events, phrases, primary language, sentiment, targeted sentiment, and personally identifiable information (PII). You can also run topic-modeling jobs.

The console also supports real-time and asynchronous analysis using custom models. For more information, see [Custom classification \(p. 100\)](#) and [Custom entity recognition \(p. 125\)](#).

## Topics

- [Real-time analysis using the built-in models \(p. 40\)](#)
- [Running analysis jobs using the console \(p. 47\)](#)

## Real-time analysis using the built-in models

You can use the Amazon Comprehend console to analyze the contents of a document up to 5,000 characters long. The document can be English or one of the other languages supported by Amazon Comprehend. The results are shown in the console so that you can review the analysis.

To start analyzing documents, sign in to the AWS Management Console and open the [Amazon Comprehend console](#).

You can replace the sample text with your own text and then choose **Analyze** to get an analysis of your text. Below the text being analyzed, the **Results** pane shows more information about the text.

### Run real-time analysis using the built-in model

1. Sign in to the AWS Management Console and open the [Amazon Comprehend console](#).
2. From the left menu, choose **Real-time analysis**.
3. Under **Input type**, choose **Built-in** for **Analysis type**.
4. Enter the text you want to analyze.
5. Choose **Analyze**. The console displays the text analysis results in the **Insights** panel. The **Insights** panel includes a tab for each of the insight types. The following sections describe the results for insight type.

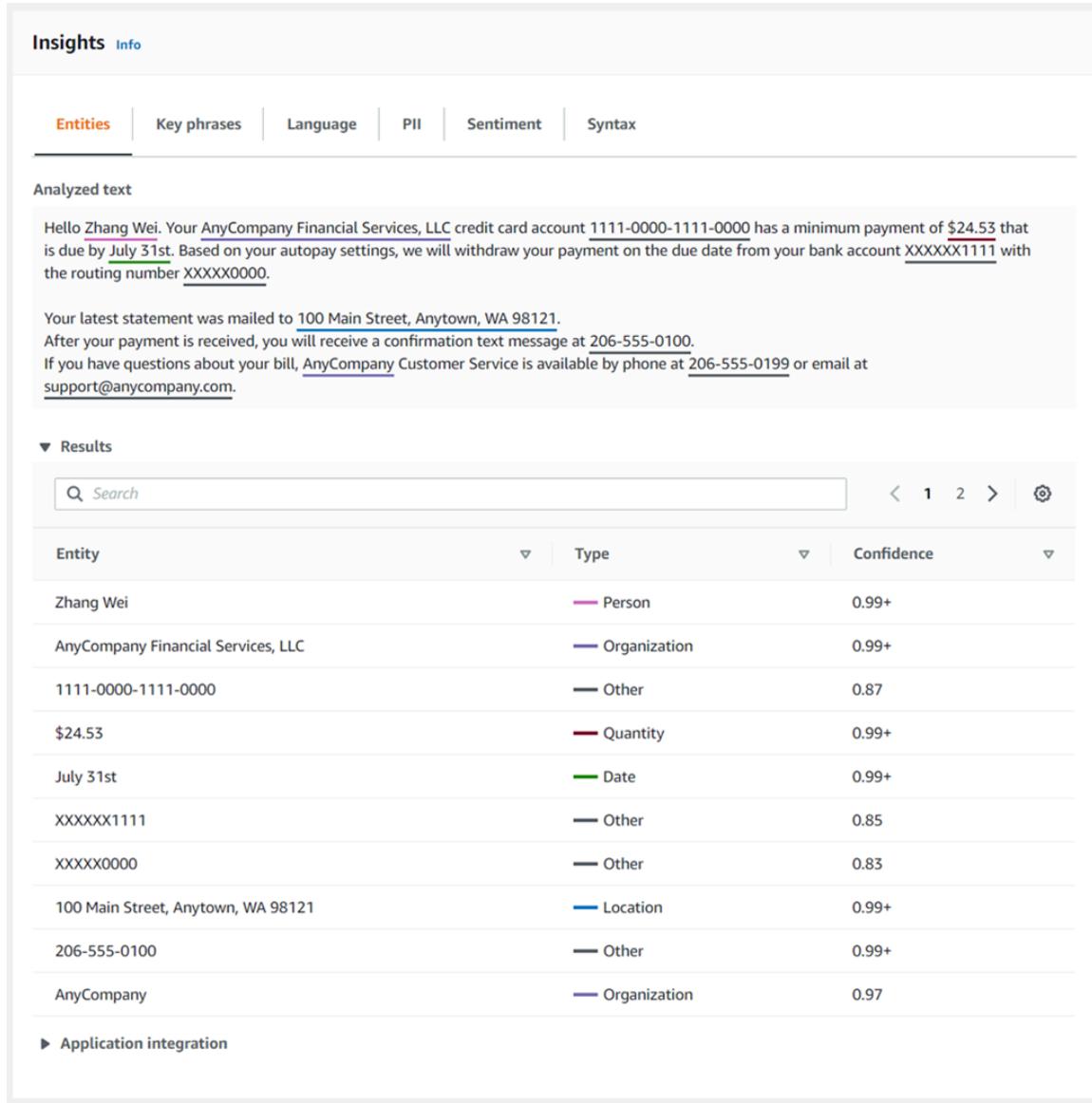
## Topics

- [Entities \(p. 41\)](#)
- [Key phrases \(p. 41\)](#)
- [Language \(p. 42\)](#)

- [Personally identifiable information \(PII\) \(p. 43\)](#)
- [Sentiment \(p. 45\)](#)
- [Syntax \(p. 46\)](#)

## Entities

The **Entities** tab lists each entity, its category, and the level of confidence that Amazon Comprehend has detected in the input text. The results are color-coded to indicate different entity types such as organizations, locations, dates, and persons. For more information, see [Entities \(p. 5\)](#).



The screenshot shows the 'Entities' tab selected in the 'Insights' interface. The analyzed text is a credit card statement from 'AnyCompany Financial Services, LLC'. The results table lists entities with their types and confidence levels:

Entity	Type	Confidence
Zhang Wei	Person	0.99+
AnyCompany Financial Services, LLC	Organization	0.99+
1111-0000-1111-0000	Other	0.87
\$24.53	Quantity	0.99+
July 31st	Date	0.99+
XXXXXX1111	Other	0.85
XXXXX0000	Other	0.83
100 Main Street, Anytown, WA 98121	Location	0.99+
206-555-0100	Other	0.99+
AnyCompany	Organization	0.97

## Key phrases

The **Key phrases** tab lists key noun phrases that Amazon Comprehend detected in the input text and the associated confidence level. For more information, see [Key phrases \(p. 11\)](#).

The screenshot shows the 'Key phrases' tab selected in the navigation bar. Below it, the analyzed text is displayed, followed by a list of key phrases and their confidence scores.

Analyzed text:

Hello Zhang Wei. Your AnyCompany Financial Services, LLC credit card account 1111-0000-1111-0000 has a minimum payment of \$24.53 that is due by July 31st. Based on your autopay settings, we will withdraw your payment on the due date from your bank account XXXXXX1111 with the routing number XXXXX0000.

Your latest statement was mailed to 100 Main Street, Anytown, WA 98121.  
After your payment is received, you will receive a confirmation text message at 206-555-0100.  
If you have questions about your bill, AnyCompany Customer Service is available by phone at 206-555-0199 or email at support@anycompany.com.

▼ Results

Key phrases	Confidence
Zhang Wei	0.83
Your AnyCompany Financial Services	0.99+
LLC credit card	0.99+
1111-0000-1111-0000	0.72
a minimum payment	0.99+
\$24.53	0.99+
July 31st	0.99+
your autopay settings	0.99+
your payment	0.99+
the due date	0.99+

► Application integration

## Language

The **Language** tab shows the dominant language of the text and Amazon Comprehend's level of confidence that it has detected the dominant language correctly. Amazon Comprehend can recognize 100 languages. For more information, see [Dominant language \(p. 12\)](#).

The screenshot shows the 'Language' tab selected in the top navigation bar. The analyzed text is a credit card statement in English. The Language section shows 'English, en' with 0.98 confidence. There are sections for Results and Application integration.

## Personally identifiable information (PII)

The **PII** tab lists entities in your input text that contain personally identifiable information (PII). A PII entity is a textual reference to personal data that could be used to identify an individual, such as an address, bank account number, or phone number. For more information, see [Detecting PII entities \(p. 83\)](#).

The **PII** tab provides two analysis modes:

- Offsets
- Labels

### Offsets

The **Offsets** analysis mode identifies the location of PII in your text documents. For more information, see [Locate PII entities \(p. 83\)](#).

**Insights Info**

Entities | Key phrases | Language | **PII** | Sentiment | Syntax

Personally identifiable information (PII) analysis mode

**Offsets**  
Identify the location of PII in your text documents.

**Labels**  
Label text documents with PII.

Analyzed text

Hello Zhang Wei. Your AnyCompany Financial Services, LLC credit card account 1111-0000-1111-0000 has a minimum payment of \$24.53 that is due by July 31st. Based on your autopay settings, we will withdraw your payment on the due date from your bank account XXXXXX1111 with the routing number XXXXX0000.

Your latest statement was mailed to 100 Main Street, Anytown, WA 98121. After your payment is received, you will receive a confirmation text message at 206-555-0100. If you have questions about your bill, AnyCompany Customer Service is available by phone at 206-555-0199 or email at support@anycompany.com.

▼ Results

Entity	Type	Confidence
Zhang Wei	Name	0.99+
1111-0000-1111-0000	Bank account number	0.93
July 31st	Date time	0.99+
XXXXXX1111	Bank account number	0.99+
XXXXX0000	Bank routing	0.99+
100 Main Street, Anytown, WA 98121	Address	0.99+
206-555-0100	Phone	0.99+
206-555-0199	Phone	0.99+
support@anycompany.com	Email	0.99+

► Application integration

## Labels

The **Labels** analysis mode checks for the presence of PII in your text document and returns the labels of identified PII entity types. For more information, see [Labeling PII entities \(p. 88\)](#).

The screenshot shows the Amazon Comprehend Insights interface. At the top, there are tabs: Entities, Key phrases, Language, PII (which is highlighted in orange), Sentiment, and Syntax. Below the tabs, it says "Personally identifiable information (PII) analysis mode". There are two options: "Offsets" (radio button) and "Labels" (radio button, which is selected). The "Labels" option is described as "Label text documents with PII". Under the "Results" section, there is a search bar and navigation controls (< 1 >). A table lists the results:

Type	Confidence
Email	0.99+
Address	0.99+
Bank routing	0.76
Phone	0.76

Below the table, there is a link labeled "► Application integration".

## Sentiment

The **Sentiment** tab shows the dominant sentiment of the text. Sentiment can be rated neutral, positive, negative, or mixed. In this case, each sentiment has a confidence rating, providing an estimate by Amazon Comprehend for that sentiment being dominant. For more information, see [Sentiment \(p. 16\)](#). Real-time analysis does not provide targeted sentiment.

The screenshot shows the 'Syntax' tab selected in the navigation bar. Below the tab, there is a section titled 'Analyzed text' containing a sample credit card statement. At the bottom of the analyzed text section, there is a '▼ Results' button followed by a 'Sentiment' table. To the right of the table, there is a '► Application integration' button.

Sentiment	Neutral 0.99 confidence	Positive 0.00 confidence	Negative 0.00 confidence	Mixed 0.00 confidence
-----------	----------------------------	-----------------------------	-----------------------------	--------------------------

## Syntax

The **Syntax** tab shows a breakdown of each element in the text, along with its part of speech and the associated confidence score. For more information, see [Syntax analysis \(p. 26\)](#).

The screenshot shows the 'Syntax' tab selected in the 'Insights' interface. The analyzed text is a statement about a credit card payment. The results table lists tokens with their part of speech and confidence scores.

Word	Part of speech	Confidence
Hello	Interjection	0.98
Zhang	Proper noun	0.99+
Wei	Proper noun	0.99+
.	Punctuation	0.99+
Your	Pronoun	0.99+
AnyCompany	Proper noun	0.99+
Financial	Proper noun	0.99+
Services	Proper noun	0.99+
,	Punctuation	0.99+
LLC	Proper noun	0.98

## Running analysis jobs using the console

You can use the Amazon Comprehend console to create and manage asynchronous analysis jobs. Your job analyzes documents stored in Amazon S3 to find entities such as events, phrases, primary language, sentiment, or personally identifiable information (PII).

### To create an analysis job

1. Sign in to the AWS Management Console and open the [Amazon Comprehend console](#).
2. From the left menu, choose **Analysis jobs** and then choose **Create job**.
3. Under **Job settings**, give the analysis job a unique name.
4. For **Analysis type**, choose one of the **Built-in** analysis types.

If you choose **Primary language**, **Personally identifiable information (PII)**, or **Topic modeling**, you can skip the next step.

5. Depending on the **Analysis type** that you choose, the console displays one or more of the following additional fields:
  - **Language** is required for all built-in analysis types except **Primary language** and **Topic modeling**.

Choose the language of your input documents.
  - **Target event types** is required for the **Events** analysis type.

Select the types of events to detect in your input documents. For more information about supported event types, see [Event types \(p. 8\)](#).
  - **PII detection settings** is required for the **PII** analysis type.

Select the output mode. For more information about PII detection settings, see [Detecting PII entities \(p. 83\)](#).
6. Under **Input data**, specify where the input documents are located in Amazon S3:
  - To analyze your own documents, choose **My documents**, and choose **Browse S3** to provide the path to the bucket or folder that contains your files.
  - To analyze samples that are provided by Amazon Comprehend, choose **Example documents**. In this case, Amazon Comprehend uses a bucket that is managed by AWS, and you don't specify the location.
7. (Optional) For **Input format**, specify one of the following formats for your input files:
  - **One document per file** – Each file contains one input document. This is best for collections of large documents.
  - **One document per line** – The input is one or more files. Each line in a file is considered a document. This is best for short documents, such as social media postings. Each line must end with a line feed (LF, \n), a carriage return (CR, \r), or both (CRLF, \r\n). You can't use the UTF-8 line separator (u+2028) to end a line.
8. Under **Output data**, choose **Browse S3**. Choose the Amazon S3 bucket or folder where you want Amazon Comprehend to write the output data that is produced by the analysis.
9. (Optional) To encrypt the output result from your job, choose **Encryption**. Then, choose whether to use a KMS key associated with the current account or one from another account:
  - If you are using a key associated with the current account, choose the key alias or ID for **KMS key ID**.
  - If you are using a key associated with a different account, enter the ARN for the key alias or ID under **KMS key ID**.

**Note**

For more information on creating and using KMS keys and the associated encryption, see [Key management service \(KMS\)](#).

10. Under **Access permissions**, provide an IAM role that:
  - Grants read access to the Amazon S3 location of your input documents.
  - Grants write access to the Amazon S3 location of your output documents.
  - Includes a trust policy that allows the comprehend.amazonaws.com service principal to assume the role and gain its permissions.

If you don't already have an IAM role with these permissions and an appropriate trust policy, choose [Create an IAM role](#) to create one.

11. When you have finished filling out the form, choose **Create job** to create and start the topic detection job.

The new job appears in the job list with the status field showing the status of the job. The field can be `IN_PROGRESS` for a job that is processing, `COMPLETED` for a job that has finished successfully, and `FAILED` for a job that has an error. You can click on a job to get more information about the job, including any error messages.

When the job is completed, Amazon Comprehend stores the analysis results in the output Amazon S3 location that you specified for the job. For a description of the analysis results for each insight type, see [Insights \(p. 4\)](#).

# Using the Amazon Comprehend API

The Amazon Comprehend API supports operations to perform real-time (synchronous) analysis and operations to start and manage asynchronous analysis jobs.

You can use the Amazon Comprehend API operators directly, or you can use the CLI or one of the SDKs. The examples in this chapter use the CLI, the Python SDK, and Java SDK.

To run the AWS CLI and Python examples, you must install the AWS CLI. For more information, see [Set up the AWS Command Line Interface \(AWS CLI\) \(p. 38\)](#).

To run the Java examples, you must install the AWS SDK for Java. For instructions for installing the SDK for Java, see [Set up the AWS SDK for Java](#).

## Topics

- [Real-time analysis using the API \(p. 50\)](#)
- [Async analysis jobs using the API \(p. 68\)](#)

## Real-time analysis using the API

The following examples demonstrate how to use Amazon Comprehend API for real-time analysis, using the AWS CLI, Java, and Python. Use the examples to learn about the Amazon Comprehend synchronous operations and as building blocks for your own applications.

## Topics

- [Detecting the dominant language \(p. 50\)](#)
- [Detecting named entities \(p. 53\)](#)
- [Detecting key phrases \(p. 55\)](#)
- [Determining sentiment \(p. 57\)](#)
- [Detecting syntax \(p. 60\)](#)
- [Real-time batch APIs \(p. 63\)](#)

## Detecting the dominant language

To determine the dominant language used in text, use the Amazon Comprehend [DetectDominantLanguage \(p. 338\)](#) operation. To detect the dominant language in up to 25 documents in a batch, use the [BatchDetectDominantLanguage \(p. 257\)](#) operation. For more information, see [Real-time batch APIs \(p. 63\)](#).

## Topics

- [Detecting the dominant language using the AWS Command Line Interface \(p. 51\)](#)
- [Detecting the dominant language using the AWS SDK for Java \(p. 51\)](#)
- [Detecting the dominant language using the AWS SDK for Python \(Boto\) \(p. 52\)](#)
- [Detecting the dominant language using the AWS SDK for .NET \(p. 52\)](#)

## Detecting the dominant language using the AWS Command Line Interface

The following example demonstrates using the `DetectDominantLanguage` operation with the AWS CLI.

The example is formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

```
aws comprehend detect-dominant-language \
--region region \
--text "It is raining today in Seattle."
```

Amazon Comprehend responds with the following:

```
{
  "Languages": [
    {
      "LanguageCode": "en",
      "Score": 0.9793661236763
    }
  ]
}
```

## Detecting the dominant language using the AWS SDK for Java

The following example uses the `DetectDominantLanguage` operation with Java.

```
import com.amazonaws.auth.AWS CredentialsProvider;
import com.amazonaws.auth.DefaultAWSCredentialsProviderChain;
import com.amazonaws.services.comprehend.AmazonComprehend;
import com.amazonaws.services.comprehend.AmazonComprehendClientBuilder;
import com.amazonaws.services.comprehend.model.DetectDominantLanguageRequest;
import com.amazonaws.services.comprehend.model.DetectDominantLanguageResult;

public class App
{
    public static void main( String[] args )
    {

        String text = "It is raining today in Seattle";

        // Create credentials using a provider chain. For more information, see
        // https://docs.aws.amazon.com/sdk-for-java/v1/developer-guide/credentials.html
        AWSCredentialsProvider awsCreds = DefaultAWSCredentialsProviderChain.getInstance();

        AmazonComprehend comprehendClient =
            AmazonComprehendClientBuilder.standard()
                .withCredentials(awsCreds)
                .withRegion("region")
                .build();

        // Call detectDominantLanguage API
        System.out.println("Calling DetectDominantLanguage");
        DetectDominantLanguageRequest detectDominantLanguageRequest = new
        DetectDominantLanguageRequest().withText(text);
        DetectDominantLanguageResult detectDominantLanguageResult =
            comprehendClient.detectDominantLanguage(detectDominantLanguageRequest);
        detectDominantLanguageResult.getLanguages().forEach(System.out::println);
    }
}
```

```
        System.out.println("Calling DetectDominantLanguage\n");
        System.out.println("Done");
    }
```

## Detecting the dominant language using the AWS SDK for Python (Boto)

The following example demonstrates using the `DetectDominantLanguage` operation with Python.

```
import boto3
import json

comprehend = boto3.client(service_name='comprehend', region_name='region')
text = "It is raining today in Seattle"

print('Calling DetectDominantLanguage')
print(json.dumps(comprehend.detect_dominant_language(Text = text), sort_keys=True,
    indent=4))
print("End of DetectDominantLanguage\n")
```

## Detecting the dominant language using the AWS SDK for .NET

The .NET example in this section uses the [AWS SDK for .NET](#). You can use the [AWS Toolkit for Visual Studio](#) to develop AWS applications using .NET. It includes helpful templates and the AWS Explorer for deploying applications and managing services. For a .NET developer perspective of AWS, see the [AWS guide for .NET developers](#).

```
using System;
using Amazon.Comprehend;
using Amazon.Comprehend.Model;

namespace Comprehend
{
    class Program
    {
        static void Main(string[] args)
        {
            String text = "It is raining today in Seattle";

            AmazonComprehendClient comprehendClient = new
            AmazonComprehendClient(Amazon.RegionEndpoint.USWest2);

            // Call DetectDominantLanguage API
            Console.WriteLine("Calling DetectDominantLanguage\n");
            DetectDominantLanguageRequest detectDominantLanguageRequest = new
            DetectDominantLanguageRequest()
            {
                Text = text
            };
            DetectDominantLanguageResponse detectDominantLanguageResponse =
            comprehendClient.DetectDominantLanguage(detectDominantLanguageRequest);
            foreach (DominantLanguage dl in detectDominantLanguageResponse.Languages)
                Console.WriteLine("Language Code: {0}, Score: {1}", dl.LanguageCode,
                    dl.Score);
            Console.WriteLine("Done");
        }
    }
}
```

## Detecting named entities

To determine the named entities in a document, use the Amazon Comprehend [DetectEntities \(p. 341\)](#) operation. To detect entities in up to 25 documents in a batch, use the [BatchDetectEntities \(p. 260\)](#) operation. For more information, see [Real-time batch APIs \(p. 63\)](#).

### Topics

- [Detecting named entities using the AWS Command Line Interface \(p. 53\)](#)
- [Detecting named entities using the AWS SDK for Java \(p. 53\)](#)
- [Detecting named entities using the AWS SDK for Python \(Boto\) \(p. 54\)](#)
- [Detecting entities using the AWS SDK for .NET \(p. 54\)](#)

## Detecting named entities using the AWS Command Line Interface

The following example demonstrates using the `DetectEntities` operation using the AWS CLI. You must specify the language of the input text.

The example is formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

```
aws comprehend detect-entities \
    --region region \
    --language-code "en" \
    --text "It is raining today in Seattle."
```

Amazon Comprehend responds with the following:

```
{
  "Entities": [
    {
      "Text": "today",
      "Score": 0.97,
      "Type": "DATE",
      "BeginOffset": 14,
      "EndOffset": 19
    },
    {
      "Text": "Seattle",
      "Score": 0.95,
      "Type": "LOCATION",
      "BeginOffset": 23,
      "EndOffset": 30
    }
  ],
  "LanguageCode": "en"
}
```

## Detecting named entities using the AWS SDK for Java

The following example uses the `DetectEntities` operation with Java. You must specify the language of the input text.

```
import com.amazonaws.auth.AWSStaticCredentialsProvider;
import com.amazonaws.auth.DefaultAWSCredentialsProviderChain;
import com.amazonaws.services.comprehend.AmazonComprehend;
```

```

import com.amazonaws.services.comprehend.AmazonComprehendClientBuilder;
import com.amazonaws.services.comprehend.model.DetectEntitiesRequest;
import com.amazonaws.services.comprehend.model.DetectEntitiesResult;

public class App
{
    public static void main( String[] args )
    {

        String text = "It is raining today in Seattle";

        // Create credentials using a provider chain. For more information, see
        // https://docs.aws.amazon.com/sdk-for-java/v1/developer-guide/credentials.html
        AWS CredentialsProvider awsCreds = DefaultAWSCredentialsProviderChain.getInstance();

        AmazonComprehend comprehendClient =
            AmazonComprehendClientBuilder.standard()
                .withCredentials(awsCreds)
                .withRegion("region")
                .build();

        // Call detectEntities API
        System.out.println("Calling DetectEntities");
        DetectEntitiesRequest detectEntitiesRequest = new
        DetectEntitiesRequest().withText(text)

        .withLanguageCode("en");
        DetectEntitiesResult detectEntitiesResult =
        comprehendClient.detectEntities(detectEntitiesRequest);
        detectEntitiesResult.getEntities().forEach(System.out::println);
        System.out.println("End of DetectEntities\n");
    }
}

```

## Detecting named entities using the AWS SDK for Python (Boto)

The following example uses the `DetectEntities` operation with Python. You must specify the language of the input text.

```

import boto3
import json

comprehend = boto3.client(service_name='comprehend', region_name='region')
text = "It is raining today in Seattle"

print('Calling DetectEntities')
print(json.dumps(comprehend.detect_entities(Text=text, LanguageCode='en'), sort_keys=True,
    indent=4))
print('End of DetectEntities\n')

```

## Detecting entities using the AWS SDK for .NET

The .NET example in this section uses the [AWS SDK for .NET](#). You can use the [AWS Toolkit for Visual Studio](#) to develop AWS applications using .NET. It includes helpful templates and the AWS Explorer for deploying applications and managing services. For a .NET developer perspective of AWS, see the [AWS guide for .NET developers](#).

```

using System;
using Amazon.Comprehend;
using Amazon.Comprehend.Model;

namespace Comprehend

```

```

{
    class Program
    {
        static void Main(string[] args)
        {
            String text = "It is raining today in Seattle";

            AmazonComprehendClient comprehendClient = new
            AmazonComprehendClient(Amazon.RegionEndpoint.USWest2);

            // Call DetectEntities API
            Console.WriteLine("Calling DetectEntities\n");
            DetectEntitiesRequest detectEntitiesRequest = new DetectEntitiesRequest()
            {
                Text = text,
                LanguageCode = "en"
            };
            DetectEntitiesResponse detectEntitiesResponse =
            comprehendClient.DetectEntities(detectEntitiesRequest);
            foreach (Entity e in detectEntitiesResponse.Entities)
                Console.WriteLine("Text: {0}, Type: {1}, Score: {2}, BeginOffset: {3},
EndOffset: {4}",
                    e.Text, e.Type, e.Score, e.BeginOffset, e.EndOffset);
            Console.WriteLine("Done");
        }
    }
}

```

## Detecting key phrases

To determine the key noun phrases used in text, use the Amazon Comprehend [DetectKeyPhrases \(p. 345\)](#) operation. To detect the key noun phrases in up to 25 documents in a batch, use the [BatchDetectKeyPhrases \(p. 263\)](#) operation. For more information, see [Real-time batch APIs \(p. 63\)](#).

### Topics

- [Detecting key phrases using the AWS Command Line Interface \(p. 55\)](#)
- [Detecting key phrases using the AWS SDK for Java \(p. 56\)](#)
- [Detecting key phrases using the AWS SDK for Python \(Boto\) \(p. 56\)](#)
- [Detecting key phrases using the AWS SDK for .NET \(p. 57\)](#)

## Detecting key phrases using the AWS Command Line Interface

The following example demonstrates using the `DetectKeyPhrases` operation with the AWS CLI. You must specify the language of the input text.

The example is formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

```
aws comprehend detect-key-phrases \
--region region \
--language-code "en" \
--text "It is raining today in Seattle."
```

Amazon Comprehend responds with the following:

```
{
    "LanguageCode": "en",
```

```
"KeyPhrases": [
    {
        "Text": "today",
        "Score": 0.89,
        "BeginOffset": 14,
        "EndOffset": 19
    },
    {
        "Text": "Seattle",
        "Score": 0.91,
        "BeginOffset": 23,
        "EndOffset": 30
    }
]
```

## Detecting key phrases using the AWS SDK for Java

The following example uses the `DetectKeyPhrases` operation with Java. You must specify the language of the input text.

```
import com.amazonaws.auth.AWSStaticCredentialsProvider;
import com.amazonaws.auth.DefaultAWSCredentialsProviderChain;
import com.amazonaws.services.comprehend.AmazonComprehend;
import com.amazonaws.services.comprehend.AmazonComprehendClientBuilder;
import com.amazonaws.services.comprehend.model.DetectKeyPhrasesRequest;
import com.amazonaws.services.comprehend.model.DetectKeyPhrasesResult;

public class App
{
    public static void main( String[] args )
    {

        String text = "It is raining today in Seattle";

        // Create credentials using a provider chain. For more information, see
        // https://docs.aws.amazon.com/sdk-for-java/v1/developer-guide/credentials.html
        AWSCredentialsProvider awsCreds = DefaultAWSCredentialsProviderChain.getInstance();

        AmazonComprehend comprehendClient =
            AmazonComprehendClientBuilder.standard()
                .withCredentials(awsCreds)
                .withRegion("region")
                .build();

        // Call detectKeyPhrases API
        System.out.println("Calling DetectKeyPhrases");
        DetectKeyPhrasesRequest detectKeyPhrasesRequest = new
        DetectKeyPhrasesRequest().withText(text)

        .withLanguageCode("en");
        DetectKeyPhrasesResult detectKeyPhrasesResult =
        comprehendClient.detectKeyPhrases(detectKeyPhrasesRequest);
        detectKeyPhrasesResult.getKeyPhrases().forEach(System.out::println);
        System.out.println("End of DetectKeyPhrases\n");
    }
}
```

## Detecting key phrases using the AWS SDK for Python (Boto)

The following example uses the `DetectKeyPhrases` operation with Python. You must specify the language of the input text.

```
import boto3
import json

comprehend = boto3.client(service_name='comprehend', region_name='region')

text = "It is raining today in Seattle"

print('Calling DetectKeyPhrases')
print(json.dumps(comprehend.detect_key_phrases(Text=text, LanguageCode='en'),
    sort_keys=True, indent=4))
print('End of DetectKeyPhrases\n')
```

## Detecting key phrases using the AWS SDK for .NET

The .NET example in this section uses the [AWS SDK for .NET](#). You can use the [AWS Toolkit for Visual Studio](#) to develop AWS applications using .NET. It includes helpful templates and the AWS Explorer for deploying applications and managing services. For a .NET developer perspective of AWS, see the [AWS guide for .NET developers](#).

```
using System;
using Amazon.Comprehend;
using Amazon.Comprehend.Model;

namespace Comprehend
{
    class Program
    {
        static void Main(string[] args)
        {
            String text = "It is raining today in Seattle";

            AmazonComprehendClient comprehendClient = new
            AmazonComprehendClient(Amazon.RegionEndpoint.USWest2);

            // Call DetectKeyPhrases API
            Console.WriteLine("Calling DetectKeyPhrases");
            DetectKeyPhrasesRequest detectKeyPhrasesRequest = new DetectKeyPhrasesRequest()
            {
                Text = text,
                LanguageCode = "en"
            };
            DetectKeyPhrasesResponse detectKeyPhrasesResponse =
            comprehendClient.DetectKeyPhrases(detectKeyPhrasesRequest);
            foreach (KeyPhrase kp in detectKeyPhrasesResponse.KeyPhrases)
                Console.WriteLine("Text: {1}, Type: {2}, BeginOffset: {3}, EndOffset: {4}",
                    kp.Text, kp.Type, kp.BeginOffset, kp.EndOffset);
            Console.WriteLine("Done");
        }
    }
}
```

## Determining sentiment

Amazon Comprehend provides the following API operations for analyzing sentiment:

- [DetectSentiment \(p. 350\)](#) – Determines the overall emotional sentiment of a document.
- [BatchDetectSentiment \(p. 266\)](#) – Determine the overall sentiment in up to 25 documents in a batch. For more information, see [Real-time batch APIs \(p. 63\)](#).
- [StartSentimentDetectionJob \(p. 434\)](#) – Starts an asynchronous sentiment detection job for a collection of documents.

- [ListSentimentDetectionJobs \(p. 392\)](#) – Returns the list of sentiment detection jobs that you have submitted.
- [DescribeSentimentDetectionJob \(p. 329\)](#) – Gets the properties (including status) associated with the specified sentiment detection job.
- [StopSentimentDetectionJob \(p. 459\)](#) – Stops the specified in-progress sentiment job.

#### Topics

- [Determining sentiment using the AWS Command Line Interface \(p. 58\)](#)
- [Determining sentiment using the AWS SDK for Java \(p. 58\)](#)
- [Determining sentiment using the AWS SDK for Python \(Boto\) \(p. 59\)](#)
- [Determining sentiment using the AWS SDK for .NET \(p. 59\)](#)

## Determining sentiment using the AWS Command Line Interface

The following example demonstrates using the `DetectSentiment` operation with the AWS CLI. This example specifies the language of the input text.

The example is formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

```
aws comprehend detect-sentiment \
--region region \
--language-code "en" \
--text "It is raining today in Seattle."
```

Amazon Comprehend responds with the following:

```
{
    "SentimentScore": {
        "Mixed": 0.014585512690246105,
        "Positive": 0.31592071056365967,
        "Neutral": 0.5985543131828308,
        "Negative": 0.07093945890665054
    },
    "Sentiment": "NEUTRAL",
    "LanguageCode": "en"
}
```

## Determining sentiment using the AWS SDK for Java

The following example Java program detects the sentiment of input text. You must specify the language of the input text.

```
import com.amazonaws.auth.AWS CredentialsProvider;
import com.amazonaws.auth.DefaultAWSCredentialsProviderChain;
import com.amazonaws.services.comprehend.AmazonComprehend;
import com.amazonaws.services.comprehend.AmazonComprehendClientBuilder;
import com.amazonaws.services.comprehend.model.DetectSentimentRequest;
import com.amazonaws.services.comprehend.model.DetectSentimentResult;

public class App
{
    public static void main( String[] args )
```

```
{  
  
    String text = "It is raining today in Seattle";  
  
    // Create credentials using a provider chain. For more information, see  
    // https://docs.aws.amazon.com/sdk-for-java/v1/developer-guide/credentials.html  
    AWS CredentialsProvider awsCreds = DefaultAWSCredentialsProviderChain.getInstance();  
  
    AmazonComprehend comprehendClient =  
        AmazonComprehendClientBuilder.standard()  
            .withCredentials(awsCreds)  
            .withRegion("region")  
            .build();  
  
    // Call detectSentiment API  
    System.out.println("Calling DetectSentiment");  
    DetectSentimentRequest detectSentimentRequest = new  
    DetectSentimentRequest().withText(text)  
  
.withLanguageCode("en");  
    DetectSentimentResult detectSentimentResult =  
comprehendClient.detectSentiment(detectSentimentRequest);  
    System.out.println(detectSentimentResult);  
    System.out.println("End of DetectSentiment\n");  
    System.out.println("Done" );  
}  
}
```

## Determining sentiment using the AWS SDK for Python (Boto)

The following Python program detects the sentiment of input text. You must specify the language of the input text.

```
import boto3  
import json  
  
comprehend = boto3.client(service_name='comprehend', region_name='region')  
  
text = "It is raining today in Seattle"  
  
print('Calling DetectSentiment')  
print(json.dumps(comprehend.detect_sentiment(Text=text, LanguageCode='en'), sort_keys=True,  
    indent=4))  
print('End of DetectSentiment\n')
```

## Determining sentiment using the AWS SDK for .NET

The .NET example in this section uses the [AWS SDK for .NET](#). You can use the [AWS Toolkit for Visual Studio](#) to develop AWS applications using .NET. It includes helpful templates and the AWS Explorer for deploying applications and managing services. For a .NET developer perspective of AWS, see the [AWS guide for .NET developers](#).

The .NET example in this section uses the AWS SDK for .NET.

```
using System;  
using Amazon.Comprehend;  
using Amazon.Comprehend.Model;  
  
namespace Comprehend  
{
```

```
class Program
{
    static void Main(string[] args)
    {
        String text = "It is raining today in Seattle";

        AmazonComprehendClient comprehendClient = new
        AmazonComprehendClient(Amazon.RegionEndpoint.USWest2);

        // Call DetectKeyPhrases API
        Console.WriteLine("Calling DetectSentiment");
        DetectSentimentRequest detectSentimentRequest = new DetectSentimentRequest()
        {
            Text = text,
            LanguageCode = "en"
        };
        DetectSentimentResponse detectSentimentResponse =
        comprehendClient.DetectSentiment(detectSentimentRequest);
        Console.WriteLine(detectSentimentResponse.Sentiment);
        Console.WriteLine("Done");
    }
}
```

## Detecting syntax

To parse text to extract the individual words and determine the parts of speech for each word, use the [DetectSyntax \(p. 353\)](#) operation. To parse the syntax of up to 25 documents in a batch, use the [BatchDetectSyntax \(p. 269\)](#) operation. For more information, see [Real-time batch APIs \(p. 63\)](#).

### Topics

- [Detecting syntax using the AWS Command Line Interface. \(p. 60\)](#)
- [Detecting syntax using the AWS SDK for Java \(p. 62\)](#)
- [Detecting parts of speech using the AWS SDK for Python \(Boto\) \(p. 62\)](#)
- [Detecting syntax using the AWS SDK for .NET \(p. 63\)](#)

## Detecting syntax using the AWS Command Line Interface.

The following example demonstrates using the `DetectSyntax` operation with the AWS CLI. This example specifies the language of the input text.

The example is formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

```
aws comprehend detect-syntax \
--region region \
--language-code "en" \
--text "It is raining today in Seattle."
```

Amazon Comprehend responds with the following:

```
{
    "SyntaxTokens": [
        {
            "Text": "It",
            "EndOffset": 2,
```

```
"BeginOffset": 0,
"PartOfSpeech": {
    "Tag": "PRON",
    "Score": 0.8389829397201538
},
"tokenId": 1
},
{
    "Text": "is",
    "EndOffset": 5,
    "BeginOffset": 3,
    "PartOfSpeech": {
        "Tag": "AUX",
        "Score": 0.9189288020133972
    },
    "tokenId": 2
},
{
    "Text": "raining",
    "EndOffset": 13,
    "BeginOffset": 6,
    "PartOfSpeech": {
        "Tag": "VERB",
        "Score": 0.9977611303329468
    },
    "tokenId": 3
},
{
    "Text": "today",
    "EndOffset": 19,
    "BeginOffset": 14,
    "PartOfSpeech": {
        "Tag": "NOUN",
        "Score": 0.9993606209754944
    },
    "tokenId": 4
},
{
    "Text": "in",
    "EndOffset": 22,
    "BeginOffset": 20,
    "PartOfSpeech": {
        "Tag": "ADP",
        "Score": 0.9999061822891235
    },
    "tokenId": 5
},
{
    "Text": "Seattle",
    "EndOffset": 30,
    "BeginOffset": 23,
    "PartOfSpeech": {
        "Tag": "PROPN",
        "Score": 0.9940338730812073
    },
    "tokenId": 6
},
{
    "Text": ".",
    "EndOffset": 31,
    "BeginOffset": 30,
    "PartOfSpeech": {
        "Tag": "PUNCT",
        "Score": 0.9999997615814209
    },
    "tokenId": 7
```

```
        }
    }
}
```

## Detecting syntax using the AWS SDK for Java

The following Java program detects the syntax of the input text. You must specify the language of the input text.

```
import com.amazonaws.auth.AWS CredentialsProvider;
import com.amazonaws.auth.DefaultAWSCredentialsProviderChain;
import com.amazonaws.services.comprehend.AmazonComprehend;
import com.amazonaws.services.comprehend.AmazonComprehendClientBuilder;
import com.amazonaws.services.comprehend.model.DetectSyntaxRequest;
import com.amazonaws.services.comprehend.model.DetectSyntaxResult;

public class App
{
    public static void main( String[] args )
    {

        String text = "It is raining today in Seattle.";
        String region = "region"

        // Create credentials using a provider chain. For more information, see
        // https://docs.aws.amazon.com/sdk-for-java/v1/developer-guide/credentials.html
        AWSCredentialsProvider awsCreds = DefaultAWSCredentialsProviderChain.getInstance();

        AmazonComprehend comprehendClient =
            AmazonComprehendClientBuilder.standard()
                .withCredentials(awsCreds)
                .withRegion(region)
                .build();

        // Call detectSyntax API
        System.out.println("Calling DetectSyntax");
        DetectSyntaxRequest detectSyntaxRequest = new DetectSyntaxRequest()
            .withText(text)
            .withLanguageCode("en");
        DetectSyntaxResult detectSyntaxResult =
            comprehendClient.detectSyntax(detectSyntaxRequest);
        detectSyntaxResult.getSyntaxTokens().forEach(System.out::println);
        System.out.println("End of DetectSyntax\n");
        System.out.println( "Done" );
    }
}
```

## Detecting parts of speech using the AWS SDK for Python (Boto)

The following Python program detects the parts of speech in the input text. You must specify the language of the input text.

```
import boto3
import json

comprehend = boto3.client(service_name='comprehend', region_name='region')
text = "It is raining today in Seattle"

print('Calling DetectSyntax')
print(json.dumps(comprehend.detect_syntax(Text=text, LanguageCode='en'), sort_keys=True,
    indent=4))
```

```
print('End of DetectSyntax\n')
```

## Detecting syntax using the AWS SDK for .NET

The .NET example in this section uses the [AWS SDK for .NET](#). You can use the [AWS Toolkit for Visual Studio](#) to develop AWS applications using .NET. It includes helpful templates and the AWS Explorer for deploying applications and managing services. For a .NET developer perspective of AWS, see the [AWS guide for .NET developers](#).

```
using System;
using Amazon.Comprehend;
using Amazon.Comprehend.Model;

namespace Comprehend
{
    class Program
    {
        static void Main(string[] args)
        {
            String text = "It is raining today in Seattle";

            AmazonComprehendClient comprehendClient = new
            AmazonComprehendClient(Amazon.RegionEndpoint.region);

            // Call DetectSyntax API
            Console.WriteLine("Calling DetectSyntax\n");
            DetectSyntaxRequest detectSyntaxRequest = new DetectSyntaxRequest()
            {
                Text = text,
                LanguageCode = "en"
            };
            DetectSyntaxResponse detectSyntaxResponse =
            comprehendClient.DetectSyntax(detectSyntaxRequest);
            foreach (SyntaxToken s in detectSyntaxResponse.SyntaxTokens)
            {
                Console.WriteLine("Text: {0}, PartOfSpeech: {1}, Score: {2}, BeginOffset: {3},
                EndOffset: {4}",
                    s.Text, s.PartOfSpeech, s.Score, s.BeginOffset, s.EndOffset);
                Console.WriteLine("Done");
            }
        }
    }
}
```

## Real-time batch APIs

To send batches of up to 25 documents, you can use the Amazon Comprehend real-time batch operations. Calling a batch operation is identical to calling the single document APIs for each document in the request. Using the batch APIs can result in better performance for your applications. For more information, see [Multiple document synchronous processing \(p. 32\)](#).

### Topics

- [Batch processing with the SDK for Java \(p. 63\)](#)
- [Batch processing with the AWS SDK for .NET \(p. 65\)](#)
- [Batch processing with the AWS CLI \(p. 66\)](#)

## Batch processing with the SDK for Java

The following sample program shows how to use the [BatchDetectEntities \(p. 260\)](#) operation with the SDK for Java. The response from the server contains a [BatchDetectEntitiesItemResult \(p. 478\)](#) object

for each document that was successfully processed. If there is an error processing a document, there will be a record in the error list in the response. The example gets each of the documents with an error and resends them.

```

import com.amazonaws.auth.AWSStaticCredentialsProvider;
import com.amazonaws.auth.DefaultAWSCredentialsProviderChain;
import com.amazonaws.services.comprehend.AmazonComprehend;
import com.amazonaws.services.comprehend.AmazonComprehendClientBuilder;
import com.amazonaws.services.comprehend.model.BatchDetectEntitiesItemResult;
import com.amazonaws.services.comprehend.model.BatchDetectEntitiesRequest;
import com.amazonaws.services.comprehend.model.BatchDetectEntitiesResult;
import com.amazonaws.services.comprehend.model.BatchItemError;

public class App
{
    public static void main( String[] args )
    {

        // Create credentials using a provider chain. For more information, see
        // https://docs.aws.amazon.com/sdk-for-java/v1/developer-guide/credentials.html
        AWSCredentialsProvider awsCreds = DefaultAWSCredentialsProviderChain.getInstance();

        AmazonComprehend comprehendClient =
            AmazonComprehendClientBuilder.standard()
                .withCredentials(awsCreds)
                .withRegion("region")
                .build();

        String[] textList = {"I love Seattle", "Today is Sunday", "Tomorrow is Monday", "I
love Seattle"};

        // Call detectEntities API
        System.out.println("Calling BatchDetectEntities");
        BatchDetectEntitiesRequest batchDetectEntitiesRequest = new
BatchDetectEntitiesRequest().withTextList(textList)

        .withLanguageCode("en");
        BatchDetectEntitiesResult batchDetectEntitiesResult =
client.batchDetectEntities(batchDetectEntitiesRequest);

        for(BatchDetectEntitiesItemResult item : batchDetectEntitiesResult.getResultList())
{
            System.out.println(item);
}

        // check if we need to retry failed requests
        if (batchDetectEntitiesResult.getErrorList().size() != 0)
{
            System.out.println("Retrying Failed Requests");
            ArrayList<String> textToRetry = new ArrayList<String>();
            for(BatchItemError errorItem : batchDetectEntitiesResult.getErrorList())
{
                textToRetry.add(textList[errorItem.getIndex()]);
}

        batchDetectEntitiesRequest = new
BatchDetectEntitiesRequest().withTextList(textToRetry).withLanguageCode("en");
        batchDetectEntitiesResult =
client.batchDetectEntities(batchDetectEntitiesRequest);

        for(BatchDetectEntitiesItemResult item :
batchDetectEntitiesResult.getResultList()) {
            System.out.println(item);
}
    }
}

```

```
        }
        System.out.println("End of DetectEntities");
    }
}
```

## Batch processing with the AWS SDK for .NET

The following sample program shows how to use the [BatchDetectEntities \(p. 260\)](#) operation with the AWS SDK for .NET. The response from the server contains a [BatchDetectEntitiesItemResult \(p. 478\)](#) object for each document that was successfully processed. If there is an error processing a document, there will be a record in the error list in the response. The example gets each of the documents with an error and resends them.

The .NET example in this section uses the [AWS SDK for .NET](#). You can use the [AWS Toolkit for Visual Studio](#) to develop AWS applications using .NET. It includes helpful templates and the AWS Explorer for deploying applications and managing services. For a .NET developer perspective of AWS, see the [AWS guide for .NET developers](#).

```
using System;
using System.Collections.Generic;
using Amazon.Comprehend;
using Amazon.Comprehend.Model;

namespace Comprehend
{
    class Program
    {
        // Helper method for printing properties
        static private void PrintEntity(Entity entity)
        {
            Console.WriteLine("      Text: {0}, Type: {1}, Score: {2}, BeginOffset: {3}
EndOffset: {4}",
                entity.Text, entity.Type, entity.Score, entity.BeginOffset,
                entity.EndOffset);
        }

        static void Main(string[] args)
        {
            AmazonComprehendClient comprehendClient = new
AmazonComprehendClient(Amazon.RegionEndpoint.USWest2);

            List<String> textList = new List<String>()
            {
                { "I love Seattle" },
                { "Today is Sunday" },
                { "Tomorrow is Monday" },
                { "I love Seattle" }
            };

            // Call detectEntities API
            Console.WriteLine("Calling BatchDetectEntities");
            BatchDetectEntitiesRequest batchDetectEntitiesRequest = new
BatchDetectEntitiesRequest()
            {
                TextList = textList,
                LanguageCode = "en"
            };
            BatchDetectEntitiesResponse batchDetectEntitiesResponse =
comprehendClient.BatchDetectEntities(batchDetectEntitiesRequest);

            foreach (BatchDetectEntitiesItemResult item in
batchDetectEntitiesResponse.ResultList)
            {
```

```
        Console.WriteLine("Entities in {0}:", textList[item.Index]);
        foreach (Entity entity in item.Entities)
            PrintEntity(entity);
    }

    // check if we need to retry failed requests
    if (batchDetectEntitiesResponse.ErrorList.Count != 0)
    {
        Console.WriteLine("Retrying Failed Requests");
        List<String> textToRetry = new List<String>();
        foreach(BatchItemError errorItem in batchDetectEntitiesResponse.ErrorList)
            textToRetry.Add(textList[errorItem.Index]);

        batchDetectEntitiesRequest = new BatchDetectEntitiesRequest()
        {
            TextList = textToRetry,
            LanguageCode = "en"
        };

        batchDetectEntitiesResponse =
comprehendClient.BatchDetectEntities(batchDetectEntitiesRequest);

        foreach(BatchDetectEntitiesItemResult item in
batchDetectEntitiesResponse.ResultList)
        {
            Console.WriteLine("Entities in {0}:", textList[item.Index]);
            foreach (Entity entity in item.Entities)
                PrintEntity(entity);
        }
        Console.WriteLine("End of DetectEntities");
    }
}
```

## Batch processing with the AWS CLI

These examples show how to use the batch API operations using the AWS Command Line Interface. All of the operations except `BatchDetectDominantLanguage` use the following JSON file called `process.json` as input. For that operation the `LanguageCode` entity is not included.

The third document in the JSON file ("\$\$\$\$\$\$\$\$") will cause an error during batch processing. It is included so that the operations will include a [BatchItemError \(p. 482\)](#) in the response.

```
{
    "LanguageCode": "en",
    "TextList": [
        "I have been living in Seattle for almost 4 years",
        "It is raining today in Seattle",
        "$$$$$$$$"
    ]
}
```

The examples are formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

### Topics

- [Detect the dominant language using a batch \(AWS CLI\) \(p. 67\)](#)
- [Detect entities using a batch \(AWS CLI\) \(p. 67\)](#)
- [Detect key phrases using a batch \(AWS CLI\) \(p. 67\)](#)
- [Detect sentiment using a batch \(AWS CLI\) \(p. 68\)](#)

## Detect the dominant language using a batch (AWS CLI)

The [BatchDetectDominantLanguage \(p. 257\)](#) operation determines the dominant language of each document in a batch. For a list of the languages that Amazon Comprehend can detect, see [Dominant language \(p. 12\)](#). The following AWS CLI command calls the `BatchDetectDominantLanguage` operation.

```
aws comprehend batch-detect-dominant-language \
--endpoint endpoint \
--region region \
--cli-input-json file:///path to input file/process.json
```

The following is the response from the `BatchDetectDominantLanguage` operation:

```
{
  "ResultList": [
    {
      "Index": 0,
      "Languages": [
        {
          "LanguageCode": "en",
          "Score": 0.99
        }
      ]
    },
    {
      "Index": 1,
      "Languages": [
        {
          "LanguageCode": "en",
          "Score": 0.82
        }
      ]
    }
  ],
  "ErrorList": [
    {
      "Index": 2,
      "ErrorCode": "InternalServerException",
      "ErrorMessage": "Unexpected Server Error. Please try again."
    }
  ]
}
```

## Detect entities using a batch (AWS CLI)

Use the [BatchDetectEntities \(p. 260\)](#) operation to find the entities present in a batch of documents. For more information about entities, see [Entities \(p. 5\)](#). The following AWS CLI command calls the `BatchDetectEntities` operation.

```
aws comprehend batch-detect-entities \
--endpoint endpoint \
--region region \
--cli-input-json file:///path to input file/process.json
```

## Detect key phrases using a batch (AWS CLI)

The [BatchDetectKeyPhrases \(p. 263\)](#) operation returns the key noun phrases in a batch of documents. The following AWS CLI command calls the `BatchDetectKeyNounPhrases` operation.

```
aws comprehend batch-detect-key-phrases
  --endpoint endpoint
  --region region
  --cli-input-json file:///path to input file/process.json
```

## Detect sentiment using a batch (AWS CLI)

Detect the overall sentiment of a batch of documents using the [BatchDetectSentiment \(p. 266\)](#) operation. The following AWS CLI command calls the BatchDetectSentiment operation.

```
aws comprehend batch-detect-sentiment \
  --endpoint endpoint \
  --region region \
  --cli-input-json file:///path to input file/process.json
```

# Async analysis jobs using the API

The following examples demonstrate how to use Amazon Comprehend API for real-time analysis, using the AWS CLI, Java, and Python. Use the examples to learn about the Amazon Comprehend synchronous operations and as building blocks for your own applications.

### Topics

- [Async analysis for Amazon Comprehend insights \(p. 68\)](#)
- [Async analysis for targeted sentiment \(p. 72\)](#)
- [Async analysis for event detection \(p. 74\)](#)
- [Async analysis for topic modeling \(p. 77\)](#)

## Async analysis for Amazon Comprehend insights

The following examples demonstrate how to use Amazon Comprehend API for real-time analysis, using the AWS CLI, Java, and Python. Use the examples to learn about the Amazon Comprehend synchronous operations and as building blocks for your own applications.

### Topics

- [Prerequisites \(p. 68\)](#)
- [Starting an analysis job \(p. 69\)](#)
- [Monitoring analysis jobs \(p. 69\)](#)
- [Getting analysis results \(p. 70\)](#)

The following sections describe using the Amazon Comprehend API to run asynchronous operations for Amazon Comprehend insights.

## Prerequisites

Documents must be in UTF-8-formatted text files. You can submit your documents in two formats. The format you use depends on the type of documents you want to analyze, as described in the following table.

Description	Format
Each file contains one input document. This is best for collections of large documents.	One document per file
The input is one or more files. Each line in a file is considered a document. This is best for short documents, such as social media postings.  Each line must end with a line feed (LF, \n), a carriage return (CR, \r), or both (CRLF, \r\n). You can't use the UTF-8 line separator (u+2028) to end a line.	One document per line

When you start an analysis job, you specify the S3 location for your input data. The URI must be in the same AWS Region as the API endpoint that you are calling. The URI can point to a single file or it can be the prefix for a collection of data files. For more information, see the [InputDataConfig \(p. 539\)](#) data type.

You must grant Amazon Comprehend access to the Amazon S3 bucket that contains your document collection and output files. For more information, see [Role-based permissions required for asynchronous operations \(p. 202\)](#).

## Starting an analysis job

To submit an analysis job, use either the Amazon Comprehend console or the appropriate Start\* operation:

- [StartDominantLanguageDetectionJob \(p. 411\)](#) — Start a job to detect the dominant language in each document in the collection. For more information about the dominant language in a document, see [Dominant language \(p. 12\)](#).
- [StartEntitiesDetectionJob \(p. 416\)](#) — Start a job to detect entities in each document in the collection. For more information about entities, see [Entities \(p. 5\)](#).
- [StartKeyPhrasesDetectionJob \(p. 425\)](#) — Start a job to detect key phrases in each document in the collection. For more information about key phrases, see [Key phrases \(p. 11\)](#).
- [StartPiiEntitiesDetectionJob \(p. 430\)](#) — Start a job to detect personally identifiable information (PII) in each document in the collection. For more information about PII, see [Detecting PII entities \(p. 11\)](#).
- [StartSentimentDetectionJob \(p. 434\)](#) — Start a job to detect the sentiment in each document in the collection. For more information about sentiments, see [Sentiment \(p. 16\)](#).

## Monitoring analysis jobs

The Start\* operation returns an ID that you can use to monitor the job's progress.

To monitor progress using the API, you use one of two operations, depending on whether you want to monitor the progress of an individual job or multiple jobs.

To monitor the progress of an individual analysis job, use the Describe\* operations. You provide the job ID returned by the Start\* operation. The response from the Describe\* operation contains the JobStatus field with the job's status.

To monitor the progress of multiple analysis jobs, use the List\* operations. List\* operations return a list of jobs that you submitted to Amazon Comprehend. The response includes a JobStatus field for each job that tells you the status of the job.

If the status field is set to `COMPLETED` or `FAILED`, job processing has completed.

To get the status of individual jobs, use the `Describe*` operation for the analysis that you are performing.

- [DescribeDominantLanguageDetectionJob \(p. 307\)](#)
- [DescribeEntitiesDetectionJob \(p. 312\)](#)
- [DescribeKeyPhrasesDetectionJob \(p. 320\)](#)
- [DescribePiiEntitiesDetectionJob \(p. 323\)](#)
- [DescribeSentimentDetectionJob \(p. 329\)](#)

To get the status of a multiple jobs, use the `List*` operation for the analysis that you are performing.

- [ListDominantLanguageDetectionJobs \(p. 368\)](#)
- [ListEntitiesDetectionJobs \(p. 374\)](#)
- [ListKeyPhrasesDetectionJobs \(p. 386\)](#)
- [ListPiiEntitiesDetectionJobs \(p. 389\)](#)
- [ListSentimentDetectionJobs \(p. 392\)](#)

To restrict the results to jobs that match certain criteria, use the `List*` operations' `Filter` parameter. You can filter on the job name, the job status, and the date and time that the job was submitted. For more information, see the `Filter` parameter for each of the `List*` operations in the [Actions \(p. 254\)](#) reference.

## Getting analysis results

After an analysis job has finished, use a `Describe*` operation to get the location of the results. If the job status is `COMPLETED`, the response includes an `OutputDataConfig` field that contains a field with the Amazon S3 location of the output file. The file, `output.tar.gz`, is a compressed archive that contains the results of the analysis.

If the status of a job is `FAILED`, the response contains a `Message` field that describes the reason that the analysis job didn't complete successfully.

To get the status of individual jobs, use the appropriate `Describe*` operation:

- [DescribeDominantLanguageDetectionJob \(p. 307\)](#)
- [DescribeEntitiesDetectionJob \(p. 312\)](#)
- [DescribeKeyPhrasesDetectionJob \(p. 320\)](#)
- [DescribeSentimentDetectionJob \(p. 329\)](#)

The results are returned in a single file, with one JSON structure for each document. Each response file also includes error messages for any job with the status field set to `FAILED`.

Each of the following sections shows examples of output for the two input formats.

### Getting dominant language detection results

The following is an example of an output file from an analysis that detected the dominant language. The format of the input is one document per line. For more information, see the [DetectDominantLanguage \(p. 338\)](#) operation.

```
{"File": "0_doc", "Languages": [{"LanguageCode": "en", "Score": 0.9514502286911011}, {"LanguageCode": "de", "Score": 0.02374090999364853}, {"LanguageCode": "nl", "Score": 0.003208699868991971}, "Line": 0} {"File": "1_doc", "Languages": [{"LanguageCode": "en", "Score": 0.9822712540626526}, {"LanguageCode": "de", "Score": 0.002621392020955682}, {"LanguageCode": "es", "Score": 0.002386554144322872}], "Line": 1}
```

The following is an example of output from an analysis where the format of the input is one document per file:

```
{"File": "small_doc", "Languages": [{"LanguageCode": "en", "Score": 0.9728053212165833}, {"LanguageCode": "de", "Score": 0.007670710328966379}, {"LanguageCode": "es", "Score": 0.0028472368139773607}]}, {"File": "huge_doc", "Languages": [{"LanguageCode": "en", "Score": 0.984955906867981}, {"LanguageCode": "de", "Score": 0.0026436643674969673}, {"LanguageCode": "fr", "Score": 0.0014206881169229746}]}
```

## Getting entity detection results

The following is an example of an output file from an analysis that detected entities in documents. The format of the input is one document per line. For more information, see the [DetectEntities \(p. 341\)](#) operation. The output contains two error messages, one for a document that is too long and one for a document that isn't in UTF-8 format.

```
{"File": "50_docs", "Line": 0, "Entities": [{"BeginOffset": 0, "EndOffset": 22, "Score": 0.9763959646224976, "Text": "Cluj-NapocaCluj-Napoca", "Type": "LOCATION"}]}, {"File": "50_docs", "Line": 1, "Entities": [{"BeginOffset": 11, "EndOffset": 15, "Score": 0.9615424871444702, "Text": "Maat", "Type": "PERSON"}]}, {"File": "50_docs", "Line": 2, "ErrorCode": "DOCUMENT_SIZE_EXCEEDED", "ErrorMessage": "Document size exceeds maximum size limit 102400 bytes."}, {"File": "50_docs", "Line": 3, "ErrorCode": "UNSUPPORTED_ENCODING", "ErrorMessage": "Document is not in UTF-8 format and all subsequent lines are ignored."}
```

The following is an example of output from an analysis where the format of the input is one document per file. The output contains two error messages, one for a document that is too long and one for a document that isn't in UTF-8 format.

```
{"File": "non_utf8.txt", "ErrorCode": "UNSUPPORTED_ENCODING", "ErrorMessage": "Document is not in UTF-8 format and all subsequent line are ignored."}, {"File": "small_doc", "Entities": [{"BeginOffset": 0, "EndOffset": 4, "Score": 0.645766019821167, "Text": "Maat", "Type": "PERSON"}]}, {"File": "huge_doc", "ErrorCode": "DOCUMENT_SIZE_EXCEEDED", "ErrorMessage": "Document size exceeds size limit 102400 bytes."}
```

## Getting key phrase detection results

The following is an example of an output file from an analysis that detected key phrases in a document. The format of the input is one document per line. For more information, see the [DetectKeyPhrases \(p. 345\)](#) operation.

```
{"File": "50_docs", "KeyPhrases": [{"BeginOffset": 0, "EndOffset": 22, "Score": 0.8948641419410706, "Text": "Cluj-NapocaCluj-Napoca"}, {"BeginOffset": 45, "EndOffset": 49, "Score": 0.9989854693412781, "Text": "Cluj"}]}, "Line": 0}
```

The following is an example of the output from an analysis where the format of the input is one document per file.

```
{"File": "1_doc", "KeyPhrases": [{"BeginOffset": 0, "EndOffset": 22, "Score": 0.8948641419410706, "Text": "Cluj-NapocaCluj-Napoca"}, {"BeginOffset": 45, "EndOffset": 49, "Score": 0.9989854693412781, "Text": "Cluj"}]}
```

## Getting personally identifiable information (PII) detection results

The following is an example of an output file from an analysis job that detected PII entities in documents. The format of the input is one document per line.

```
{"Entities": [{"Type": "NAME", "BeginOffset": 40, "EndOffset": 69, "Score": 0.999995}, {"Type": "ADDRESS", "BeginOffset": 247, "EndOffset": 253, "Score": 0.998828}, {"Type": "BANK_ACCOUNT_NUMBER", "BeginOffset": 406, "EndOffset": 411, "Score": 0.693283}], "File": "doc.txt", "Line": 1}, {"Entities": [{"Type": "SSN", "BeginOffset": 1114, "EndOffset": 1124, "Score": 0.999999}, {"Type": "EMAIL", "BeginOffset": 3742, "EndOffset": 3775, "Score": 0.999993}, {"Type": "PIN", "BeginOffset": 4098, "EndOffset": 4102, "Score": 0.999995}], "File": "doc.txt", "Line": 1}
```

The following is an example of output from an analysis where the format of the input is one document per file.

```
{"Entities": [{"Type": "NAME", "BeginOffset": 40, "EndOffset": 69, "Score": 0.999995}, {"Type": "ADDRESS", "BeginOffset": 247, "EndOffset": 253, "Score": 0.998828}, {"Type": "BANK_ROUTING", "BeginOffset": 279, "EndOffset": 289, "Score": 0.999999}], "File": "doc.txt"}
```

## Getting sentiment detection results

The following is an example of an output file from an analysis that detected the sentiment expressed in a document. It includes an error message because one document is too long. The format of the input is one document per line. For more information, see the [DetectSentiment \(p. 350\)](#) operation.

```
{"File": "50_docs", "Line": 0, "Sentiment": "NEUTRAL", "SentimentScore": {"Mixed": 0.002734508365392685, "Negative": 0.008935936726629734, "Neutral": 0.9841893315315247, "Positive": 0.004140198230743408}}, {"File": "50_docs", "Line": 1, "ErrorCode": "DOCUMENT_SIZE_EXCEEDED", "ErrorMessage": "Document size is exceeded maximum size limit 5120 bytes."}, {"File": "50_docs", "Line": 2, "Sentiment": "NEUTRAL", "SentimentScore": {"Mixed": 0.0023119584657251835, "Negative": 0.0029857370536774397, "Neutral": 0.9866572022438049, "Positive": 0.008045154623687267}}
```

The following is an example of the output from an analysis where the format of the input is one document per file.

```
{"File": "small_doc", "Sentiment": "NEUTRAL", "SentimentScore": {"Mixed": 0.0023450672160834074, "Negative": 0.0009663937962614, "Neutral": 0.9795311689376831, "Positive": 0.017157377675175667}}, {"File": "huge_doc", "ErrorCode": "DOCUMENT_SIZE_EXCEEDED", "ErrorMessage": "Document size is exceeds the limit of 5120 bytes."}
```

## Async analysis for targeted sentiment

Amazon Comprehend provides the following API operations for analyzing targeted sentiment:

- [StartTargetedSentimentDetectionJob \(p. 439\)](#) – Starts an asynchronous targeted sentiment detection job for a collection of documents.
- [ListTargetedSentimentDetectionJobs \(p. 397\)](#) – Returns the list of targeted sentiment detection jobs that you have submitted.

- [DescribeTargetedSentimentDetectionJob \(p. 332\)](#) – Gets the properties (including status) associated with the specified targeted sentiment detection job.
- [StopTargetedSentimentDetectionJob \(p. 461\)](#) – Stops the specified in-progress targeted sentiment job.

#### Topics

- [Before you start \(p. 73\)](#)
- [Analyzing targeted sentiment using the AWS CLI \(p. 73\)](#)

## Before you start

Before you start, make sure that you have:

- **Input and output buckets**—Identify the Amazon S3 buckets that you want to use for input and output. The buckets must be in the same region as the API that you are calling.
- **IAM service role**—You must have an IAM service role with permission to access your input and output buckets. For more information, see [Role-based permissions required for asynchronous operations \(p. 202\)](#).

## Analyzing targeted sentiment using the AWS CLI

The following example demonstrates using the `StartTargetedSentimentDetectionJob` operation with the AWS CLI. This example specifies the language of the input text.

The example is formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

```
aws comprehend start-targeted-sentiment-detection-job \
    --job-name "job name" \
    --language-code "en" \
    --cli-input-json file://path to JSON input file
```

For the `cli-input-json` parameter you supply the path to a JSON file that contains the request data, as shown in the following example.

```
{
    "InputDataConfig": {
        "S3Uri": "s3://input bucket/input path",
        "InputFormat": "ONE_DOC_PER_FILE"
    },
    "OutputDataConfig": {
        "S3Uri": "s3://output bucket/output path"
    },
    "DataAccessRoleArn": "arn:aws:iam::account ID:role/data access role"
}
```

If the request to start the job was successful, you will receive the following response:

```
{
    "JobStatus": "SUBMITTED",
    "JobArn": "job ARN"
    "JobId": "job ID"
}
```

## Async analysis for event detection

### Topics

- [Before you start \(p. 74\)](#)
- [Detect events using the AWS CLI \(p. 74\)](#)
- [List events using the AWS CLI \(p. 75\)](#)
- [Describe events using the AWS CLI \(p. 76\)](#)
- [Get events detection results \(p. 76\)](#)

To detect events in a document set, use the [StartEventsDetectionJob \(p. 421\)](#) to start an asynchronous job.

### Before you start

Before you start, make sure that you have:

- **Input and output buckets**—Identify the Amazon S3 buckets that you want to use for input and output. The buckets must be in the same region as the API that you are calling.
- **IAM service role**—You must have an IAM service role with permission to access your input and output buckets. For more information, see [Role-based permissions required for asynchronous operations \(p. 202\)](#).

### Detect events using the AWS CLI

The following example demonstrates using the [StartEventsDetectionJob \(p. 421\)](#) operation with the AWS CLI

The example is formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

```
aws comprehend start-events-detection-job \
--region region \
--job-name job name \
--cli-input-json file:///path to JSON input file
```

For the `cli-input-json` parameter you supply the path to a JSON file that contains the request data, as shown in the following example.

```
{
    "InputDataConfig": {
        "S3Uri": "s3://input bucket/input path",
        "InputFormat": "ONE_DOC_PER_LINE"
    },
    "OutputDataConfig": {
        "S3Uri": "s3://output bucket/output path"
    },
    "DataAccessRoleArn": "arn:aws:iam::account ID:role/data access role",
    "LanguageCode": "en",
    "TargetEventTypes": [
        "BANKRUPTCY",
        "EMPLOYMENT",
        "CORPORATE_ACQUISITION",
        "INVESTMENT_GENERAL",
        "CORPORATE_MERGER",
```

```
    "IPO",
    "RIGHTS_ISSUE",
    "SECONDARY_OFFERING",
    "SHELF_OFFERING",
    "TENDER_OFFERING",
    "STOCK_SPLIT"
]
}
```

If the request to start the events detection job was successful, you will receive the following response:

```
{
  "JobStatus": "SUBMITTED",
  "JobId": "job ID"
}
```

## List events using the AWS CLI

Use the [ListEventsDetectionJobs \(p. 383\)](#) operation to see a list of the events detection jobs that you have submitted. The list includes information about the input and output locations that you used and the status of each of the detection jobs. The example is formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

```
aws comprehend list-events-detection-jobs --region region
```

You will get JSON similar to the following in response:

```
{
  "EventsDetectionJobPropertiesList": [
    {
      "DataAccessRoleArn": "arn:aws:iam::account ID:role/data access role",
      "EndTime": timestamp,
      "InputDataConfig": {
        "InputFormat": "ONE_DOC_PER_LINE",
        "S3Uri": "s3://input bucket/input path"
      },
      "JobId": "job ID",
      "JobName": "job name",
      "JobStatus": "COMPLETED",
      "LanguageCode": "en",
      "Message": "message",
      "OutputDataConfig": {
        "S3Uri": "s3://output bucket/output path"
      },
      "SubmitTime": timestamp,
      "TargetEventTypes": [
        "BANKRUPTCY",
        "EMPLOYMENT",
        "CORPORATE_ACQUISITION",
        "INVESTMENT_GENERAL",
        "CORPORATE_MERGER",
        "IPO",
        "RIGHTS_ISSUE",
        "SECONDARY_OFFERING",
        "SHELF_OFFERING",
        "TENDER_OFFERING",
        "STOCK_SPLIT"
      ]
    }
  ],
  "NextToken": "next token"
```

```
}
```

## Describe events using the AWS CLI

You can use the [DescribeEventsDetectionJob](#) (p. 318) operation to get the status of an existing job. The example is formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

```
aws comprehend describe-events-detection-job \
--region region \
--job-id job ID
```

You will get the following JSON in response:

```
{
    "EventsDetectionJobProperties": {
        "DataAccessRoleArn": "arn:aws:iam::account ID:role/data access role",
        "EndTime": timestamp,
        "InputDataConfig": {
            "InputFormat": "ONE_DOC_PER_LINE",
            "S3Uri": "S3Uri": "s3://input bucket/input path"
        },
        "JobId": "job ID",
        "JobName": "job name",
        "JobStatus": "job status",
        "LanguageCode": "en",
        "Message": "message",
        "OutputDataConfig": {
            "S3Uri": "s3://output bucket/output path"
        },
        "SubmitTime": timestamp,
        "TargetEventTypes": [
            "BANKRUPTCY",
            "EMPLOYMENT",
            "CORPORATE_ACQUISITION",
            "INVESTMENT_GENERAL",
            "CORPORATE_MERGER",
            "IPO",
            "RIGHTS_ISSUE",
            "SECONDARY_OFFERING",
            "SHELF_OFFERING",
            "TENDER_OFFERING",
            "STOCK_SPLIT"
        ]
    }
}
```

## Get events detection results

The following is an example an output file from an analysis job that detected events in documents. The format of the input is one document per line.

```
{"Entities": [{"Mentions": [{"BeginOffset": 12, "EndOffset": 27, "GroupScore": 1.0, "Score": 0.916355, "Text": "over a year ago", "Type": "DATE"}]}, {"Mentions": [{"BeginOffset": 33, "EndOffset": 39, "GroupScore": 1.0, "Score": 0.996603, "Text": "Amazon", "Type": "ORGANIZATION"}]}, {"Mentions": [{"BeginOffset": 66, "EndOffset": 77, "GroupScore": 1.0, "Score": 0.999283, "Text": "Whole Foods", "Type": "ORGANIZATION"}]}, {"Events": [{"Arguments": [{"EntityIndex": 2, "Role": "INVESTEE", "Score": 0.999283}], "EntityIndex": 0, "Role": "DATE", "Score": 0.916355}]}]
```

```
{"EntityIndex": 1, "Role": "INVESTOR", "Score": 0.996603}], "Triggers": [{"BeginOffset": 373, "EndOffset": 380, "GroupScore": 0.999984, "Score": 0.999955, "Text": "acquire", "Type": "CORPORATE_ACQUISITION"}], "Type": "CORPORATE_ACQUISITION"}, {"Arguments": [{"EntityIndex": 2, "Role": "PARTICIPANT", "Score": 0.999283}], "Triggers": [{"BeginOffset": 115, "EndOffset": 123, "GroupScore": 1.0, "Score": 0.999967, "Text": "combined", "Type": "CORPORATE_MERGER"}], "Type": "CORPORATE_MERGER"}], "File": "doc.txt", "Line": 0}
```

For more information about events output file structure and supported event types, see [Events \(p. 6\)](#).

## Async analysis for topic modeling

To determine the topics in a document set, use the [StartTopicsDetectionJob \(p. 444\)](#) to start an asynchronous job. You can monitor topics in documents written in English or Spanish.

### Topics

- [Before you start \(p. 77\)](#)
- [Topic modeling using the AWS Command Line Interface \(p. 77\)](#)
- [Topic modeling using the AWS SDK for Java \(p. 79\)](#)
- [Topic modeling using the AWS SDK for Python \(Boto\) \(p. 80\)](#)
- [Topic modeling using the AWS SDK for .NET \(p. 81\)](#)

## Before you start

Before you start, make sure that you have:

- **Input and output buckets**—Identify the Amazon S3 buckets that you want to use for input and output. The buckets must be in the same region as the API that you are calling.
- **IAM service role**—You must have an IAM service role with permission to access your input and output buckets. For more information, see [Role-based permissions required for asynchronous operations \(p. 202\)](#).

## Topic modeling using the AWS Command Line Interface

The following example demonstrates using the `StartTopicsDetectionJob` operation with the AWS CLI

The example is formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

```
aws comprehend start-topics-detection-job \
    --number-of-topics topics to return \
    --job-name "job name" \
    --region region \
    --cli-input-json file:///path to JSON input file
```

For the `cli-input-json` parameter you supply the path to a JSON file that contains the request data, as shown in the following example.

```
{  
    "InputDataConfig": {  
        "S3Uri": "s3://input bucket/input path",  
        "InputFormat": "ONE_DOC_PER_FILE"
```

```
        },
        "OutputDataConfig": {
            "S3Uri": "s3://output bucket/output path"
        },
        "DataAccessRoleArn": "arn:aws:iam::account ID:role/data access role"
    }
```

If the request to start the topic detection job was successful, you will receive the following response:

```
{
    "JobStatus": "SUBMITTED",
    "JobId": "job ID"
}
```

Use the [ListTopicsDetectionJobs \(p. 400\)](#) operation to see a list of the topic detection jobs that you have submitted. The list includes information about the input and output locations that you used and the status of each of the detection jobs. The example is formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

```
aws comprehend list-topics-detection-jobs \-- region
```

You will get JSON similar to the following in response:

```
{
    "TopicsDetectionJobPropertiesList": [
        {
            "InputDataConfig": {
                "S3Uri": "s3://input bucket/input path",
                "InputFormat": "ONE_DOC_PER_LINE"
            },
            "NumberOfTopics": topics to return,
            "JobId": "job ID",
            "JobStatus": "COMPLETED",
            "JobName": "job name",
            "SubmitTime": timestamp,
            "OutputDataConfig": {
                "S3Uri": "s3://output bucket/output path"
            },
            "EndTime": timestamp
        },
        {
            "InputDataConfig": {
                "S3Uri": "s3://input bucket/input path",
                "InputFormat": "ONE_DOC_PER_LINE"
            },
            "NumberOfTopics": topics to return,
            "JobId": "job ID",
            "JobStatus": "RUNNING",
            "JobName": "job name",
            "SubmitTime": timestamp,
            "OutputDataConfig": {
                "S3Uri": "s3://output bucket/output path"
            }
        }
    ]
}
```

You can use the [DescribeTopicsDetectionJob \(p. 335\)](#) operation to get the status of an existing job. The example is formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

```
aws comprehend describe-topics-detection-job --job-id job ID
```

You will get the following JSON in response:

```
{  
    "TopicsDetectionJobProperties": {  
        "InputDataConfig": {  
            "S3Uri": "s3://input bucket/input path",  
            "InputFormat": "ONE_DOC_PER_LINE"  
        },  
        "NumberOfTopics": topics to return,  
        "JobId": "job ID",  
        "JobStatus": "COMPLETED",  
        "JobName": "job name",  
        "SubmitTime": timestamp,  
        "OutputDataConfig": {  
            "S3Uri": "s3://output bucket/output path"  
        },  
        "EndTime": timestamp  
    }  
}
```

## Topic modeling using the AWS SDK for Java

The following Java program detects the topics in a document collection. It uses the [StartTopicsDetectionJob \(p. 444\)](#) operation to start detecting topics. Next, it uses the [DescribeTopicsDetectionJob \(p. 335\)](#) operation to check the status of the topic detection. Finally, it calls [ListTopicsDetectionJobs \(p. 400\)](#) to show a list of all jobs submitted for the account.

```
import com.amazonaws.auth.AWSStaticCredentialsProvider;  
import com.amazonaws.auth.DefaultAWSCredentialsProviderChain;  
import com.amazonaws.client.builder.AwsClientBuilder;  
import com.amazonaws.services.comprehend.AmazonComprehend;  
import com.amazonaws.services.comprehend.AmazonComprehendClientBuilder;  
import com.amazonaws.services.comprehend.model.DescribeTopicsDetectionJobRequest;  
import com.amazonaws.services.comprehend.model.DescribeTopicsDetectionJobResult;  
import com.amazonaws.services.comprehend.model.InputDataConfig;  
import com.amazonaws.services.comprehend.model.InputFormat;  
import com.amazonaws.services.comprehend.model.ListTopicsDetectionJobsRequest;  
import com.amazonaws.services.comprehend.model.ListTopicsDetectionJobsResult;  
import com.amazonaws.services.comprehend.model.StartTopicsDetectionJobRequest;  
import com.amazonaws.services.comprehend.model.StartTopicsDetectionJobResult;  
  
public class App  
{  
    public static void main( String[] args )  
    {  
        // Create credentials using a provider chain. For more information, see  
        // https://docs.aws.amazon.com/sdk-for-java/v1/developer-guide/credentials.html  
        AWSStaticCredentialsProvider awsCreds =  
        DefaultAWSCredentialsProviderChain.getInstance();  
  
        AmazonComprehend comprehendClient =  
            AmazonComprehendClientBuilder.standard()  
                .withCredentials(awsCreds)  
                .withRegion("region")  
                .build();  
  
        final String inputS3Uri = "s3://input bucket/input path";  
        final InputFormat inputDocFormat = InputFormat.ONE_DOC_PER_FILE;  
        final String outputS3Uri = "s3://output bucket/output path";  
        final String dataAccessRoleArn = "arn:aws:iam::account ID:role/data access role";
```

```

        final int numberOfTopics = 10;

        final StartTopicsDetectionJobRequest startTopicsDetectionJobRequest = new
StartTopicsDetectionJobRequest()
            .withInputDataConfig(new InputDataConfig()
                .withS3Uri(inputS3Uri)
                .withInputFormat(inputDocFormat))
            .withOutputDataConfig(new OutputDataConfig()
                .withS3Uri(outputsS3Uri))
            .withDataAccessRoleArn(dataAccessRoleArn)
            .withNumberOfTopics(numberOfTopics);

        final StartTopicsDetectionJobResult startTopicsDetectionJobResult =
comprehendClient.startTopicsDetectionJob(startTopicsDetectionJobRequest);

        final String jobId = startTopicsDetectionJobResult.getJobId();
        System.out.println("JobId: " + jobId);

        final DescribeTopicsDetectionJobRequest describeTopicsDetectionJobRequest = new
DescribeTopicsDetectionJobRequest()
            .withJobId(jobId);

        final DescribeTopicsDetectionJobResult describeTopicsDetectionJobResult =
comprehendClient.describeTopicsDetectionJob(describeTopicsDetectionJobRequest);
        System.out.println("describeTopicsDetectionJobResult: " +
describeTopicsDetectionJobResult);

        ListTopicsDetectionJobsResult listTopicsDetectionJobsResult =
comprehendClient.listTopicsDetectionJobs(new ListTopicsDetectionJobsRequest());
        System.out.println("listTopicsDetectionJobsResult: " +
listTopicsDetectionJobsResult);

    }
}

```

## Topic modeling using the AWS SDK for Python (Boto)

The following Python program detects the topics in a document collection. It uses the [StartTopicsDetectionJob](#) (p. 444) operation to start detecting topics. Next, it uses the [DescribeTopicsDetectionJob](#) (p. 335) operation to check the status of the topic detection. Finally, it calls [ListTopicsDetectionJobs](#) (p. 400) to show a list of all jobs submitted for the account.

```

import boto3
import json
from bson import json_util

comprehend = boto3.client(service_name='comprehend', region_name='region')

input_s3_url = "s3://<input bucket>/<input path>"
input_doc_format = "ONE_DOC_PER_FILE"
output_s3_url = "s3://<output bucket>/<output path>"
data_access_role_arn = "<arn>:aws:iam::<account ID>:role/<data access role>"
number_of_topics = 10

input_data_config = {"S3Uri": input_s3_url, "InputFormat": input_doc_format}
output_data_config = {"S3Uri": output_s3_url}

start_topics_detection_job_result =
    comprehend.start_topics_detection_job(NumberOfTopics=number_of_topics,
                                         InputDataConfig=input_data_config,
                                         OutputDataConfig=output_data_config,
                                         )

```

```

        DataAccessRoleArn=data_access_role_arn)

print('start_topics_detection_job_result: ' +
    json.dumps(start_topics_detection_job_result))

job_id = start_topics_detection_job_result["JobId"]

print('job_id: ' + job_id)

describe_topics_detection_job_result =
    comprehend.describe_topics_detection_job(JobId=job_id)

print('describe_topics_detection_job_result: ' +
    json.dumps(describe_topics_detection_job_result, default=json_util.default))

list_topics_detection_jobs_result = comprehend.list_topics_detection_jobs()

print('list_topics_detection_jobs_result: ' + json.dumps(list_topics_detection_jobs_result,
    default=json_util.default))

```

## Topic modeling using the AWS SDK for .NET

The following C# program detects the topics in a document collection. It uses the [StartTopicsDetectionJob \(p. 444\)](#) operation to start detecting topics. Next, it uses the [DescribeTopicsDetectionJob \(p. 335\)](#) operation to check the status of the topic detection. Finally, it calls [ListTopicsDetectionJobs \(p. 400\)](#) to show a list of all jobs submitted for the account.

The .NET example in this section uses the [AWS SDK for .NET](#). You can use the [AWS Toolkit for Visual Studio](#) to develop AWS applications using .NET. It includes helpful templates and the AWS Explorer for deploying applications and managing services. For a .NET developer perspective of AWS, see the [AWS guide for .NET developers](#).

```

using System;
using Amazon.Comprehend;
using Amazon.Comprehend.Model;

namespace Comprehend
{
    class Program
    {
        // Helper method for printing properties
        static private void PrintJobProperties(TopicsDetectionJobProperties props)
        {
            Console.WriteLine("JobId: {0}, JobName: {1}, JobStatus: {2}, NumberOfTopics: {3}\nInputS3Uri: {4}, InputFormat: {5}, OutputS3Uri: {6}",
                props.JobId, props.JobName, props.JobStatus, props.NumberOfTopics,
                props.InputDataConfig.S3Uri, props.InputDataConfig.InputFormat,
                props.OutputDataConfig.S3Uri);
        }

        static void Main(string[] args)
        {
            String text = "It is raining today in Seattle";

            AmazonComprehendClient comprehendClient = new
            AmazonComprehendClient(Amazon.RegionEndpoint.USWest2);

            String inputS3Uri = "s3://input bucket/input path";
            InputFormat inputDocFormat = InputFormat.ONE_DOC_PER_FILE;
            String outputS3Uri = "s3://output bucket/output path";
            String dataAccessRoleArn = "arn:aws:iam::account ID:role/data access role";
            int numberOfTopics = 10;

```

```
StartTopicsDetectionJobRequest startTopicsDetectionJobRequest = new
StartTopicsDetectionJobRequest()
{
    InputDataConfig = new InputDataConfig()
    {
        S3Uri = inputS3Uri,
        InputFormat = inputDocFormat
    },
    OutputDataConfig = new OutputDataConfig()
    {
        S3Uri = outputS3Uri
    },
    DataAccessRoleArn = dataAccessRoleArn,
    NumberOfTopics = numberOfTopics
};

StartTopicsDetectionJobResponse startTopicsDetectionJobResponse =
comprehendClient.StartTopicsDetectionJob(startTopicsDetectionJobRequest);

String jobId = startTopicsDetectionJobResponse.JobId;
Console.WriteLine("JobId: " + jobId);

DescribeTopicsDetectionJobRequest describeTopicsDetectionJobRequest = new
DescribeTopicsDetectionJobRequest()
{
    JobId = jobId
};

DescribeTopicsDetectionJobResponse describeTopicsDetectionJobResponse =
comprehendClient.DescribeTopicsDetectionJob(describeTopicsDetectionJobRequest);

PrintJobProperties(describeTopicsDetectionJobResponse.TopicsDetectionJobProperties);

ListTopicsDetectionJobsResponse listTopicsDetectionJobsResponse =
comprehendClient.ListTopicsDetectionJobs(new ListTopicsDetectionJobsRequest());
foreach (TopicsDetectionJobProperties props in
listTopicsDetectionJobsResponse.TopicsDetectionJobPropertiesList)
    PrintJobProperties(props);
}
}
```

# Personally identifiable information (PII)

You can use the Amazon Comprehend console or APIs to detect *personally identifiable information (PII)* in English text documents. PII is a textual reference to personal data that could be used to identify an individual. PII examples include addresses, bank account numbers, and phone numbers.

With PII detection, you have the choice of locating the PII entities or redacting the PII entities in the text. To locate PII entities, you can use real-time analysis or an asynchronous batch job. To redact the PII entities, you must use an asynchronous batch job.

You can use Amazon S3 Object Lambda Access Points for personally identifiable information (PII) to control the retrieval of documents from your Amazon S3 bucket. You can control access to documents that contain PII and redact personally identifiable information from the documents. For more information, see [Using Amazon S3 object Lambda access points for personally identifiable information \(PII\) \(p. 249\)](#).

## Topics

- [Detecting PII entities \(p. 83\)](#)
- [Labeling PII entities \(p. 88\)](#)
- [PII real-time analysis \(Console\) \(p. 88\)](#)
- [PII asynchronous analysis jobs \(Console\) \(p. 90\)](#)
- [PII real-time analysis \(API\) \(p. 91\)](#)
- [PII asynchronous analysis jobs \(API\) \(p. 93\)](#)

## Detecting PII entities

You can use Amazon Comprehend to detect *PII entities* in English text documents. A PII entity is a specific type of personally identifiable information (PII). Use PII detection to locate the PII entities or redact the PII entities in the text.

## Topics

- [Locate PII entities \(p. 83\)](#)
- [Redact PII entities \(p. 84\)](#)
- [PII universal entity types \(p. 84\)](#)
- [Country-specific PII entity types \(p. 86\)](#)

## Locate PII entities

To locate the PII entities in your text, you can quickly analyze a single document using real-time analysis. You also can start an asynchronous batch job on a collection of documents.

You can use the console or the API for real-time analysis of a single document. Your input text can include up to 5,000 bytes of UTF-8 encoded characters.

For example, you can submit the following input text to locate the PII entities:

*Hello Paulo Santos. The latest statement for your credit card account 1111-0000-1111-0000 was mailed to 123 Any Street, Seattle, WA 98109.*

The output includes the information that "Paul Santos" has the type NAME, "1111-0000-1111-0000" has the type CREDIT\_DEBIT\_NUMBER, and "123 Any Street, Seattle, WA 98109" has the type ADDRESS.

Amazon Comprehend returns a list of detected PII entities, with the following information for each PII entity:

- A score that estimates the probability that the detected text span is the detected entity type.
- The PII entity type.
- The location of the PII entity in the document, specified as character offsets for the start and the end of the entity.

For example, the input text mentioned previously produces the following response:

```
{  
    "Entities": [  
        {  
            "Score": 0.9999669790267944,  
            "Type": "NAME",  
            "BeginOffset": 6,  
            "EndOffset": 18  
        },  
        {  
            "Score": 0.8905550241470337,  
            "Type": "CREDIT_DEBIT_NUMBER",  
            "BeginOffset": 69,  
            "EndOffset": 88  
        },  
        {  
            "Score": 0.9999889731407166,  
            "Type": "ADDRESS",  
            "BeginOffset": 103,  
            "EndOffset": 138  
        }  
    ]  
}
```

## Redact PII entities

To redact the PII entities in your text, you can use the console or the API to start an asynchronous batch job. Amazon Comprehend returns a copy of the input text with redactions for each PII entity.

For example, you can submit the following input text to redact the PII entities:

*Hello Paulo Santos. The latest statement for your credit card account 1111-0000-1111-0000 was mailed to 123 Any Street, Seattle, WA 98109.*

The output file includes the following text:

*Hello \*\*\*\*\* \*\*\*\*\*. The latest statement for your credit card account \*\*\*\*\* was mailed to \*\*\* \*\*\*  
\*\*\*\*\* \*\*\*\*\* \*\* \*\*\*\*\*.*

## PII universal entity types

Some PII entity types are universal (not specific to individual countries), such as email addresses and credit card numbers. Amazon Comprehend detects the following types of universal PII entities:

## ADDRESS

A physical address, such as "100 Main Street, Anytown, USA" or "Suite #12, Building 123". An address can include information such as the street, building, location, city, state, country, county, zip code, precinct, and neighborhood.

## AGE

An individual's age, including the quantity and unit of time. For example, in the phrase "I am 40 years old," Amazon Comprehend recognizes "40 years" as an age.

## AWS\_ACCESS\_KEY

A unique identifier that's associated with a secret access key; you use the access key ID and secret access key to sign programmatic AWS requests cryptographically.

## AWS\_SECRET\_KEY

A unique identifier that's associated with an access key. You use the access key ID and secret access key to sign programmatic AWS requests cryptographically.

## CREDIT\_DEBIT\_CVV

A three-digit card verification code (CVV) that is present on VISA, MasterCard, and Discover credit and debit cards. For American Express credit or debit cards, the CVV is a four-digit numeric code.

## CREDIT\_DEBIT\_EXPIRY

The expiration date for a credit or debit card. This number is usually four digits long and is often formatted as month/year or MM/YY. Amazon Comprehend recognizes expiration dates such as 01/21, 01/2021, and Jan 2021.

## CREDIT\_DEBIT\_NUMBER

The number for a credit or debit card. These numbers can vary from 13 to 16 digits in length. However, Amazon Comprehend also recognizes credit or debit card numbers when only the last four digits are present.

## DATE\_TIME

A date can include a year, month, day, day of week, or time of day. For example, Amazon Comprehend recognizes "January 19, 2020" or "11 am" as dates. Amazon Comprehend will recognize partial dates, date ranges, and date intervals. It will also recognize decades, such as "the 1990s".

## DRIVER\_ID

The number assigned to a driver's license, which is an official document permitting an individual to operate one or more motorized vehicles on a public road. A driver's license number consists of alphanumeric characters.

## EMAIL

An email address, such as marymajor@email.com.

## INTERNATIONAL\_BANK\_ACCOUNT\_NUMBER

An International Bank Account Number has specific formats in each country. See [www.iban.com/structure](http://www.iban.com/structure).

## IP\_ADDRESS

An IPv4 address, such as 198.51.100.0.

## LICENSE\_PLATE

A license plate for a vehicle is issued by the state or country where the vehicle is registered. The format for passenger vehicles is typically five to eight digits, consisting of upper-case letters and numbers. The format varies depending on the location of the issuing state or country.

## **MAC\_ADDRESS**

A media access control (MAC) address is a unique identifier assigned to a network interface controller (NIC).

## **NAME**

An individual's name. This entity type does not include titles, such as Dr., Mr., Mrs., or Miss. Amazon Comprehend does not apply this entity type to names that are part of organizations or addresses. For example, Amazon Comprehend recognizes the "John Doe Organization" as an organization, and it recognizes "Jane Doe Street" as an address.

## **PASSWORD**

An alphanumeric string that is used as a password, such as "\*very20special#pass\*".

## **PHONE**

A phone number. This entity type also includes fax and pager numbers.

## **PIN**

A four-digit personal identification number (PIN) with which you can access your bank account.

## **SWIFT\_CODE**

A SWIFT code is a standard format of Bank Identifier Code (BIC) used to specify a particular bank or branch. Banks use these codes for money transfers such as international wire transfers.

SWIFT codes consist of eight or 11 characters. The 11-digit codes refer to specific branches, while eight-digit codes (or 11-digit codes ending in 'XXX') refer to the head or primary office.

## **URL**

A web address, such as [www.example.com](http://www.example.com).

## **USERNAME**

A user name that identifies an account, such as a login name, screen name, nick name, or handle.

## **VEHICLE\_IDENTIFICATION\_NUMBER**

A Vehicle Identification Number (VIN) uniquely identifies a vehicle. VIN content and format are defined in the ISO 3779 specification. Each country has specific codes and formats for VINS.

# Country-specific PII entity types

Some PII entity types are country-specific, such as passport numbers and other government-issued ID numbers. Amazon Comprehend detects the following types of country-specific PII entities:

## **CA\_HEALTH\_NUMBER**

A Canadian Health Service Number is a 10-digit unique identifier, required for individuals to access healthcare benefits.

## **CA\_SOCIAL\_INSURANCE\_NUMBER**

A Canadian Social Insurance Number (SIN) is a nine-digit unique identifier, required for individuals to access government programs and benefits.

The SIN is formatted as three groups of three digits, such as 123-456-789. A SIN can be validated through a simple check-digit process called the [Luhn algorithm](#).

### **IN\_AADHAAR**

An Indian Aadhaar is a 12-digit unique identification number issued by the Indian government to the residents of India. The Aadhaar format has a space or hyphen after the fourth and eighth digit.

### **IN\_NREGA**

An Indian National Rural Employment Guarantee Act (NREGA) number consists of two letters followed by 14 numbers.

### **IN\_PERMANENT\_ACCOUNT\_NUMBER**

An Indian Permanent Account Number is a 10-digit unique alphanumeric number issued by the Income Tax Department.

### **IN\_VOTER\_NUMBER**

An Indian Voter ID consists of three letters followed by seven numbers.

### **UK\_NATIONAL\_HEALTH\_SERVICE\_NUMBER**

A UK National Health Service Number is a 10-17 digit number, such as **485 777 3456**. The current system formats the 10-digit number with spaces after the third and sixth digits. The final digit is an error-detecting checksum.

The 17-digit number format has spaces after the 10th and 13th digits.

### **UK\_NATIONAL\_INSURANCE\_NUMBER**

A UK National Insurance Number (NINO) provides individuals with access to National Insurance (social security) benefits. It is also used for some purposes in the UK tax system.

The number is nine digits long and starts with two letters, followed by six numbers and one letter. A NINO can be formatted with a space or a dash after the two letters and after the second, forth, and sixth digits.

### **UK\_UNIQUE\_TAXPAYER\_REFERENCE\_NUMBER**

A UK Unique Taxpayer Reference (UTR) is a 10-digit number that identifies a taxpayer or a business.

### **BANK\_ACCOUNT\_NUMBER**

A US bank account number, which is typically 10 to 12 digits long. Amazon Comprehend also recognizes bank account numbers when only the last four digits are present.

### **BANK\_ROUTING**

A US bank account routing number. These are typically nine digits long, but Amazon Comprehend also recognizes routing numbers when only the last four digits are present.

### **PASSPORT\_NUMBER**

A US passport number. Passport numbers range from six to nine alphanumeric characters.

### **US\_INDIVIDUAL\_TAX\_IDENTIFICATION\_NUMBER**

A US Individual Taxpayer Identification Number (ITIN) is a nine-digit number that starts with a "9" and contain a "7" or "8" as the fourth digit. An ITIN can be formatted with a space or a dash after the third and forth digits.

### **SSN**

A US Social Security Number (SSN) is a nine-digit number that is issued to US citizens, permanent residents, and temporary working residents. Amazon Comprehend also recognizes Social Security Numbers when only the last four digits are present.

## Labeling PII entities

When you run PII detection, Amazon Comprehend returns the labels of identified PII entity types. For example, if you submit the following input text to Amazon Comprehend:

*Hello Paulo Santos. The latest statement for your credit card account 1111-0000-1111-0000 was mailed to 123 Any Street, Seattle, WA 98109.*

The output includes labels that represent PII entity types along with a confidence score of the accuracy. In this case, the document text "Paul Santos", "1111-0000-1111-0000" and "123 Any Street, Seattle, WA 98109" generate the labels NAME, CREDIT\_DEBIT\_NUMBER, and ADDRESS respectively as PII entity types. For more information about supported entity types, see [PII universal entity types \(p. 84\)](#).

Amazon Comprehend provides the following information for each label:

- The label name of the PII entity type.
- A score that estimates the probability that the detected text is labeled as a PII entity type.

The input text example above results in the following JSON output.

```
{  
    "Labels": [  
        {  
            "Name": "NAME",  
            "Score": 0.9149109721183777  
        },  
        {  
            "Name": "CREDIT_DEBIT_NUMBER",  
            "Score": 0.5698626637458801  
        },  
        {  
            "Name": "ADDRESS",  
            "Score": 0.9951046109199524  
        }  
    ]  
}
```

## PII real-time analysis (Console)

You can use the console to run PII real-time detection of a text document up to 5,000 characters long. The results are shown in the console so that you can review the analysis.

### Run PII detection real-time analysis using the built-in model

1. Sign in to the AWS Management Console and open the [Amazon Comprehend console](#).
2. From the left menu, choose **Real-time analysis**.
3. Under **Input type**, choose **Built-in** for **Analysis type**.
4. Enter the text you want to analyze.
5. Choose **Analyze**. The console displays the text analysis results in the **Insights** panel. The **PII** tab lists the PII entities detected in your input text.

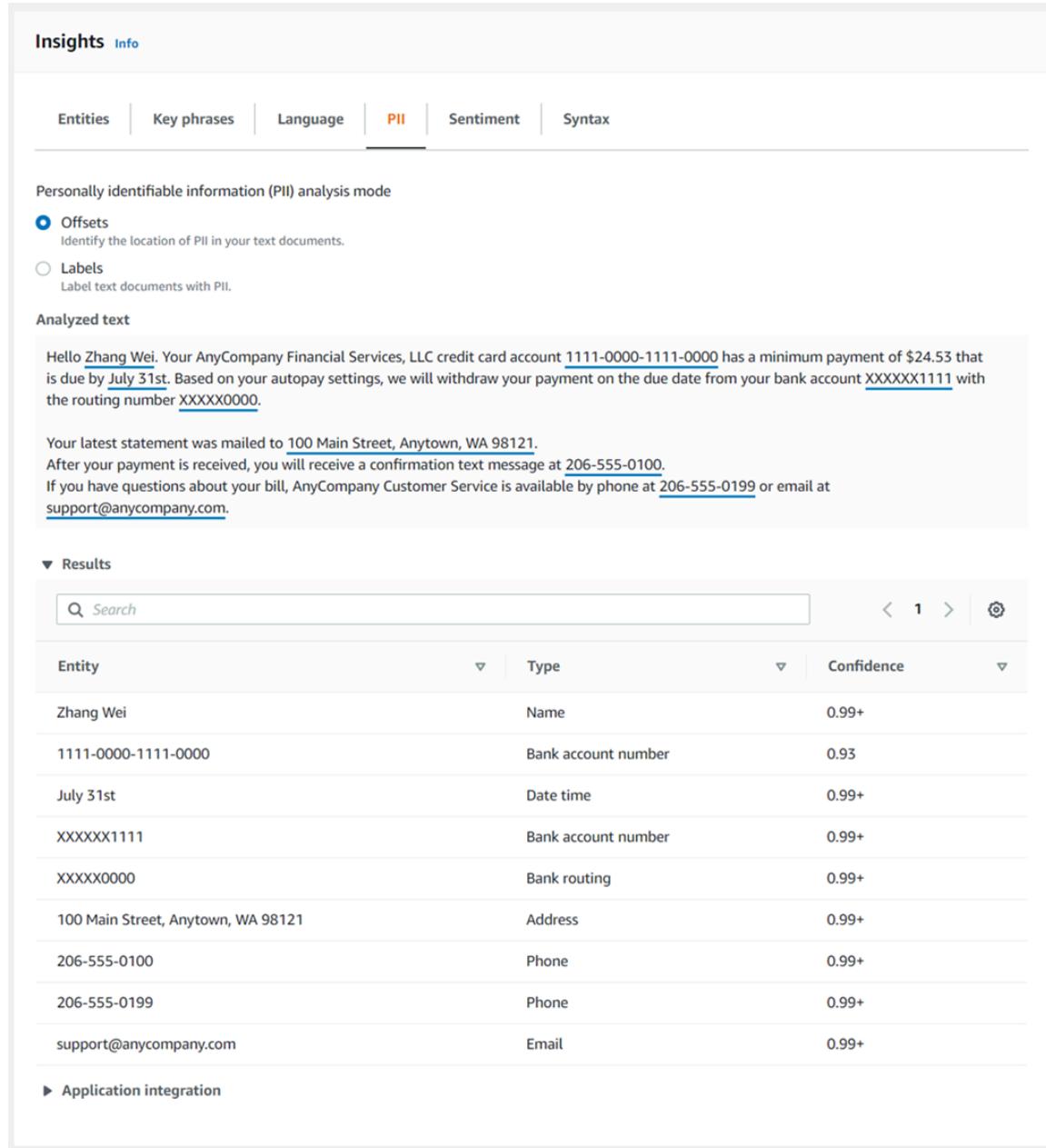
In the **Insights** panel, the **PII** tab displays results for two analysis modes:

- **Offsets** – identifies the location of PII in the text document.

- **Labels** – identifies the labels of identified PII entity types.

## Offsets

The **Offsets** analysis mode identifies the location of PII in your text documents. For more information, see [Locate PII entities \(p. 83\)](#).



The screenshot shows the Amazon Comprehend Insights interface. At the top, there is a navigation bar with tabs: Entities, Key phrases, Language, **PII**, Sentiment, and Syntax. Below the navigation bar, it says "Personally identifiable information (PII) analysis mode". Under this, there are two options: "Offsets" (selected) and "Labels". The "Offsets" option is described as "Identify the location of PII in your text documents." The "Labels" option is described as "Label text documents with PII." Below these options, there is a section titled "Analyzed text" containing a sample text message from a bank statement. The analyzed text includes several underlined PII entities: "Zhang Wei", "1111-0000-1111-0000", "July 31st", "XXXXXX1111", "XXXXX0000", "100 Main Street, Anytown, WA 98121", "206-555-0100", "206-555-0199", and "support@anycompany.com". At the bottom of the analyzed text section, there is a link to "Application integration". Below the analyzed text, there is a "Results" section with a table. The table has columns: Entity, Type, and Confidence. The table lists the following entities:

Entity	Type	Confidence
Zhang Wei	Name	0.99+
1111-0000-1111-0000	Bank account number	0.93
July 31st	Date time	0.99+
XXXXXX1111	Bank account number	0.99+
XXXXX0000	Bank routing	0.99+
100 Main Street, Anytown, WA 98121	Address	0.99+
206-555-0100	Phone	0.99+
206-555-0199	Phone	0.99+
support@anycompany.com	Email	0.99+

## Labels

The **Labels** analysis mode returns the labels of identified PII entity types. For more information, see [Labeling PII entities \(p. 88\)](#).

The screenshot shows the 'Insights' tab selected in the top navigation bar. Below it, tabs for 'Entities', 'Key phrases', 'Language', 'PII' (which is selected), 'Sentiment', and 'Syntax' are visible. A sub-header indicates 'Personally identifiable information (PII) analysis mode'. Two options are shown: 'Offsets' (radio button unselected) and 'Labels' (radio button selected). The 'Labels' option is described as 'Label text documents with PII.' Below this is a section titled 'Results' with a search bar and navigation controls. A table lists detected PII types with their confidence scores:

Type	Confidence
Email	0.99+
Address	0.99+
Bank routing	0.76
Phone	0.76

A link 'Application integration' is also present.

## PII asynchronous analysis jobs (Console)

You can use the console to create async analysis jobs to detect PII entities. For more information about PII entity types, see [Detecting PII entities \(p. 83\)](#).

### To create an analysis job

1. Sign in to the AWS Management Console and open the [Amazon Comprehend console](#).
2. From the left menu, choose **Analysis jobs** and then choose **Create job**.
3. Under **Job settings**, give the analysis job a unique name.
4. For **Analysis type**, choose **Personally identifiable information (PII)**.
5. From **Output mode**, select one of the following choices:
  - **Offsets** – The job output returns the location of each PII entity.
  - **Redactions** – The job output returns a copy of the input text with each PII entry redacted.
6. (Optional) If you choose **Redactions** as the output mode, you can select the PII entity types to redact.
7. Under **Input data**, specify where the input documents are located in Amazon S3:
  - To analyze your own documents, choose **My documents**, and choose **Browse S3** to provide the path to the bucket or folder that contains your files.
  - To analyze samples that are provided by Amazon Comprehend, choose **Example documents**. In this case, Amazon Comprehend uses a bucket that is managed by AWS, and you don't specify the location.
8. (Optional) For **Input format**, specify one of the following formats for your input files:
  - **One document per file** – Each file contains one input document. This is best for collections of large documents.

- **One document per line** – The input is one or more files. Each line in a file is considered a document. This is best for short documents, such as social media postings. Each line must end with a line feed (LF, \n), a carriage return (CR, \r), or both (CRLF, \r\n). You can't use the UTF-8 line separator (u+2028) to end a line.
9. Under **Output data**, choose **Browse S3**. Choose the Amazon S3 bucket or folder where you want Amazon Comprehend to write the output data that is produced by the analysis.
  10. (Optional) To encrypt the output result from your job, choose **Encryption**. Then, choose whether to use a KMS key associated with the current account or one from another account:
    - If you are using a key associated with the current account, choose the key alias or ID for **KMS key ID**.
    - If you are using a key associated with a different account, enter the ARN for the key alias or ID under **KMS key ID**.
- Note**  
For more information on creating and using KMS keys and the associated encryption, see [Key management service \(KMS\)](#).
11. Under **Access permissions**, provide an IAM role that:
    - Grants read access to the Amazon S3 location of your input documents.
    - Grants write access to the Amazon S3 location of your output documents.
    - Includes a trust policy that allows the comprehend.amazonaws.com service principal to assume the role and gain its permissions.

If you don't already have an IAM role with these permissions and an appropriate trust policy, choose [Create an IAM role](#) to create one.

12. When you have finished filling out the form, choose **Create job** to create and start the topic detection job.

The new job appears in the job list with the status field showing the status of the job. The field can be `IN_PROGRESS` for a job that is processing, `COMPLETED` for a job that has finished successfully, and `FAILED` for a job that has an error. You can click on a job to get more information about the job, including any error messages.

When the job is completed, Amazon Comprehend stores the analysis results in the output Amazon S3 location that you specified for the job. For a description of the analysis results, see [Detecting PII entities \(p. 83\)](#).

## PII real-time analysis (API)

Amazon Comprehend provides real-time synchronous API operations to analyze personally identifiable information (PII) in a document.

### Topics

- [Locating PII real-time entities \(API\) \(p. 91\)](#)
- [Labeling PII real-time entities \(API\) \(p. 92\)](#)

## Locating PII real-time entities (API)

To locate PII in a single document, you can use the Amazon Comprehend [DetectPiiEntities \(p. 348\)](#) operation. Your input text can include up to 5,000 bytes of UTF-8 encoded characters.

## Locating PII using (CLI)

The following example uses the `DetectPiiEntities` operation with the AWS CLI.

The example is formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

```
aws comprehend detect-pii-entities \
--text "Hello Paul Santos. The latest statement for your credit card \
account 1111-0000-1111-0000 was mailed to 123 Any Street, Seattle, WA \
98109." \
--language-code en
```

Amazon Comprehend responds with the following:

```
{
    "Entities": [
        {
            "Score": 0.9999669790267944,
            "Type": "NAME",
            "BeginOffset": 6,
            "EndOffset": 18
        },
        {
            "Score": 0.8905550241470337,
            "Type": "CREDIT_DEBIT_NUMBER",
            "BeginOffset": 69,
            "EndOffset": 88
        },
        {
            "Score": 0.9999889731407166,
            "Type": "ADDRESS",
            "BeginOffset": 103,
            "EndOffset": 138
        }
    ]
}
```

## Labeling PII real-time entities (API)

You can use real-time synchronous API operations to return the labels of identified PII entity types. For more information, see [Labeling PII entities \(p. 88\)](#).

## Labeling PII entities (CLI)

The following example uses the `ContainsPiiEntities` operation with the AWS CLI.

The example is formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

```
aws comprehend contains-pii-entities \
--text "Hello Paul Santos. The latest statement for your credit card \
account 1111-0000-1111-0000 was mailed to 123 Any Street, Seattle, WA \
98109." \
--language-code en
```

Amazon Comprehend responds with the following:

```
{
```

```
"Labels": [
    {
        "Name": "NAME",
        "Score": 0.9149109721183777
    },
    {
        "Name": "CREDIT_DEBIT_NUMBER",
        "Score": 0.8905550241470337
    },
    {
        "Name": "ADDRESS",
        "Score": 0.9951046109199524
    }
]
```

## PII asynchronous analysis jobs (API)

### PII async analysis (API)

You can use asynchronous API operations to create analysis jobs to locate or redact PII entities. For more information about PII entity types, see [Detecting PII entities \(p. 83\)](#).

#### Topics

- [Locating PII entities with asynchronous jobs \(API\) \(p. 93\)](#)
- [Redacting PII entities with asynchronous jobs \(API\) \(p. 97\)](#)

## Locating PII entities with asynchronous jobs (API)

Run an asynchronous batch job to locate PII in a collection of documents. To run the job, upload your documents to Amazon S3, and submit a [StartPiiEntitiesDetectionJob \(p. 430\)](#) request.

#### Topics

- [Before you start \(p. 93\)](#)
- [Input parameters \(p. 93\)](#)
- [Async Job methods \(p. 94\)](#)
- [Output file format \(p. 94\)](#)
- [Async analysis using the AWS Command Line Interface \(p. 95\)](#)

## Before you start

Before you start, make sure that you have:

- **Input and output buckets**—Identify the Amazon S3 buckets that you want to use for input files and output files. The buckets must be in the same region as the API that you are calling.
- **IAM service role**—You must have an IAM service role with permission to access your input and output buckets. For more information, see [Role-based permissions required for asynchronous operations \(p. 202\)](#).

## Input parameters

In your request, include the following required parameters:

- **InputDataConfig** – Provide an [InputDataConfig \(p. 539\)](#) definition for your request, which includes the input properties for the job. For the `S3Uri` parameter, specify the Amazon S3 location of your input documents.
- **OutputDataConfig** – Provide an [OutputDataConfig \(p. 546\)](#) definition for your request, which includes the output properties for the job. For the `S3Uri` parameter, specify the Amazon S3 location where Amazon Comprehend writes the results of its analysis.
- **DataAccessRoleArn** – Provide the Amazon Resource Name (ARN) of an AWS Identity and Access Management role. This role must grant Amazon Comprehend read access to your input data and write access to your output location in Amazon S3. For more information, see [Role-based permissions required for asynchronous operations \(p. 202\)](#).
- **Mode** – Set this parameter to `ONLY_OFFSETS`. With this setting, the output provides the character offsets that locate each PII entity in the input text. The output also includes confidence scores and PII entity types.
- **LanguageCode** – Set this parameter to `en`. Amazon Comprehend supports PII detection in only English text.

## Async Job methods

The `StartPiiEntitiesDetectionJob` returns a job ID, so that you can monitor the progress of the job and retrieve the job status when it completes.

To monitor the progress of an analysis job, provide the job ID to the [DescribePiiEntitiesDetectionJob \(p. 323\)](#) operation. The response from `DescribePiiEntitiesDetectionJob` contains the `JobStatus` field with the current status of the job. A successful job transitions through the following states:

`SUBMITTED` -> `IN_PROGRESS` -> `COMPLETED`.

After an analysis job has finished (`JobStatus` is `COMPLETED`, `FAILED`, or `STOPPED`), use `DescribePiiEntitiesDetectionJob` to get the location of the results. If the job status is `COMPLETED`, the response includes an `OutputDataConfig` field that contains a field with the Amazon S3 location of the output file.

For additional details about the steps to follow for Amazon Comprehend async analysis, see [Asynchronous batch processing \(p. 34\)](#).

## Output file format

The output file, `output.tar.gz`, is a compressed archive that contains the results of the analysis.

The following is an example an output file from an analysis job that detected PII entities in documents. The format of the input is one document per line.

```
{  
  "Entities": [  
    {  
      "Type": "NAME",  
      "BeginOffset": 40,  
      "EndOffset": 69,  
      "Score": 0.999995  
    },  
    {  
      "Type": "ADDRESS",  
      "BeginOffset": 247,  
      "EndOffset": 253,  
      "Score": 0.998828  
    },  
    {  
      "Type": "BANK_ACCOUNT_NUMBER",  
    }  
  ]  
}
```

```

        "BeginOffset": 406,
        "EndOffset": 411,
        "Score": 0.693283
    }
],
"File": "doc.txt",
"Line": 0
},
{
"Entities": [
{
    "Type": "SSN",
    "BeginOffset": 1114,
    "EndOffset": 1124,
    "Score": 0.999999
},
{
    "Type": "EMAIL",
    "BeginOffset": 3742,
    "EndOffset": 3775,
    "Score": 0.999993
},
{
    "Type": "PIN",
    "BeginOffset": 4098,
    "EndOffset": 4102,
    "Score": 0.999995
}
],
"File": "doc.txt",
"Line": 1
}

```

The following is an example of output from an analysis where the format of the input is one document per file.

```

{
"Entities": [
{
    "Type": "NAME",
    "BeginOffset": 40,
    "EndOffset": 69,
    "Score": 0.999995
},
{
    "Type": "ADDRESS",
    "BeginOffset": 247,
    "EndOffset": 253,
    "Score": 0.998828
},
{
    "Type": "BANK_ROUTING",
    "BeginOffset": 279,
    "EndOffset": 289,
    "Score": 0.999999
}
],
"File": "doc.txt"
}

```

## Async analysis using the AWS Command Line Interface

The following example uses the `StartPiiEntitiesDetectionJob` operation with the AWS CLI.

The example is formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

```
aws comprehend start-pii-entities-detection-job \
--region region \
--job-name job name \
--cli-input-json file://path to JSON input file
```

For the `cli-input-json` parameter you supply the path to a JSON file that contains the request data, as shown in the following example.

```
{
    "InputDataConfig": {
        "S3Uri": "s3://input bucket/input path",
        "InputFormat": "ONE_DOC_PER_LINE"
    },
    "OutputDataConfig": {
        "S3Uri": "s3://output bucket/output path"
    },
    "DataAccessRoleArn": "arn:aws:iam::account ID:role/data access role"
    "LanguageCode": "en",
    "Mode": "ONLY_OFFSETS"
}
```

If the request to start the events detection job was successful, you will receive a response similar to the following:

```
{
    "JobId": "5d2fbe6e...e2c",
    "JobArn": "arn:aws:comprehend:us-west-2:123456789012:pii-entities-detection-
job/5d2fbe6e...e2c",
    "JobStatus": "SUBMITTED",
}
```

You can use the [DescribeEventsDetectionJob \(p. 318\)](#) operation to get the status of an existing job. If the request to start the events detection job was successful, you will receive a response similar to the following:

```
aws comprehend describe-pii-entities-detection-job \
--region region \
--job-id job ID
```

When the job completes successfully, you receive a response similar to the following:

```
{
    "PiiEntitiesDetectionJobProperties": {
        "JobId": "5d2fbe6e...e2c",
        "JobArn": "arn:aws:comprehend:us-west-2:123456789012:pii-entities-detection-
job/5d2fbe6e...e2c",
        "JobName": "piicLItest3",
        "JobStatus": "COMPLETED",
        "SubmitTime": "2022-05-05T14:54:06.169000-07:00",
        "EndTime": "2022-05-05T15:00:17.007000-07:00",
        "InputDataConfig": {
            (identical to the input data that you provided with the request)
        }
    }
}
```

# Redacting PII entities with asynchronous jobs (API)

To redact the PII entities in your text, you start an asynchronous batch job. To run the job, upload your documents to Amazon S3, and submit a [StartPiiEntitiesDetectionJob \(p. 430\)](#) request.

## Topics

- [Before you start \(p. 97\)](#)
- [Input parameters \(p. 97\)](#)
- [Output file format \(p. 98\)](#)
- [PII redaction using the AWS Command Line Interface \(p. 98\)](#)

## Before you start

Before you start, make sure that you have:

- **Input and output buckets**—Identify the Amazon S3 buckets that you want to use for input files and output files. The buckets must be in the same region as the API that you are calling.
- **IAM service role**—You must have an IAM service role with permission to access your input and output buckets. For more information, see [Role-based permissions required for asynchronous operations \(p. 202\)](#).

## Input parameters

In your request, include the following required parameters:

- **InputDataConfig** – Provide an [InputDataConfig \(p. 539\)](#) definition for your request, which includes the input properties for the job. For the `S3Uri` parameter, specify the Amazon S3 location of your input documents.
- **OutputDataConfig** – Provide an [OutputDataConfig \(p. 546\)](#) definition for your request, which includes the output properties for the job. For the `S3Uri` parameter, specify the Amazon S3 location where Amazon Comprehend writes the results of its analysis.
- **DataAccessRoleArn** – Provide the Amazon Resource Name (ARN) of an AWS Identity and Access Management role. This role must grant Amazon Comprehend read access to your input data and write access to your output location in Amazon S3. For more information, see [Role-based permissions required for asynchronous operations \(p. 202\)](#).
- **Mode** – Set this parameter to `ONLY_REDACTION`. With this setting, Amazon Comprehend writes a copy of your input documents to the output location in Amazon S3. In this copy, each PII entity is redacted.
- **RedactionConfig** – Provide a [RedactionConfig \(p. 555\)](#) definition for your request, which includes the configuration parameters for the redaction. Specify the types of PII to redact, and specify whether each PII entity is replaced with the name of its type or a character of your choice:
  - Specify the PII entity types to redact in the `PiiEntityType` array. To redact all entity types, set the array value to `[ "ALL" ]`.
  - To replace each PII entity with its type, set the `MaskMode` parameter to `REPLACE_WITH_PII_ENTITY_TYPE`. For example, with this setting, the PII entity "Jane Doe" is replaced with "[NAME]".
  - To replace the characters in each PII entity with a character of your choice, set the `MaskMode` parameter to `MASK`, and set the `MaskCharacter` parameter to the replacement character. Provide only a single character. Valid characters are !, #, \$, %, &, \*, and @. For example, with this setting, the PII entity "Jane Doe" can be replaced with "\*\*\*\* \*\*\*"
- **LanguageCode** – Set this parameter to `en`. Amazon Comprehend supports PII detection in only English text.

## Output file format

The following example shows the input and output files from an analysis job that redacts PII. The format of the input is one document per line.

```
{  
Managing Your Accounts Primary Branch Canton John Doe Phone Number 443-573-4800 123 Main  
StreetBaltimore, MD 21224  
Online Banking HowardBank.com Telephone 1-877-527-2703 Bank 3301 Boston Street, Baltimore,  
MD 21224}
```

The analysis job to redact this input file produces the following output file.

```
{  
Managing Your Accounts Primary Branch ***** ***** Phone Number *****  
*****  
Online Banking ***** Telephone ***** Bank  
*****  
}
```

## PII redaction using the AWS Command Line Interface

The following example uses the `StartPiiEntitiesDetectionJob` operation with the AWS CLI.

The example is formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

```
aws comprehend start-pii-entities-detection-job \  
--region region \  
--job-name job name \  
--cli-input-json file://path to JSON input file
```

For the `cli-input-json` parameter you supply the path to a JSON file that contains the request data, as shown in the following example.

```
{  
    "InputDataConfig": {  
        "S3Uri": "s3://input bucket/input path",  
        "InputFormat": "ONE_DOC_PER_LINE"  
    },  
    "OutputDataConfig": {  
        "S3Uri": "s3://output bucket/output path"  
    },  
    "DataAccessRoleArn": "arn:aws:iam::account ID:role/data access role"  
    "LanguageCode": "en",  
    "Mode": "ONLY_REDACTION"  
    "RedactionConfig": {  
        "MaskCharacter": "*",  
        "MaskMode": "MASK",  
        "PiiEntityTypes": [ "ALL" ]  
    }  
}
```

If the request to start the events detection job was successful, you will receive a response similar to the following:

```
{
```

```
    "JobId": "7c4fbe6e...e5b"
    "JobArn": "arn:aws:comprehend:us-west-2:123456789012:pii-entities-detection-
job/7c4fbe6e...e5b"
    "JobStatus": "SUBMITTED",
}
```

You can use the [DescribeEventsDetectionJob](#) (p. 318) operation to get the status of an existing job.

```
aws comprehend describe-pii-entities-detection-job \
--region region \
--job-id job ID
```

When the job completes successfully, you receive a response similar to the following:

```
{
  "PiiEntitiesDetectionJobProperties": {
    "JobId": "7c4fbe6e...e5b"
    "JobArn": "arn:aws:comprehend:us-west-2:123456789012:pii-entities-detection-
job/7c4fbe6e...e5b"
    "JobName": "piiCLlredtest1",
    "JobStatus": "COMPLETED",
    "SubmitTime": "2022-05-05T14:54:06.169000-07:00",
    "EndTime": "2022-05-05T15:00:17.007000-07:00",
    "InputDataConfig": {
      (identical to the input data that you provided with the request)
    }
  }
}
```

# Custom classification

Use *custom classification* to organize your documents into categories (classes) that you define. Custom classification is a two-step process. First, you train a custom classification model (also called a classifier) to recognize the classes that are of interest to you. Then you use your model to classify any number of document sets.

For example, you can categorize the content of support requests so that you can route the request to the proper support team. Or you can categorize emails received from customers to provide guidance on the requests that customers are making. You can combine Amazon Comprehend with Amazon Transcribe to convert speech to text and then to classify the requests coming from support phone calls.

You can have multiple custom classifiers in your account, each trained using different data. When you submit a classification job, you choose which classifier to use. Amazon Comprehend returns results based on that classifier, how it was trained, and whether it was trained using multi-class or multi-label mode. For multi-class mode, you can classify a single document synchronously (in real-time) or classify a large document or set of documents asynchronously. The multi-label mode supports asynchronous jobs only.

## Topics

- [Preparing training data \(p. 100\)](#)
- [Training classification models \(p. 105\)](#)
- [Running custom classifier models \(p. 118\)](#)

## Preparing training data

You can classify your documents using two modes: multi-class or multi-label. Some of the input file formats are different for each mode, so you choose which mode to use when creating your data for training the model.

The concept of *class* is used for both modes. It's a custom category that applies to the document being analyzed. However, each mode uses class differently. Multi-class mode associates only a single class with each document. Multi-label mode associates more than one class with a document. The training data formats are different for each mode as well.

You can train a custom classifier by using any of the following languages that work with Amazon Comprehend: English, Spanish, German, Italian, French, or Portuguese. However, you can only train the classifier in one language. Classifiers do not support multiple languages.

To train a custom classifier (custom model), identify the classes you want to use for classification. For example, **pricing**, **defect**, or **profanity**. Next, identify examples of documents for each of these classes. For each class, provide a minimum of 10 documents for training. For example, if you have 10 possible classes, you need a total of at least 100 classified documents to train the model. For more accurate training, we recommend at least 50 documents or more for each class.

### Note

Even though you can use multiple classes in a classifier, no hierarchy is determined by them when you use the classifier on a document.

We recommend that you train the model with 50 or more training documents for each class. While a minimum of 10 training documents for each class is required, you get better accuracy with more documents. The total size of the training documents must be less than 5 GB.

## Topics

- [Multi-class mode \(p. 101\)](#)
- [Multi-label mode \(p. 102\)](#)

## Multi-class mode

In multi-class classification, each document can have one and only one class assigned to it. The individual classes are mutually exclusive. For example, a movie can be classed as a documentary or as science fiction, but not both at the same time.

After you train the custom classifier, you can analyze documents in either asynchronous or synchronous operations. You can analyze a large number of documents at once using the asynchronous operation. The resulting analysis is returned in a separate file. Using the synchronous operation, you can only analyze a single document, but you can get results in real time. These options are not available when you use multi-label mode.

To train a custom classifier, you must provide labeled training data. The labels in your training data should resemble the type of output that the trained model produces later when you provide unlabeled input. You can provide training data as a CSV file or as an augmented manifest file from SageMaker Ground Truth.

### CSV file

To train a custom classifier, you can provide training data as a two-column CSV file. In it, labels are provided in the first column, and documents are provided in the second.

Classes can be any valid UTF-8 string. We suggest classes that are clear and don't overlap in meaning. They can have white space, and they can consist of multiple words connected by underscores or hyphens.

Training documents must end with `\n` or `\r\n` and be valid UTF-8 in a CSV file.

The data must be in two columns. Do not include headers for the individual columns. Including headers in your file may cause runtime errors. Each line of the file contains a single class and the text of a document that demonstrates that class.

```
CLASS,Text of document 1
CLASS,Text of document 2
CLASS,Text of document 3
```

For example, the following line belongs to a CSV file that trains a custom classifier to detect whether an email message is spam:

```
SPAM, "Paulo, your $1000 award is waiting for you! Claim it while you still can at http://example.com."
```

### Augmented manifest file

An augmented manifest file is a labeled dataset that is produced by SageMaker Ground Truth. Ground Truth is a data labeling service that helps you—or a workforce that you employ—build training datasets for machine learning models. Amazon Comprehend accepts augmented manifest files as training data for custom models. You can provide these files when you create a custom classifier by using the Amazon Comprehend console or the [CreateDocumentClassifier \(p. 277\)](#) API action.

For more information about Ground Truth and the output that it produces, see [Use Amazon SageMaker Ground Truth to Label Data](#) in the *Amazon SageMaker Developer Guide*.

Augmented manifest files are in JSON lines format. In these files, each line is a complete JSON object that contains a training document and its associated labels. The following example is an augmented manifest file that trains a custom classifier to determine whether an email message is spam:

```
{"source":"Document 1 text","MultiClassJob":0,"MultiClassJob-metadata":
{"confidence":0.62,"job-name":"labeling-job/multiclassjob","class-name":"not_spam","human-
```

```
annotated": "yes", "creation-date": "2020-05-21T17:36:45.814354", "type": "groundtruth/text-classification"}}
{"source": "Document 2 text", "MultiClassJob": 1, "MultiClassJob-metadata": {"confidence": 0.81, "job-name": "labeling-job/multiclassjob", "class-name": "spam", "human-annotated": "yes", "creation-date": "2020-05-21T17:37:51.970530", "type": "groundtruth/text-classification"}}
{"source": "Document 3 text", "MultiClassJob": 1, "MultiClassJob-metadata": {"confidence": 0.81, "job-name": "labeling-job/multiclassjob", "class-name": "spam", "human-annotated": "yes", "creation-date": "2020-05-21T17:37:51.970566", "type": "groundtruth/text-classification"}}
```

Each line in this JSON lines file is a complete JSON object, where the attributes include the document text, a single class name, and other metadata from Ground Truth. The following example is a single JSON object in the augmented manifest file, but it's formatted for readability:

```
{
    "source": "Paulo, your $1000 award is waiting for you! Claim it while you still can at http://example.com.",
    "MultiClassJob": 0,
    "MultiClassJob-metadata": {
        "confidence": 0.98,
        "job-name": "labeling-job/multiclassjob",
        "class-name": "spam",
        "human-annotated": "yes",
        "creation-date": "2020-05-21T17:36:45.814354",
        "type": "groundtruth/text-classification"
    }
}
```

In this example, the `source` attribute provides the text of the training document, and the `MultiClassJob` attribute assigns the index of a class from a classification list. The name of the `MultiClassJob` attribute is arbitrary, and you provide a name of your choice when you define the labeling job in Ground Truth.

In this example, the `MultiClassJob` attribute is the *label attribute name*, which is the attribute that provides the labels that a Ground Truth worker assigns to the training data. When you provide your training data to Amazon Comprehend, you must specify one or more label attribute names. The number of attribute names that you specify depends on whether your augmented manifest file is the output of a single labeling job or a chained labeling job.

If your file is the output of a single labeling job, specify the single label attribute name that was used when the job was created in Ground Truth.

If your file is the output of a chained labeling job, specify the label attribute name for one or more jobs in the chain. Each label attribute name provides the annotations from an individual job. You can specify up to 5 of these attributes for augmented manifest files that are produced by chained labeling jobs.

In an augmented manifest file, the label attribute name typically follows the `source` key. If the file is the output of a chained job, there will be multiple label attribute names. When you provide your training data to Amazon Comprehend, provide only those attributes that contain annotations that are relevant for your model. Do not specify the attributes that end with `-metadata`.

For more information about chained labeling jobs, and for examples of the output that they produce, see [Chaining Labeling Jobs](#) in the Amazon SageMaker Developer Guide.

## Multi-label mode

In multi-label classification, individual classes represent different categories, but these categories are somehow related and are not mutually exclusive. As a result, each document has at least one class

assigned to it, but can have more. For example, a movie can simply be an action movie, or it can be an action movie, a science fiction movie, and a comedy, all at the same time.

For training, multi-label mode supports up to 1 million examples containing up to 100 unique classes.

You can provide training data as a CSV file or as an augmented manifest file from Amazon SageMaker Ground Truth.

## CSV file

To train a custom classifier, you can provide training data as a two-column CSV file. In it, labels are provided in the first column, and documents are provided in the second.

Do not include headers for the individual columns. Including headers in your CSV file may cause runtime errors. Each line of the file contains one or more classes and the text of the training document. More than one class can be indicated by using a delimiter (such as a | ) between each class.

```
CLASS,Text of document 1
CLASS,Text of document 2
CLASS|CLASS|CLASS,Text of document 3
```

For example, the following line belongs to a CSV file that trains a custom classifier to detect genres in movie abstracts:

```
COMEDY|MYSTERY|SCIENCE_FICTION|TEEN,"A band of misfit teens become unlikely detectives when they discover troubling clues about their high school English teacher. Could the strange Mrs. Doe be an alien from outer space?"
```

The default delimiter between class names is a pipe (|). However, you can use a different character as a delimiter. The delimiter cannot be part of your class name. For example, if your classes are CLASS\_1, CLASS\_2, and CLASS\_3, the underscore (\_) is part of the class name. You cannot use then use an underscore as the delimiter for separating class names.

## Augmented manifest file

An augmented manifest file is a labeled dataset that is produced by SageMaker Ground Truth. Ground Truth is a data labeling service that helps you—or a workforce that you employ—build training datasets for machine learning models. Amazon Comprehend accepts augmented manifest files as training data for custom models. You can provide these files when you create a custom classifier by using the Amazon Comprehend console or the [CreateDocumentClassifier \(p. 277\)](#) API action.

For more information about Ground Truth and the output that it produces, see [Use Amazon SageMaker Ground Truth to Label Data](#) in the *Amazon SageMaker Developer Guide*.

Augmented manifest files are in JSON lines format. In these files, each line is a complete JSON object that contains a training document and its associated labels. The following example is an augmented manifest file that trains a custom classifier to detect genres in movie abstracts:

```
{"source":"Document 1 text","MultiLabelJob": [0,4],"MultiLabelJob-metadata":{"job-name":"labeling-job/multilabeljob","class-map":{"0":"action","4":"drama"},"human-annotated":"yes","creation-date":"2020-05-21T19:02:21.521882","confidence-map":{"0":0.66},"type":"groundtruth/text-classification-multilabel"}}
{"source":"Document 2 text","MultiLabelJob": [3,6],"MultiLabelJob-metadata":{"job-name":"labeling-job/multilabeljob","class-map":{"3":"comedy","6":"horror"},"human-annotated":"yes","creation-date":"2020-05-21T19:00:01.291202","confidence-map":{"1":0.61,"0":0.61},"type":"groundtruth/text-classification-multilabel"}
 {"source":"Document 3 text","MultiLabelJob": [1],"MultiLabelJob-metadata":{"job-name":"labeling-job/multilabeljob","class-map":{"1":"action"}}, "human-
```

```
{"annotated": "yes", "creation-date": "2020-05-21T18:58:51.662050", "confidence-map": {"1": 0.68}, "type": "groundtruth/text-classification-multilabel"}}
```

Each line in this JSON lines file is a complete JSON object, where the attributes include the document text, one or more class names, and other metadata from Ground Truth. The following example is a single JSON object in the augmented manifest file, but it's formatted for readability:

```
{
    "source": "A band of misfit teens become unlikely detectives when they discover
troubling clues about their high school English teacher. Could the strange Mrs. Doe be an
alien from outer space?",
    "MultiLabelJob": [
        3,
        8,
        10,
        11
    ],
    "MultiLabelJob-metadata": {
        "job-name": "labeling-job/multilabeljob",
        "class-map": {
            "3": "comedy",
            "8": "mystery",
            "10": "science_fiction",
            "11": "teen"
        },
        "human-annotated": "yes",
        "creation-date": "2020-05-21T19:00:01.291202",
        "confidence-map": {
            "3": 0.95,
            "8": 0.77,
            "10": 0.83,
            "11": 0.92
        },
        "type": "groundtruth/text-classification-multilabel"
    }
}
```

In this example, the `source` attribute provides the text of the training document, and the `MultiLabelJob` attribute assigns the indexes of several classes from a classification list. The name of the `MultiLabelJob` attribute is arbitrary, and you provide a name of your choice when you define the labeling job in Ground Truth.

In this example, the `MultiLabelJob` attribute is the *label attribute name*, which is the attribute that provides the labels that a Ground Truth worker assigns to the training data. When you provide your training data to Amazon Comprehend, you must specify one or more label attribute names. The number of attribute names that you specify depends on whether your augmented manifest file is the output of a single labeling job or a chained labeling job.

If your file is the output of a single labeling job, specify the single label attribute name that was used when the job was created in Ground Truth.

If your file is the output of a chained labeling job, specify the label attribute name for one or more jobs in the chain. Each label attribute name provides the annotations from an individual job. You can specify up to 5 of these attributes for augmented manifest files that are produced by chained labeling jobs.

In an augmented manifest file, the label attribute name typically follows the `source` key. If the file is the output of a chained job, there will be multiple label attribute names. When you provide your training data to Amazon Comprehend, provide only those attributes that contain annotations that are relevant for your model. Do not specify the attributes that end with `-metadata`.

For more information about chained labeling jobs, and for examples of the output that they produce, see [Chaining Labeling Jobs](#) in the Amazon SageMaker Developer Guide.

# Training classification models

Train your custom classifier model in either multi-class or multi-label mode. The concept of *class* is used for both modes. It's a custom category that applies to the document being analyzed. However, each mode uses class differently. Multi-class mode associates only a single class with each document. Multi-label mode associates more than one class with a document. The training data formats are different for each mode as well.

You can train a custom classifier by using any of the following languages that work with Amazon Comprehend: English, Spanish, German, Italian, French, or Portuguese. However, you can only train the classifier in one language. Classifiers do not support multiple languages.

After you create a custom classifier, you can monitor the progress of the request using the [DescribeDocumentClassifier \(p. 304\)](#) operation. Once the `Status` field is `TRAINED` you can then use the classifier to classify documents.

## Topics

- [Train custom classifiers \(console\) \(p. 105\)](#)
- [Train and run custom classifiers \(API\) \(p. 107\)](#)
- [Test the training data \(p. 111\)](#)
- [Custom classifier metrics \(p. 112\)](#)

## Train custom classifiers (console)

You can create and train a custom classifier using the console, and then use the custom classifier to analyze your documents.

To train a custom classifier, you need a set of training documents. You label these documents with the categories that you want the document classifier to recognize. For more information about these training documents, see [Custom classification \(p. 100\)](#).

### To create and train a document classifier

1. Sign in to the AWS Management Console and open the [Amazon Comprehend console](#).
2. From the left menu, choose **Customization** and then choose **Custom Classification**.
3. Choose **Create new model**.
4. Give the classifier a name. The name must be unique within your account and current Region.
5. Select the language of the training documents. You can train a document classifier using any of the languages that work with Amazon Comprehend. However, you can only train the classifier in one language. To learn more, see [Languages Supported by Amazon Comprehend. \(p. 35\)](#)
6. (Optional) If you want to encrypt the data in the storage volume while your training job is being processed, choose **Classifier encryption** and then choose whether to use a KMS key associated with your current account, or one from another account.
  - If you are using a key associated with the current account, choose the key ID for **KMS key ID**.
  - If you are using a key associated with a different account, enter the ARN for the key ID under **KMS key ARN**.

#### Note

For more information on creating and using KMS keys and the associated encryption, see [Key management service \(KMS\)](#).

7. Under **Data specifications**, choose which classifier mode to use.

- **Single-label mode:** Choose this option if the categories you are assigning to documents are mutually exclusive and you are training your classifier to assign one and only one label to each document.
  - **Multi-label mode:** Choose this option if multiple categories can applied to a document at the same time and you are training your classifier to assign one, many, all, or no label to each document.
8. If you chose **Multi-label mode**, choose the character delimiter you want to use to separate labels when there are more than one label per line from **Delimiter for labels**.
  9. Under **Data format**, choose the format of your training documents:
    - **CSV file** — A two-column CSV file, where labels are provided in the first column, and documents are provided in the second.
    - **Augmented manifest** — A labeled dataset that is produced by Amazon SageMaker Ground Truth. This file is in JSON lines format. Each line is a complete JSON object that contains a training document and its associated labels.

For more information about these formats, and for examples, see [Preparing training data \(p. 100\)](#).

10. Under **Training dataset**, enter the location of the Amazon S3 bucket that contains your training documents or navigate to it by choosing **Select folder**. The IAM role you're using for access permissions for the training job must have reading permissions for the S3 bucket.
11. Under **Test dataset** select how you want to evaluate the performance of your trained model - you can do this for both annotations and entity list training types.
  - **Autosplit:** Autosplit automatically selects 10% of your provided training data to use as testing data
  - (Optional) **Customer provided:** When you select customer provided, you can specify exactly what test data you want to use. If you select Customer provided test dataset, enter the URL of the annotations file in Amazon S3. You can also navigate to the bucket or folder in Amazon S3 where the annotation files are located and choose **Select folder**.
12. (Optional) If you want Amazon Comprehend to create a confusion matrix that provides metrics on how well the classifier performed during training, enter the location of an Amazon S3 bucket where it will be saved. For more information, see [Confusion matrix \(p. 115\)](#).

(Optional) If you choose to encrypt the output result from your training job, choose **Encryption** and then choose whether to use a KMS key associated with the current account, or one from another account.

- If you are using a key associated with the current account, choose the key alias for **KMS key ID**.
- If you are using a key associated with a different account, enter the ARN for the key alias or ID under **KMS key ID**.

13. Choose **Choose an existing IAM role**, and then choose an existing IAM role that has read permissions for the S3 bucket that contains your training documents. Only roles that have a trust policy that begins with comprehend.amazonaws.com are valid.

If you don't already have an IAM role with these permissions, choose **Create an IAM role** to make one. Choose the access permissions to grant this role, and then choose a name suffix to distinguish the role from IAM roles in your account.

#### Note

If the input documents are encrypted, the IAM role used must also have kms:Decrypt permission. For more information, see [Permissions required to use KMS encryption \(p. 199\)](#).

14. (Optional) To launch your resources into Amazon Comprehend from a VPC, enter the VPC ID under **VPC** or choose the ID from the drop-down list.

1. Choose the subnet under **Subnets(s)**. After you select the first subnet, you can choose additional ones.
2. Under **Security Group(s)**, choose the security group to use if you specified one. After you select the first security group, you can choose additional ones.

**Note**

When you use a VPC with your classification job, the `DataAccessRole` used for the Create and Start operations must have permissions to the VPC from which the input documents and the output bucket are accessed.

15. (Optional) To add a tag to the custom classifier, enter a key-value pair under **Tags**. Choose **Add tag**. To remove this pair before creating the classifier, choose **Remove tag**. For more information, see [Tagging your resources \(p. 183\)](#).
16. Choose **Create**.

The new classifier will then appear in the list, showing its status. It will first show as Submitted. It will then show Training for a classifier that is processing training documents, Trained for a classifier that is ready to use, and In error for a classifier that has an error. You can click on a job to get more information about the classifier, including any error messages.

Name	Training started	Training ended	Status
classifiertags5-copy	7/22/2019, 3:48:38 PM	7/22/2019, 3:57:18 PM	Trained
classifiertags5	6/24/2019, 3:40:28 PM	6/24/2019, 3:47:26 PM	Trained
classifiertags:	6/3/2019, 6:33:16 PM	6/3/2019, 6:33:35 PM	In error
hk-classifier-output-2	4/9/2019, 11:28:26 AM	4/9/2019, 11:28:29 AM	In error

## Train and run custom classifiers (API)

To create and train a custom classifier, use the Amazon Comprehend [the section called "CreateDocumentClassifier" \(p. 277\)](#). To identify custom classifiers in a corpus of documents, use the [section called "StartDocumentClassificationJob" \(p. 406\)](#) operation.

### Topics

- [Using custom classification with the AWS Command Line Interface \(p. 107\)](#)
- [Using custom classification using the AWS SDK for Java \(p. 109\)](#)
- [Using custom classification using the AWS SDK for Python \(Boto\) \(p. 110\)](#)

## Using custom classification with the AWS Command Line Interface

The following examples demonstrate using the `CreateDocumentClassifier` operation, `StartDocumentClassificationJob` operation, and other custom classifier APIs with the AWS CLI.

The examples are formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

Create a custom classifier using the `create-document-classifier` operation.

```
aws comprehend create-document-classifier \
--region region \
--document-classifier-name testDelete \
--language-code en \
--input-data-config S3Uri=s3://S3Bucket/docclass/file name \
--data-access-role-arn arn:aws:iam::account number:role/testDeepInsightDataAccess
```

Get information on a custom classifier with the document classifier ARN using the `DescribeDocumentClassifier` operation.

```
aws comprehend describe-document-classifier \
--region region \
--document-classifier-arn arn:aws:comprehend:region:account number:document-
classifier/file name
```

Delete a custom classifier using the `DeleteDocumentClassifier` operation.

```
aws comprehend delete-document-classifier \
--region region \
--document-classifier-arn arn:aws:comprehend:region:account number:document-
classifier/testDelete
```

List all custom classifiers in the account using the `ListDocumentClassifiers` operation.

```
aws comprehend list-document-classifiers
--region region
```

Run a custom classification job using the `StartDocumentClassificationJob` operation.

```
aws comprehend start-document-classification-job \
--region region \
--document-classifier-arn arn:aws:comprehend:region:account number:document-
classifier/testDelete \
--input-data-config S3Uri=s3://S3Bucket/docclass/file
name,InputFormat=ONE_DOC_PER_LINE \
--output-data-config S3Uri=s3://S3Bucket/output \
--data-access-role-arn arn:aws:iam::account number:role/resource name
```

Get information on a custom classifier with the job id using the `DescribeDocumentClassificationJob` operation.

```
aws comprehend describe-document-classification-job \
--region region \
--job-id job id
```

List all custom classification jobs in your account using the `ListDocumentClassificationJobs` operation.

```
aws comprehend list-document-classification-jobs
--region region
```

Create an endpoint associated with a specific custom model using the `CreateEndpoint` operation.

```
aws comprehend create-endpoint \
--desired-inference-units number of inference units \
--endpoint-name endpoint name \
--model-arn arn:aws:comprehend:region:account-id:model/example \
--tags Key=My1stTag,Value=Value1
```

Run a custom classification request using an endpoint by using the `ClassifyDocument` operation.

```
aws comprehend classify-document \
--endpoint-arn arn:aws:comprehend:region:account-id:endpoint/endpoint name \
--text 'text.'
```

Update an endpoint using the `UpdateEndpoint` operation.

```
aws comprehend update-endpoint \
--desired-inference-units updated number of inference units \
--endpoint-arn arn:aws:comprehend:region:account-id:endpoint/endpoint name
```

Delete an endpoint using the `DeleteEndpoint` operation.

```
aws comprehend delete-endpoint \
--endpoint-arn arn:aws:comprehend:region:account-id:endpoint/endpoint name
```

Get information on an endpoint with the endpoint Arn using the `DescribeEndpoint` operation.

```
aws comprehend describe-endpoint \
--endpoint-arn arn:aws:comprehend:region:account-id:endpoint/endpoint name
```

List all endpoints in your account using the `ListEndpoints` operation.

```
aws comprehend list-endpoint \
--filter status=Ready \
--max-results 50
```

## Using custom classification using the AWS SDK for Java

This example creates a custom classifier and trains it using Java

```
import com.amazonaws.services.comprehend.AmazonComprehend;

import com.amazonaws.services.comprehend.AmazonComprehendClientBuilder;
import com.amazonaws.services.comprehend.model.CreateDocumentClassifierRequest;
import com.amazonaws.services.comprehend.model.CreateDocumentClassifierResult;
import com.amazonaws.services.comprehend.model.DescribeDocumentClassifierRequest;
import com.amazonaws.services.comprehend.model.DescribeDocumentClassifierResult;
import com.amazonaws.services.comprehend.model.DocumentClassifierInputDataConfig;
import com.amazonaws.services.comprehend.model.LanguageCode;
import com.amazonaws.services.comprehend.model.ListDocumentClassifiersRequest;
import com.amazonaws.services.comprehend.model.ListDocumentClassifiersResult;

public class DocumentClassifierDemo {

    public static void main(String[] args) {
        final AmazonComprehend comprehendClient =
            AmazonComprehendClientBuilder.standard()
                .withRegion("us-west-2")
```

```
.build();

final String dataAccessRoleArn = "arn:aws:iam::account number:role/resource name";

final CreateDocumentClassifierRequest createDocumentClassifierRequest = new
CreateDocumentClassifierRequest()
    .withDocumentClassifierName("SampleCodeClassifier")
    .withDataAccessRoleArn(dataAccessRoleArn)
    .withLanguageCode(LanguageCode.En)
    .withInputDataConfig(new DocumentClassifierInputDataConfig()
        .withS3Uri("s3://$3Bucket/docclass/file name"));

final CreateDocumentClassifierResult createDocumentClassifierResult =
comprehendClient.createDocumentClassifier(createDocumentClassifierRequest);
final String documentClassifierArn =
createDocumentClassifierResult.getDocumentClassifierArn();

System.out.println("Document Classifier ARN: " + documentClassifierArn);

final DescribeDocumentClassifierRequest describeDocumentClassifierRequest = new
DescribeDocumentClassifierRequest()
    .withDocumentClassifierArn(documentClassifierArn);
final DescribeDocumentClassifierResult describeDocumentClassifierResult =
comprehendClient.describeDocumentClassifier(describeDocumentClassifierRequest);
System.out.println("DescribeDocumentClassifierResult: " +
describeDocumentClassifierResult);

final ListDocumentClassifiersRequest listDocumentClassifiersRequest = new
ListDocumentClassifiersRequest();

final ListDocumentClassifiersResult listDocumentClassifiersResult =
comprehendClient
    .listDocumentClassifiers(listDocumentClassifiersRequest);
System.out.println("ListDocumentClassifierResult: " +
listDocumentClassifiersResult );
}
}
```

## Using custom classification using the AWS SDK for Python (Boto)

This example creates a custom classifier and trains it using Python

```
import boto3

# Instantiate Boto3 SDK:
client = boto3.client('comprehend', region_name='region')

# Create a document classifier
create_response = client.create_document_classifier(
    InputDataConfig={
        'S3Uri': 's3://$3Bucket/docclass/file name'
    },
    DataAccessRoleArn='arn:aws:iam::account number:role/resource name',
    DocumentClassifierName='SampleCodeClassifier1',
    LanguageCode='en'
)
print("Create response: %s\n", create_response)

# Check the status of the classifier
describe_response = client.describe_document_classifier(
    DocumentClassifierArn=create_response['DocumentClassifierArn'])
```

```

print("Describe response: %s\n", describe_response)

# List all classifiers in account
list_response = client.list_document_classifiers()
print("List response: %s\n", list_response)

```

This example runs a custom classifier job using Python

```

import boto3

# Instantiate Boto3 SDK:
client = boto3.client('comprehend', region_name='region')

start_response = client.start_document_classification_job(
    InputDataConfig={
        'S3Uri': 's3://srikad-us-west-2-input/docclass/file name',
        'InputFormat': 'ONE_DOC_PER_LINE'
    },
    OutputDataConfig={
        'S3Uri': 's3://$3Bucket/output'
    },
    DataAccessRoleArn='arn:aws:iam::account number:role/resource name',
    DocumentClassifierArn=
        'arn:aws:comprehend:region:account number:document-classifier/SampleCodeClassifier1'
)

print("Start response: %s\n", start_response)

# Check the status of the job
describe_response =
    client.describe_document_classification_job(JobId=start_response['JobId'])
print("Describe response: %s\n", describe_response)

# List all classification jobs in account
list_response = client.list_document_classification_jobs()
print("List response: %s\n", list_response)

```

## Test the training data

After training the model, Amazon Comprehend tests the custom classifier model. If you did not provide test data, Amazon Comprehend trains the model with 90 percent of the training data and reserves 10 percent of the training data to use for testing.

Testing the model provides you with metrics that you can use to determine if the model is trained well enough for your purposes. These metrics are displayed in the **Classifier performance** section of the **Classifier details** page in the console. They are also returned in the **Metrics** fields returned by the [the section called "DescribeDocumentClassifier" \(p. 304\)](#) operation.

For example, in the sample of training data below, there are 5 labels, DOCUMENTARY, DOCUMENTARY, SCIENCE\_FICTION, DOCUMENTARY, ROMANTIC\_COMEDY. There are **3 unique classes**: DOCUMENTARY, SCIENCE\_FICTION, ROMANTIC\_COMEDY.

Column 1	Column 2
DOCUMENTARY	document text 1
DOCUMENTARY	document text 2
SCIENCE_FICTION	document text 3

Column 1	Column 2
DOCUMENTARY	document text 4
ROMANTIC_COMEDY	document text 5

For instance, if the data contained 1000 instances of the DOCUMENTARY class, 900 instances of the SCIENCE\_FICTION, and a single instance of the ROMANTIC\_COMEDY class, then the test set would approximately be 100 DOCUMENTARY and 90 SCIENCE\_FICTION instances. The ROMANTIC\_COMEDY class would not be included in the test set, as there is only a single example available. This is because it's highly unlikely you will see a document classified as ROMANTIC\_COMEDY during prediction/inference in a setting like this.

Once you've finished training your model, the training metrics can provide you with information that you can use to decide if the model is trained sufficiently for your needs.

## Custom classifier metrics

Amazon Comprehend provides you with metrics to help you estimate how well a custom classifier should work for your job. They are based on training the classifier model, and so while they accurately represent the performance of the model during training, they are only an approximation of the model performance during classification.

Metrics are included any time metadata from a trained custom classifier is returned.

### Note

Please refer to [Metrics: Precision, recall, and FScore](#) for an understanding of the underlying Precision, Recall, and F1 score metrics. These metrics are defined at a class level. We have used **macro** averaging for combining these metrics together to come up with the test set P,R,F1, as discussed below.

Amazon Comprehend creates a [Confusion matrix \(p. 115\)](#) as part of the custom classifier model training. This is placed in the output file specified in the [CreateDocumentClassifier \(p. 277\)](#) operation and can be used to assess how well the model works.

### Topics

- [Metrics \(p. 112\)](#)
- [Improving your custom classifier's performance \(p. 115\)](#)
- [Confusion matrix \(p. 115\)](#)

## Metrics

Amazon Comprehend supports the following metrics:

### Topics

- [Accuracy \(p. 113\)](#)
- [Precision \(macro precision\) \(p. 113\)](#)
- [Recall \(macro recall\) \(p. 114\)](#)
- [F1 score \(macro F1 score\) \(p. 114\)](#)
- [Hamming loss \(p. 115\)](#)
- [Micro precision \(p. 115\)](#)
- [Micro recall \(p. 115\)](#)
- [Micro F1 score \(p. 115\)](#)

These can be seen on the **Classifier Details** page in the console.

Classifier performance <a href="#">Info</a>			
Accuracy	Precision	Recall	F1 score
0.34	0.3298	0.3304	0.32
Hamming loss	Micro precision	Micro recall	Micro F1 score
-	-	-	-

## Accuracy

Accuracy indicates the percentage of labels from the test data that are predicted exactly right by the model. In other words, this is the fraction of the labels that were correctly recognized. It is computed by dividing the number of labels in the test documents that were correctly recognized by the total number of labels in the test documents.

For example

Actual label	Predicted label	Right/Wrong
1	1	Right
0	1	Wrong
2	3	Wrong
3	3	Right
2	2	Right
1	1	Right
3	3	Right

The accuracy consists of the number of "rights" divided by the number of overall test samples = 5/7 = 0.714, or 71.4%

## Precision (macro precision)

Precision is a measure of the usefulness of the classifier results in the test data. It's defined as the number of documents correctly classified, divided by the total number of classifications for the class. High precision means that the classifier returned substantially more relevant results than irrelevant ones.

The **Precision** metric is also known as *Macro Precision*.

This is demonstrated in the following test set:

Label	Sample size	Label precision
Label_1	400	0.75

Label	Sample size	Label precision
Label_2	300	0.80
Label_3	30000	0.90
Label_4	20	0.50
Label_5	10	0.40

The Precision (Macro Precision) metric for the model is therefore:

$$\text{Macro Precision} = (0.75 + 0.80 + 0.90 + 0.50 + 0.40)/5 = 0.67$$

## Recall (macro recall)

This indicates the percentage of correct categories in your text that the model can predict. This metric comes from averaging the recall scores of all available labels. Recall is a measure of how complete the classifier results are for the test data.

High recall means that the classifier returned most of the relevant results.

The Recall metric is also known as *Macro Recall*.

This is demonstrated in the following test set:

Label	Sample size	Label recall
Label_1	400	0.70
Label_2	300	0.70
Label_3	30000	0.98
Label_4	20	0.80
Label_5	10	0.10

The Recall (Macro Recall) metric for the model is therefore:

$$\text{Macro Recall} = (0.70 + 0.70 + 0.98 + 0.80 + 0.10)/5 = 0.656$$

## F1 score (macro F1 score)

The F1 score is derived from the Precision and Recall values. It measures the overall accuracy of the classifier. The highest score is 1, and the lowest score is 0.

Amazon Comprehend calculates the *Macro F1 Score*. It is the unweighted average of the label F1 scores. Using the following test set as an example:

Label	Sample size	Label F1 score
Label_1	400	0.724

Label	Sample size	Label F1 score
Label_2	300	0.824
Label_3	30000	0.94
Label_4	20	0.62
Label_5	10	0.16

The F1 Score (Macro F1 Score) for the model is calculated as follows:

$$\text{Macro F1 Score} = (0.724 + 0.824 + 0.94 + 0.62 + 0.16)/5 = 0.6536$$

## Hamming loss

The fraction of labels that are incorrectly predicted. Also seen as the fraction of wrong labels compared to the total number of labels. Scores closer to zero are better.

## Micro precision

Original:

As Precision above, except that instead of averaging the precision scores of all available labels, this is based on the overall score of all precision scores added together.

## Micro recall

As Recall above, except that instead of averaging the recall scores of all labels, this is based on the overall score of all recall scores added together.

## Micro F1 score

As F1 Score above, but instead a combination of the Micro Precision and Micro Recall metrics.

## Improving your custom classifier's performance

The metrics provide an insight into how your custom classifier will perform during a classification job. If the metrics are low, it's very likely that the classification model might not be effective for your use case. If this happens, you have several options to improve your classifier performance.

1. In your training data, provide more concrete data that can easily separate the categories. For example, provide documents that can best represent the label in terms of unique words/sentences.
2. Add more data for under-represented labels in your training data.
3. Try to reduce skew in the categories. If the largest label in your data is more than 10X the documents that are in the smallest label, try to increase the number of documents in the smallest and make sure to get the skew ratio down to at least 10:1 between highly represented and least represented classes. You can also try removing few documents from highly represented classes as well.

## Confusion matrix

When a custom classifier model is trained, Amazon Comprehend creates a confusion matrix that provides metrics on how well the model performed in training. This enables you to assess how well the classifier

will perform when run. This matrix shows a matrix of labels as predicted by the model compared to actual labels and is created using 10 to 20 percent of the documents submitted to test the trained model.

A confusion matrix can give a very good indication on the classes for which adding more data would help model performance. A higher fraction of samples for a label shown along the diagonal of the matrix shows that the classifier is able to classify that label more accurately. If this number is lower (if the label class has a higher fraction of its samples in the non-diagonal portion of the matrix), you can try to add more samples. For example, if 40 percent of label A samples are classified as label D, adding more samples for both label A and label D will enhance the performance of the classifier. For more information, see [Confusion matrix \(p. 115\)](#).

The format of the confusion matrix produced varies, depending on if you train your classifier using multi-class or multi-label mode.

### Confusion matrix for multi-class mode

Recall that in multi-class classification, the individual classes are mutually exclusive and each document is expected to have one and only one label assigned to it. For example, an animal can be a dog or a cat, but not both at the same time.

Consider the following example of a confusion matrix for a multi-class trained classifier:

```

A B X Y <-(predicted label)
A 1 2 0 4
B 0 3 0 1
X 0 0 1 0
Y 1 1 1 1
^
|
(actual label)

```

In this case, the model predicted the following:

- One "A" label was correctly identified, two "A" labels were incorrectly identified as actually "B" labels, and four "A" labels were incorrectly identified as "Y" labels.
- Three "B" labels were correctly identified, and one "B" label was incorrectly identified as a "Y" label.
- One "X" was correctly identified.
- One "Y" label was incorrectly identified as an "A" label, one was incorrectly identified as a "B" label, one was incorrectly identified as an "X" label, and one was correctly identified as a "Y" label.

In this matrix, the correctly identified labels are shown on the diagonal line (A:A, B:B, X:X, and Y:Y) so you can easily check the table for prediction errors because they will be represented as values outside this diagonal. In this case, you can see that the model correctly identifies "X" labels (although the sample is very small) and can correctly identify "B" labels 75% of the time. However, it incorrectly identifies "A" labels 86% of the time and correctly identifies "Y" labels at a rate no better than random chance.

The confusion matrix is presented in JSON format and for the above example is shown as the following:

```
{
  "type": "multi_class",
  "confusion_matrix": [
    [1, 2, 0, 4],
    [0, 3, 0, 1],
    [0, 0, 1, 0],
    [1, 1, 1, 1]],
  "labels": ["A", "B", "X", "Y"],
```

```

    "all_labels": ["A", "B", "X", "Y"]
}

```

## Confusion matrix for multi-label mode

Recall that in multi-label classification, the individual labels represent different categories, but these categories are somehow related. For example, a movie can be just an action movie, or it can be an action movie, a science fiction movie, and a comedy, all at the same time.

Consider the following example of a confusion matrix for a multi-class trained classifier.

In this example, there are three possible labels: Comedy, Action, and Drama. Unlike the multi-class confusion matrix, the multi-label confusion matrix creates one 2x2 matrix for each label as shown below.

Comedy			Action			Drama			
		No Yes			No Yes			No Yes	<-(predicted label)
No	2	1	No	1	1	No	3	0	
Yes	0	2	Yes	2	1	Yes	1	1 <th></th>	
^			^			^			
----- (was this label actually used) -----									

In this case, the model returned the following for the Comedy label:

- Two instances where a Comedy label was not present and was correctly predicted to not be present. True negative (TN).
- Zero instances where a Comedy label was predicted to be present but was not. False positive (FP).
- One instance where a Comedy label was predicted to be absent but was present. False negative (FN).
- Two instances where a Comedy label was present were correctly predicted to be present. True positive (TP).

As with the multi-class confusion matrix above, the correctly identified labels here are shown on the diagonal line (Yes:Yes and No:No). You can easily check the table for prediction errors because they will be represented as values outside this diagonal. In this case, you can see that the model correctly identifies Comedy labels as present 40% of the time and can correctly identify their absence to the same degree (40%). However, it incorrectly identifies Comedy labels as being present 20% of the time. It did not incorrectly identify a Comedy label as absent when it was not.

The confusion matrix is presented in JSON format and for the above example is shown as the following:

```

{
  "type": "multi_label",
  "confusion_matrix": [
    [[2, 1],
     [0, 2]],
    [[1, 1],
     [2, 1]],
    [[3, 0],
     [1, 1]]
  ],
  "labels": ["Comedy", "Action", "Drama"],
  "all_labels": ["Comedy", "Action", "Drama"]
}

```

### The CreateDocumentClassifier API

The confusion matrix is available when running the [CreateDocumentClassifier \(p. 277\)](#) API. When the operation is run, the confusion matrix is shown in the `confusion_matrix.json` file, located at `s3://user-defined-path/unique-value/output/output.tar.gz` where the user-defined-path is the `S3Uri` value of the `OutputDataConfig` parameter in the [CreateDocumentClassifier \(p. 277\)](#) operation.

## Running custom classifier models

After you train your custom classifier model, you can run real-time or asynchronous custom classification. You need to create an endpoint to run real-time analysis using a custom model.

### Topics

- [Real-time analysis for custom classification \(console\) \(p. 118\)](#)
- [Inputs and outputs for asynchronous classification jobs \(p. 120\)](#)
- [Analysis jobs for custom classification \(console\) \(p. 124\)](#)

## Real-time analysis for custom classification (console)

After you build and train a custom classifier model, you can run real-time (synchronous) analysis for custom classification. Because the analysis is synchronous, you can build real-time applications using a custom model.

You create an endpoint to run real-time analysis using a custom model. An endpoint includes managed resources that makes your custom model available for real-time inference. The level of throughput assigned to an endpoint is measured in *Inference units*, each of which represents data throughput of 100 characters per second. You can provision the endpoint with up to 10 inference units. You can scale the endpoint throughput either up or down by updating the endpoint.

After you have completed your real-time analysis, delete the endpoint because the charge for it continues as long as it's active. You can create another endpoint when you are ready to run further real-time analysis.

For more information on endpoint cost, see [Amazon Comprehend Pricing](#).

After you create an endpoint, you can monitor it with Amazon CloudWatch, update it to change its inference units, or delete it when you no longer need it. For more information, see [Managing Amazon Comprehend endpoints \(p. 171\)](#).

### Topics

- [Creating an endpoint for custom classification \(p. 118\)](#)
- [Running real-time custom classification \(p. 119\)](#)

## Creating an endpoint for custom classification

You need to create an endpoint to run real-time analysis using a custom model.

### To create an endpoint (console)

1. Sign in to the AWS Management Console and open the [Amazon Comprehend console](#).

2. From the left menu, choose **Endpoints** and choose the **Create endpoint** button. A **Create endpoint** screen opens.
3. Give the endpoint a name. The name must be unique within the AWS Region and account.
4. Choose a custom model you want to attach the new endpoint to. From the dropdown, you can search by model name.

**Note**

You need to create a model before you can attach an endpoint to it. If you don't have a model yet, go to **Custom classification** or **Custom entity recognition** to create one.

5. (Optional) To add a tag to the endpoint, enter a key-value pair under **Tags** and choose **Add tag**. To remove this pair before creating the endpoint, choose **Remove tag**.
6. Enter the number of inference units (IUs) to assign to the endpoint. Each unit represents a throughput of 100 characters per second for up to 2 documents per second.
7. (Optional) If you are creating a new endpoint, you have the option to use the IU estimator. It can be difficult to understand how many inference units you require depending on the throughput or the number of characters you want to analyze per second—especially at scale. This optional step can help you determine how many IUs to request.

**Note**

The range for available IUs is 1 to 10. The maximum characters you can analyze per second is 1000.

8. From the **Purchase summary**, review your estimated hourly, daily, and monthly endpoint cost.
9. Select the checkbox if you understand that you will be charged for the endpoint from the time it starts until it is deleted.
10. Choose **Create endpoint**

#### To create an endpoint (AWS CLI)

The following example demonstrates using the *CreateEndpoint* operation with the AWS CLI.

The example is formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

```
aws comprehend create-endpoint \
--desired-inference-units number of inference units \
--endpoint-name endpoint name \
--model-arn arn:aws:comprehend:region:account-id:model/example \
--tags Key=My1stTag,Value=Value1
```

Amazon Comprehend responds with the following:

```
{  
    "EndpointArn": "Arn"  
}
```

## Running real-time custom classification

Once you've created an endpoint, you can run real-time analysis using your custom model. There are two different ways to run real-time analysis from the console, shown below, as well as the CLI method.

### (Procedure A) To run real-time analysis using a custom model (console)

1. Sign in to the AWS Management Console and open the [Amazon Comprehend console](#).
2. From the left menu, choose **Real-time analysis**.
3. Under **Input type**, choose **Custom** for **Analysis type**.

4. For **Select endpoint**, choose the endpoint that you want to use. This endpoint is linked to a specific custom model.
5. Enter the text you want to analyze.
6. Choose **Analyze**. The text analysis based on your custom model is displayed, along with a confidence assessment of the analysis.

#### (Procedure B) To run real-time analysis using a custom model (console)

1. Sign in to the AWS Management Console and open the [Amazon Comprehend console](#).
2. From the left menu, choose **Customization** and then choose **Custom classification**.
3. From the **Classifiers** list, choose the name of the custom model for which you want to update the endpoint and follow the link. The custom model details page is displayed.
4. Navigate to the **Endpoints** list, choose the name of the endpoint you want to use for real-time analysis and follow the link. The endpoint details page is displayed.
5. Choose **Use in real-time analysis**.
6. For **Input text**, enter the text you want to analyze.
7. Choose **Analyze**. The text analysis based on your custom model is displayed, along with a confidence assessment of the analysis.

#### To run real-time analysis using a custom model (AWS CLI)

The following example demonstrates using the *ClassifyDocument* operation with the AWS CLI.

The example is formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

```
aws comprehend classify-document \
    --endpoint-arn arn:aws:comprehend:region:account-id:endpoint/endpoint name \
    --text 'From the Tuesday, April 16th, 1912 edition of The Guardian newspaper: The
maiden voyage of the White Star liner Titanic,
the largest ship ever launched ended in disaster. The Titanic started her trip from
Southampton for New York on Wednesday. Late
on Sunday night she struck an iceberg off the Grand Banks of Newfoundland. By wireless
telegraphy she sent out signals of distress,
and several liners were near enough to catch and respond to the call.'
```

Amazon Comprehend responds with the following:

```
{
  "Classes": [
    {
      "Name": "string",
      "Score": 0.9793661236763
    }
  ]
}
```

## Inputs and outputs for asynchronous classification jobs

After you've trained your model, your custom classifier is available for asynchronous use to categorize unlabeled documents.

### Note

If trained in multi-class mode, your customer classifier can also be used for real-time insights into documents. However, real-time analysis can only be applied to a single document at a time. For more information, see [Real-time analysis for custom classification \(console\) \(p. 118\)](#).

For asynchronous analysis, all documents must be in UTF-8-formatted text files. Although you can only train your custom classification model using the one document per line format, you can submit your documents in that format or as one document per file. The format you use depends on the type of documents you want to analyze, as described below.

Description	Format
Each file contains one input document. This is best for collections of large documents, such as newspaper articles or scientific papers.	One document per file
The input is one or more files. Each line in a file is considered a document. This is best for short documents, such as text messages or social media posts.	One document per line
Each line must end with a line feed (LF, \n), a carriage return (CR, \r), or both (CRLF, \r\n). You can't use the UTF-8 line separator (u+2028) to end a line.	

### One document per line

With the One document per line method, each document is placed on a separate line and no header is used. The label is not included on each line (since you don't yet know the label for the document). Each line of the file (the end of the individual document) must end with a line feed (LF, \n), a carriage return (CR, \r), or both (CRLF, \r\n).

The format of the input file can be seen as thus:

```
Text of document 1 \n
Text of document 2 \n
Text of document 3 \n
Text of document 4 \n
```

After preparing the documents file, you place that file in the S3 bucket that you're using for input data.

### One document per file

As with the previous method, the files used for this must be UTF-8 formatted text files. Each of these is placed into the S3 bucket being used for input data.

The input data bucket contains the files used to run the classification job. Each file represents one document.

When you start a classification job, you will specify this Amazon S3 location for your input data. The URI must be in the same AWS Region as the API endpoint that you are calling. The URI can point to a single file (as when using the "one document per line" method, or it can be the prefix for a collection of data files.

For example, if you use the URI `S3://bucketName/prefix`, if the prefix is a single file, Amazon Comprehend uses that file as input. If more than one file begins with the prefix, Amazon Comprehend uses all of them as input.

Grant Amazon Comprehend access to the S3 bucket that contains your document collection and output files. For more information, see [Role-based permissions required for asynchronous operations \(p. 202\)](#).

## The classification job

Use the [the section called “StartDocumentClassificationJob” \(p. 406\)](#) operation to start classifying unlabeled documents. You provide the S3 bucket that contains the documents to be classified, the S3 bucket where the output should be placed, and classifier to use.

Custom classification is asynchronous. Once you have started the job, use the [DescribeDocumentClassificationJob \(p. 301\)](#) operation to monitor its progress. When the `Status` field in the response shows `COMPLETED`, you can access the output in the location that you specified.

### Classification job output

For asynchronous analysis, all documents must be in UTF-8-formatted text files. Although you can only train your custom classification model using the one document per line format, you can submit your documents in that format or as one document per file. The format you use depends on the type of documents you want to analyze, as described below.

The output from your classification job depends not only on the dataset you use. The output also depends on whether the classifier you use was trained for multi-class or multi-label mode. Inference (the classification job) is directly dependent on the classifier model training mode used.

Regardless of the mode used, the job output consists of a single file named `output.tar.gz`. It is a compressed archive file that contains a text file with the output.

#### Multi-class output

When you use a classifier trained in multi-class mode, your results are shown in terms of `classes`. Each of these `classes` is the class used to create the set of categories when training your classifier.

The following examples use the following mutually exclusive classes.

```
DOCUMENTARY
SCIENCE_FICTION
ROMANTIC_COMEDY
SERIOUS_DRAMA
OTHER
```

If your input data is formatted as one document per line, the output file contains one line for each line in the input. Each line has the file name, the zero-based line number of the input line, the class or classes found in the document. It ends with the confidence that Amazon Comprehend has that the individual instance was correctly classified.

For example:

```
{"File": "file1.txt", "Line": "0", "Classes": [{"Name": "Documentary", "Score": 0.8642}, {"Name": "Other", "Score": 0.0381}, {"Name": "Serious_Drama", "Score": 0.0372}], {"File": "file1.txt", "Line": "1", "Classes": [{"Name": "Science_Fiction", "Score": 0.5}, {"Name": "Science_Fiction", "Score": 0.0381}, {"Name": "Science_Fiction", "Score": 0.0372}], {"File": "file2.txt", "Line": "2", "Classes": [{"Name": "Documentary", "Score": 0.1}, {"Name": "Documentary", "Score": 0.0381}, {"Name": "Documentary", "Score": 0.0372}], {"File": "file2.txt", "Line": "3", "Classes": [{"Name": "Serious_Drama", "Score": 0.3141}, {"Name": "Other", "Score": 0.0381}, {"Name": "Other", "Score": 0.0372}]}
```

If your input data is formatted as one document per file, the output file contains one line for each document. Each line has the name of the file and the class or classes found in the document. It ends with the confidence that Amazon Comprehend has that the individual instance was correctly classified.

For example:

```
{"File": "file0.txt", "Classes": [{"Name": "Documentary", "Score": 0.8642}, {"Name": "Other", "Score": 0.0381}, {"Name": "Serious_Drama", "Score": 0.0372}], {"File": "file1.txt", "Classes": [{"Name": "Science_Fiction", "Score": 0.5}, {"Name": "Science_Fiction", "Score": 0.0381}, {"Name": "Science_Fiction", "Score": 0.0372}], {"File": "file2.txt", "Classes": [{"Name": "Documentary", "Score": 0.0381}, {"Name": "Documentary", "Score": 0.1}, {"Name": "Documentary", "Score": 0.0381}, {"Name": "Documentary", "Score": 0.0372}], {"File": "file3.txt", "Classes": [{"Name": "Serious_Drama", "Score": 0.3141}, {"Name": "Other", "Score": 0.0381}, {"Name": "Other", "Score": 0.0372}]}
```

### **Multi-label output**

When you use a classifier trained in multi-label mode, your results are shown in terms of labels. Each of these labels is the labels used to create the set of categories when training your classifier.

The following examples use these unique labels.

```
SCIENCE_FICTION
ACTION
DRAMA
COMEDY
ROMANCE
```

If your input data is formatted as one document per line, the output file contains one line for each line in the input. Each line has the file name, the zero-based line number of the input line, the class or classes found in the document. It ends with the confidence that Amazon Comprehend has that the individual instance was correctly classified.

For example:

```
{"File": "file1.txt", "Line": "0", "Labels": [{"Name": "Action", "Score": 0.8642}, {"Name": "Drama", "Score": 0.650}, {"Name": "Science Fiction", "Score": 0.0372}], {"File": "file1.txt", "Line": "1", "Labels": [{"Name": "Comedy", "Score": 0.5}, {"Name": "Action", "Score": 0.0381}, {"Name": "Drama", "Score": 0.0372}], {"File": "file1.txt", "Line": "2", "Labels": [{"Name": "Action", "Score": 0.9934}, {"Name": "Drama", "Score": 0.0381}, {"Name": "Action", "Score": 0.0372}], {"File": "file1.txt", "Line": "3", "Labels": [{"Name": "Romance", "Score": 0.9845}, {"Name": "Comedy", "Score": 0.8756}, {"Name": "Drama", "Score": 0.7723}, {"Name": "Science_Fiction", "Score": 0.6157}]}
```

If your input data is formatted as one document per file, the output file contains one line for each document. Each line has the name of the file and the class or classes found in the document. It ends with the confidence that Amazon Comprehend has that the individual instance was correctly classified.

For example:

```
{"File": "file0.txt", "Labels": [{"Name": "Action", "Score": 0.8642}, {"Name": "Drama", "Score": 0.650}, {"Name": "Science Fiction", "Score": 0.0372}], {"File": "file1.txt", "Labels": [{"Name": "Comedy", "Score": 0.5}, {"Name": "Action", "Score": 0.0381}, {"Name": "Drama", "Score": 0.0372}], {"File": "file2.txt", "Labels": [{"Name": "Action", "Score": 0.9934}, {"Name": "Drama", "Score": 0.0381}, {"Name": "Action", "Score": 0.0372}], {"File": "file3.txt", "Labels": [{"Name": "Romance", "Score": 0.9845}, {"Name": "Comedy", "Score": 0.8756}, {"Name": "Drama", "Score": 0.7723}, {"Name": "Science_Fiction", "Score": 0.6157}]}
```

### **Note**

For more information about the asynchronous analysis job format, see [Asynchronous batch processing \(p. 34\)](#)

## Analysis jobs for custom classification (console)

After you create and train a [custom document classifier](#), you can use it to run custom classifier jobs.

### To create a custom classification job

1. Sign in to the AWS Management Console and open the [Amazon Comprehend console](#).
2. From the left menu, choose **Analysis jobs** and then choose **Create job**.
3. Give the classification job a name. The name must be unique your account and current Region.
4. Under **Analysis type**, choose **Custom classification**.
5. From **Select classifier**, choose the custom classifier to use.
6. (Optional) If you choose to encrypt the data in the storage volume while your classification job is processed, choose **Job encryption** and then choose whether to use a KMS key associated with the current account, or one from another account.
  - If you are using a key associated with the current account, choose the key ID for **KMS key ID**.
  - If you are using a key associated with a different account, enter the ARN for the key ID under **KMS key ARN**.

#### Note

For more information on creating and using KMS keys and the associated encryption, see [Key management service \(KMS\)](#).

7. Under **Input data**, enter the location of the Amazon S3 bucket that contains your input documents or navigate to it by choosing **Browse S3**. This bucket must be in the same region as the API that you are calling. The IAM role you're using for access permissions for the classification job must have reading permissions for the S3 bucket.
8. (Optional) Choose the format of the documents to be classified under **Input format**. These can be one document per file, or one document per line in a single file.
9. Under **Output data**, enter the location of the Amazon S3 bucket where Amazon Comprehend should write the job's output data or navigate to it by choosing **Browse S3**. This bucket must be in the same region as the API that you are calling. The IAM role you're using for access permissions for the classification job must have write permissions for the S3 bucket.
10. (Optional) If you choose to encrypt the output result from your job, choose **Encryption** and then choose whether to use a KMS key associated with the current account, or one from another account.
  - If you are using a key associated with the current account, choose the key alias or ID for **KMS key ID**.
  - If you are using a key associated with a different account, enter the ARN for the key alias or ID under **KMS key ID**.
11. (Optional) To launch your resources into Amazon Comprehend from a VPC, enter the VPC ID under **VPC** or choose the ID from the drop-down list.
  1. Choose the subnet under **Subnet(s)**. After you select the first subnet, you can choose additional ones.
  2. Under **Security Group(s)**, choose the security group to use if you specified one. After you select the first security group, you can choose additional ones.

#### Note

When you use a VPC with your classification job, the `DataAccessRole` used for the Create and Start operations must have permissions to the VPC from which the output bucket are accessed.

12. Choose **Create job** to create the document classification job.

# Custom entity recognition

Custom entity recognition extends the capability of Amazon Comprehend by helping you identify your specific new entity types that are not in the preset [generic entity types](#). This means that you can analyze documents and extract entities like product codes or business-specific entities that fit your particular needs.

Building an accurate custom entity recognizer on your own can be a complex process, requiring preparation of large sets of manually annotated training documents and the selection of the right algorithms and parameters for model training. Amazon Comprehend helps to reduce the complexity by providing automatic annotation and model development to create a custom entity recognition model.

Creating a custom entity recognition model is a more effective approach than using string matching or regular expressions to extract entities from documents. For example, to extract ENGINEER names in a document, it is difficult to enumerate all possible names. Additionally, without context, it is challenging to distinguish between ENGINEER names and ANALYST names. A custom entity recognition model can learn the context where those names are likely to appear. Additionally, string matching will not detect entities that have typos or follow new naming conventions, while this is possible using a custom model.

You have two options for creating a custom model:

1. Annotations – provide a data set containing annotated entities for model training.
2. Entity lists (plain text only) – provide a list of entities and their type label (such as `PRODUCT_CODES` and a set of unannotated documents containing those entities for model training).

To analyze image files (JPG, PNG, or TIFF), Word documents or PDF files, train a custom entity recognizer from annotated PDF files. We don't support annotation of image files or Word documents.

You can train a model on up to 25 custom entities at once. For more details, see the [Guidelines and quotas page](#).

After your model is trained, you can use the model for real-time entity detection and in entity detection jobs.

## Topics

- [Preparing the training data \(p. 125\)](#)
- [Training recognizer models \(p. 138\)](#)
- [Running custom recognizer models \(p. 148\)](#)

## Preparing the training data

To train a successful custom entity recognition model, it's important to supply the model trainer with high quality data as input. Without good data, the model won't learn how to correctly identify entities.

You can choose one of two ways to provide data to Amazon Comprehend in order to train a custom entity recognition model:

- [Annotations \(p. 127\)](#)—Provides the location of your entities in a large number of documents so Amazon Comprehend can train on both the entity and its context. To create a model for analyzing image files, PDFs, or Word documents, you must train your recognizer using PDF annotations.

- [Entity lists \(plain text only\) \(p. 136\)](#)—Lists the specific entities so Amazon Comprehend can train to identify your custom entities. Note: Entity lists can only be used for plain text documents.

In both cases, Amazon Comprehend learns about the kind of documents and the context where the entities occur and builds a recognizer that can generalize to detect the new entities when you analyze documents.

### Annotations

By submitting annotation along with your documents, you can increase the accuracy of the model. With Annotations, you're not simply providing the location of the entity you're looking for, but you're also providing more accurate context to the custom entity you're seeking.

For instance, if you're searching for the name John Johnson, with the entity type JUDGE, providing your annotation might help the model to learn that the person you want to find is a judge. If it is able to use the context, then Amazon Comprehend won't find people named John Johnson who are attorneys or witnesses. Without providing annotations, Amazon Comprehend will create its own version of an annotation, but won't be as effective at including only judges. Providing your own annotations might help to achieve better results and to generate models that are capable of better leverage context when extracting custom entities.

Providing your own annotation takes more work, but can be significantly more refined. Not using your own annotation is quicker and less work-intensive, but the results are less refined and less accurate.

### Entity lists

With custom entity recognition, Amazon Comprehend helps you to train your model using an entity list. If you want to use an entity list, you provide two pieces of information: a list of the entity names with their corresponding custom entity types and a collection of unannotated documents which you expect your entities will appear. This is a more straightforward choice than the annotations option, but is probably going to result in a rougher, less specific result. This is because the annotations provide more context for Amazon Comprehend to use when training the model. Without that context, Amazon Comprehend will have a higher number of false positives when trying to identify the entities.

When you provide an Entity List, Amazon Comprehend uses an intelligent algorithm to detect occurrences of the entity in the documents to serve as the basis for training the custom entity recognizer model.

For instance, if you are searching for the name John Johnson, with the entity type JUDGE, using an entity list will enable you to identify instances of his name. However, without exact locations where John Johnson or JUDGE is annotated, Amazon Comprehend might view all instances of the name John Johnson, including other employees with the same name match for your custom entity.

### Annotations or entity list?

This comparison would make it seem as if annotations are always the best approach, but this isn't the case. Only the name John Johnson might be significant to your search and whether it's the exact individual isn't relevant. Or the result is useful, but not worth the time and cost of producing an annotation list. Or the metrics when using the entity list are good enough to provide you with the recognizer you need. There are many scenarios when it makes more business sense to avoid the higher expense and workload of creating the annotations necessary for the other option. In such instances, using an entity list instead can be the more effective choice.

We recommend using the annotations mode in the following cases:

- If you plan to run inferences for image files, PDFs, or Word documents. In this scenario, you train a model using annotated PDF files and use the model to run inference jobs for image files, PDFs, and Word documents.

- When the meaning of the entities could be ambiguous and context-dependent. For example, the term *Amazon* could either refer to the river in Brazil, or the online retailer Amazon.com. When you build a custom entity recognizer to identify business entities such as *Amazon*, you should use annotations instead of an entity list because this method is better able to use context to find entities.
- When you are comfortable setting up a process to acquire annotations, which can require some effort.

We recommend using entity list in the following cases:

- When you already have a list of entities or when it is relatively easy to compose a comprehensive list of entities. If you use an entity list, the list should be complete or at least covers the majority of valid entities that might appear in the documents you provide for training.
- For first-time users, it is generally recommended to use an entity list because this requires a smaller effort than constructing annotations. However, it is important to note that the trained model might not be as accurate as if you used annotations.

#### Topics

- [Annotations \(p. 127\)](#)
- [Entity lists \(plain text only\) \(p. 136\)](#)

## Annotations

Annotations label entities in context by associating your custom entity types with the locations where they occur in your training documents.

You can provide training data as a CSV file, an augmented manifest file from SageMaker Ground Truth, or a PDF.

## Annotation best practices

There are a number of things to consider to get the best result when using annotations, including:

- Annotate your data with care and verify that you annotate every mention of the entity. Imprecise annotations can lead to poor results.
- In general, more annotations lead to better results.
- Input data should not contain duplicates, like a duplicate of a PDF you are going to annotate. Presence of a duplicate sample might result in test set contamination and could negatively affect the training process, model metrics, and model behavior.
- Make sure that all of your documents are annotated, and that the documents without annotations are due to lack of legitimate entities, not due to negligence. For example, if you have a document that says "J Doe has been an engineer for 14 years", you should also provide an annotation for "J Doe" as well as "John Doe". Failing to do so confuses the model and can result in the model not recognizing "J Doe" as ENGINEER. This should be consistent within the same document and across documents.
- To get started you need 250 documents and 100 annotations per entity. This minimum of 250 documents helps to ensure prediction quality. With more training data, you are more likely to produce a higher-quality model. If you want higher accuracy, we recommend increasing the volume of annotated data by 10% to further improve the accuracy. This improvement might be best visible to you by running inference on a held-out test set which remains unchanged and can be tested by different models. In this way you can compare successive models.
- Provide documents that resemble real use cases as closely as possible. Synthesized data with repetitive patterns should be avoided. The input data should be as diverse as possible to avoid overfitting and help the underlying model better generalize on real examples.

- It is important that documents should be diverse in terms of word count. For example, if all documents in the training data are short, the resulting model may have difficulty predicting entities in longer documents.
- Try and give the same data distribution for training as you expect to be using when you're actually detecting your custom entities (inference time). For example, at inference time, if you expect to be sending us documents that have no entities in them, this should also be part of your training document set.

For additional suggestions, see [Improving custom entity recognizer performance](#).

## CSV files (plain text only)

When using comma-separated value (CSV) files for your annotations, your CSV files must have the following columns:

File	Line	Begin offset	End offset	Type
The name of the file containing the document. For example, if one of the document files is located at s3://my-S3-bucket/test-files/documents.txt, the value in the File column will be documents.txt. You must include the file extension (in this case '.txt') as part of the file name.	The line number containing the entity, starting with line 0.	The character offset in the input text (relative to the beginning of the line) that shows where the entity begins. The first character is at position 0.	The character offset in the input text that shows where the entity ends.	The customer-defined entity type. Entity types must be an uppercase, underscore-separated string. We recommend using descriptive entity types such as MANAGER, SENIOR_MANAGER, or PRODUCT_CODE. Up to 25 entity types can be trained per model.

Here's an example:

The file documents.txt contains four lines (rows 0, 1, 2, and 3):

```
Diego Ramirez is an engineer in the high tech industry.
Emilio Johnson has been an engineer for 14 years.
J Doe is a judge on the Washington Supreme Court.
Our latest new employee, Mateo Jackson, has been a manager in the industry for 4 years.
```

The CSV file with the list of annotations is as follows:

```
File, Line, Begin Offset, End Offset, Type
documents.txt, 0, 0, 13, ENGINEER
documents.txt, 1, 0, 15, ENGINEER
documents.txt, 3, 25, 38, MANAGER
```

### Note

In the annotations file, the line number containing the entity starts with line 0. In this example, line 2 is not present in the CSV file because there is no entity in line 2 of documents.txt.

### Creating your data files

It's important to put your annotations in a properly configured CSV file to reduce the risk of errors. To manually configure your CSV file, the following must be true:

- UTF-8 encoding must be explicitly specified, even if its used as a default in most cases.
- The first line must contain the column headers: File, Line, Begin Offset, End Offset, Type.

We highly recommended that CSV input files are generated programmatically to avoid potential issues.

The following example uses Python to generate a CSV for the annotations shown above:

```
import csv
with open("./annotations/annotations.csv", "w", encoding="utf-8") as csv_file:
    csv_writer = csv.writer(csv_file)
    csv_writer.writerow(["File", "Line", "Begin Offset", "End Offset", "Type"])
    csv_writer.writerow(["documents.txt", 0, 0, 11, "ENGINEER"])
    csv_writer.writerow(["documents.txt", 1, 0, 5, "ENGINEER"])
    csv_writer.writerow(["documents.txt", 3, 25, 30, "MANAGER"])
```

## Augmented manifest files

An augmented manifest file is a labeled dataset that is produced by SageMaker Ground Truth. Ground Truth is a data labeling service that helps you—or a workforce that you employ—build training datasets for machine learning models. Amazon Comprehend accepts augmented manifest files as training data for custom models. You can provide these files when you create a custom entity recognizer by using the Amazon Comprehend console or the [CreateEntityRecognizer \(p. 287\)](#) API action.

You can use the Ground Truth built-in task type, Named Entity Recognition, to create a labeling job to have workers identify entities in text. To learn more, see [Named Entity Recognition](#) in the *Amazon SageMaker Developer Guide*. To learn more about Amazon SageMaker Ground Truth, see [Use Amazon SageMaker Ground Truth to Label Data](#).

Augmented manifest files are in JSON lines format. In these files, each line is a complete JSON object that contains a training document and its associated labels. The following example is an augmented manifest file that trains an entity recognizer to detect the professions of individuals who are mentioned in the text:

```
{"source": "Diego Ramirez is an engineer in the high tech industry.", "NamedEntityRecognitionDemo": {"annotations": {"entities": [{"endOffset": 13, "startOffset": 0, "label": "ENGINEER"}]}, "labels": [{"label": "ENGINEER"}]}, "NamedEntityRecognitionDemo-metadata": {"entities": [{"confidence": 0.92}], "job-name": "labeling-job/namedentityrecognitiondemo", "type": "groundtruth/text-span", "creation-date": "2020-05-14T21:45:27.175903", "human-annotated": "yes"}}, {"source": "J Doe is a judge on the Washington Supreme Court.", "NamedEntityRecognitionDemo": {"annotations": {"entities": [{"endOffset": 5, "startOffset": 0, "label": "JUDGE"}]}, "labels": [{"label": "JUDGE"}]}}, "NamedEntityRecognitionDemo-metadata": {"entities": [{"confidence": 0.72}], "job-name": "labeling-job/namedentityrecognitiondemo", "type": "groundtruth/text-span", "creation-date": "2020-05-14T21:45:27.174910", "human-annotated": "yes"}}, {"source": "Our latest new employee, Mateo Jackson, has been a manager in the industry for 4 years.", "NamedEntityRecognitionDemo": {"annotations": {"entities": [{"endOffset": 38, "startOffset": 26, "label": "MANAGER"}]}, "labels": [{"label": "MANAGER"}]}}, "NamedEntityRecognitionDemo-metadata": {}}
```

```
{"entities": [{"confidence": 0.91}], "job-name": "labeling-job/namedentityrecognitiondemo", "type": "groundtruth/text-span", "creation-date": "2020-05-14T21:45:27.174035", "human-annotated": "yes"}}
```

Each line in this JSON lines file is a complete JSON object, where the attributes include the document text, the annotations, and other metadata from Ground Truth. The following example is a single JSON object in the augmented manifest file, but it's formatted for readability:

```
{
  "source": "Diego Ramirez is an engineer in the high tech industry.",
  "NamedEntityRecognitionDemo": {
    "annotations": {
      "entities": [
        {
          "endOffset": 13,
          "startOffset": 0,
          "label": "ENGINEER"
        }
      ],
      "labels": [
        {
          "label": "ENGINEER"
        }
      ]
    }
  },
  "NamedEntityRecognitionDemo-metadata": {
    "entities": [
      {
        "confidence": 0.92
      }
    ],
    "job-name": "labeling-job/namedentityrecognitiondemo",
    "type": "groundtruth/text-span",
    "creation-date": "2020-05-14T21:45:27.175903",
    "human-annotated": "yes"
  }
}
```

In this example, the `source` attribute provides the text of the training document, and the `NamedEntityRecognitionDemo` attribute provides the annotations for the entities in the text. The name of the `NamedEntityRecognitionDemo` attribute is arbitrary, and you provide a name of your choice when you define the labeling job in Ground Truth.

In this example, the `NamedEntityRecognitionDemo` attribute is the *label attribute name*, which is the attribute that provides the labels that a Ground Truth worker assigns to the training data. When you provide your training data to Amazon Comprehend, you must specify one or more label attribute names. The number of attribute names that you specify depends on whether your augmented manifest file is the output of a single labeling job or a chained labeling job.

If your file is the output of a single labeling job, specify the single label attribute name that was used when the job was created in Ground Truth.

If your file is the output of a chained labeling job, specify the label attribute name for one or more jobs in the chain. Each label attribute name provides the annotations from an individual job. You can specify up to 5 of these attributes for augmented manifest files that are produced by chained labeling jobs.

In an augmented manifest file, the label attribute name typically follows the `source` key. If the file is the output of a chained job, there will be multiple label attribute names. When you provide your training data to Amazon Comprehend, provide only those attributes that contain annotations that are relevant for your model. Do not specify the attributes that end with `-metadata`.

For more information about chained labeling jobs, and for examples of the output that they produce, see [Chaining Labeling Jobs](#) in the Amazon SageMaker Developer Guide.

## Annotating PDF files

Before you can annotate your training PDFs in SageMaker Ground Truth, you'll need to complete a few prerequisites:

- Install `python3.8.x`
- Install the AWS CLI

If you're using the us-east-1 Region, you can skip installing the AWS CLI because it's already installed with your Python environment. In this case, you'll create a virtual environment to use Python 3.8 in AWS Cloud9.

- Install `jq`
- Configure your [AWS credentials](#)
- Create a private [SageMaker Ground Truth workforce](#) to support annotation

Make sure to record the workteam name you choose in your new private workforce, as you'll be required to use it during installation.

### Topics

- [Setting up your environment \(p. 131\)](#)
- [Uploading a PDF to an S3 bucket \(p. 132\)](#)
- [Creating an annotation job \(p. 133\)](#)
- [Annotating with SageMaker Ground Truth \(p. 134\)](#)

## Setting up your environment

1. If using Windows, install [Cygwin](#); if using Linux or Mac, skip this step.
2. Download the [annotation artifacts](#) from GitHub. Unzip the file.
3. From your terminal window, navigate to the unzipped folder ([amazon-comprehend-semi-structured-documents-annotation-tools-main](#)). This folder includes a `Makefile` that you run to install dependencies, setup a Python virtualenv, and deploy the required resources.
4. Run the following command to install the AWS CLI, [Pipenv](#), [AWS SAM](#), other dependencies, and set up a virtual environment:

```
make bootstrap
```

5. The following command runs basic python checkstyle and cnf-lint, and builds the AWS CloudFormation template using the AWS SAM CLI:

```
make build
```

6. To create and deploy the CloudFormation stack, run the following command. It packages the AWS CloudFormation template to be ready for deployment, and launches the AWS SAM deployment command with interactive guidance:

```
make deploy-guided
```

This command presents a set of configuration options. Be sure your AWS Region is correct. For all other fields, you can either accept the default values or fill in custom values. If you modify the AWS CloudFormation stack name, write it down as you need it in the next steps.

```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

Looking for config file [samconfig.toml] : Not found
Setting default arguments for 'sam deploy'
=====
Stack Name [sam-app]:
AWS Region [us-west-2]:
Parameter PreHumanLambdaTimeoutInSeconds [300]:
Parameter ConsolidationLambdaTimeoutInSeconds [300]:
#Shows you resources changes to be deployed and require a 'Y' to initiate deploy
Confirm changes before deploy [y/N]:
#SAM needs permission to be able to create roles to connect to the resources in
Allow SAM CLI IAM role creation [Y/n]:
Save arguments to configuration file [Y/n]:
SAM configuration file [samconfig.toml]:
SAM configuration environment [default]:
```

The command defines a CloudFormation stack. This CloudFormation stack will create and manage the [AWS lambdas](#), [AWS IAM](#) roles, and [AWS S3](#) buckets required for the annotation tool.

You can review each of these resources in the stack details page in the CloudFormation console.

7. The command prompts you to start the deployment. CloudFormation creates all the resources in the specified Region.

```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

Deploying with following values
=====
Stack name : sam-app
Region : us-west-2
Confirm changeset : False
Deployment s3 bucket : aws-sam-cli-managed-default-samclisourcebucket-j
Capabilities : ["CAPABILITY_IAM"]
Parameter overrides : {"PreHumanLambdaTimeoutInSeconds": "300", "Conso
Signing Profiles : {}

Initiating deployment
=====
```

When the CloudFormation stack status transitions to create-complete, the resources are ready to use.

## Uploading a PDF to an S3 bucket

In step [Step 6 \(p. 131\)](#), you deployed a CloudFormation stack that creates an S3 bucket named `comprehend-semi-structured-documents-${AWS::Region}-${AWS::AccountId}`. You now upload your source PDF documents into this bucket.

### Note

This bucket contains the data required for your labeling job. The Lambda Execution Role policy grants permission for the Lambda function to access this bucket.

You can find the S3 bucket name in the [CloudFormation Stack details](#) using the 'SemiStructuredDocumentsS3Bucket' key.

1. Create a new folder in the S3 bucket. Name this new folder '**src**'.
2. Add your PDF source files to your '**src**' folder. In a later step, you annotate these files to train your recognizer.
3. (Optional) Here's an AWS CLI example you can use to upload your source documents from a local directory into an S3 bucket:

```
aws s3 cp --recursive local-path-to-your-source-docs s3://deploy-guided/src/
```

Or, with your Region and Account ID:

```
aws s3 cp --recursive local-path-to-your-source-docs s3://deploy-guided-Region-AccountID/src/
```

4. You now have a private SageMaker Ground Truth workforce and have uploaded your source files to the S3 bucket, **deploy-guided/src**; you're ready to start annotating.

## Creating an annotation job

The **comprehend-ssie-annotation-tool-cli.py** script in the `bin` directory is a simple wrapper command that streamlines the creation of a SageMaker Ground Truth labeling job. The python script reads the source documents from your S3 bucket and creates a corresponding single-page manifest file with one source document per line. The script then creates a labeling job, which requires the manifest file as an input.

The python script uses the S3 bucket and CloudFormation stack that you configured in [Step 6 \(p. 131\)](#). Required input parameters for the script include:

- **input-s3-path:** S3 Uri to the source documents you uploaded to your S3 bucket. For example: `s3://deploy-guided/src/`. You can also add your Region and Account ID to this path. For example: `s3://deploy-guided-Region-AccountID/src/`.
- **cfn-name:** The CloudFormation stack name. If you used the default value in [Step 6 \(p. 131\)](#), your cfn-name is `sam-app`.
- **work-team-name:** The workforce name you created when you built out the private workforce in SageMaker Ground Truth.
- **job-name-prefix:** The prefix for the SageMaker Ground Truth labeling job. Note that there is a 29-character limit for this field. A timestamp is appended to this value. For example: `my-job-name-20210902T232116`.
- **entity-types:** The entities you want to use during your labeling job, separated by commas. This list must include all entities that you want to annotate in your training dataset. The Ground Truth labeling job displays only these entities for annotators to label content in the PDF documents.

To view additional arguments the script supports, use the `-h` option to display the help content.

- Run the following script with the input parameters as described in the previous list.

```
python bin/comprehend-ssie-annotation-tool-cli.py \
--input-s3-path s3://deploy-guided-Region-AccountID/src/ \
--cfn-name sam-app \
--work-team-name my-work-team-name \
--region us-east-1 \
--job-name-prefix my-job-name-20210902T232116 \
--entity-types "EntityA, EntityB, EntityC" \
--annotator-metadata "key=info,value=sample,key=Due Date,value=12/12/2021"
```

The script produces the following output:

```
Downloaded files to temp local directory /tmp/a1dc0c47-0f8c-42eb-9033-74a988ccc5aa
Deleted downloaded temp files from /tmp/a1dc0c47-0f8c-42eb-9033-74a988ccc5aa
Uploaded input manifest file to s3://comprehend-semi-structured-documents-
us-west-2-123456789012/input-manifest/my-job-name-20220203-labeling-
job-20220203T183118.manifest
Uploaded schema file to s3://comprehend-semi-structured-documents-us-
west-2-123456789012/comprehend-semi-structured-docs-ui-template/my-job-name-20220203-
labeling-job-20220203T183118/ui-template/schema.json
Uploaded template UI to s3://comprehend-semi-structured-documents-us-
west-2-123456789012/comprehend-semi-structured-docs-ui-template/my-job-name-20220203-
labeling-job-20220203T183118/ui-template/template-2021-04-15.liquid
Sagemaker GroundTruth Labeling Job submitted: arn:aws:sagemaker:us-
west-2:123456789012:labeling-job/my-job-name-20220203-labeling-job-20220203t183118
(amazon-comprehend-semi-structured-documents-annotation-tools-main) user@3c063014d632
amazon-comprehend-semi-structured-documents-annotation-tools-main %
```

## Annotating with SageMaker Ground Truth

Now that you have configured the required resources and created a labeling job, you can log in to the labeling portal and annotate your PDFs.

1. Log in to the [SageMaker console](#) using either Chrome or Firefox web browsers.
2. Select **Labeling workforces** and choose **Private**.
3. Under **Private workforce summary**, select the labeling portal sign-in URL that you created with your private workforce. Sign in with the appropriate username and password.

If you don't see any jobs listed, don't worry—it can take a while to update, depending on the number of files you uploaded for annotation.

4. Select your task and, in the top right corner, choose **Start working** to open the annotation screen.

You'll see one of your documents open in the annotation screen and, above it, the entity types you provided during set up. To the right of your entity types, there is an arrow you can use to navigate through your documents.

Instructions   Shortcuts

Labeling Task: NER ▾ **OFFERING\_PRICE** **OFFERED\_SHARES**

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DIL

If you purchase units in this offering, you will experience dilution to the ex value to the warrants) and the net tangible book value per share of our common stock.

Our net tangible book value as of June 30, 2017 was approximately \$15.9 equal to our total tangible assets minus total liabilities, all divided by the number of **OFFERED\_SHARES** **OFFERING**.

After giving effect to the sale of 3,265,309 units at a price of \$2.45 per unit payable by us, and attributing no value to the warrants, our as adjusted net tangible per share of common stock, as of June 30, 2017. This represents an immediate increase stockholders and an immediate dilution of approximately \$1.714 per share to new investors.

Public offering price per unit

Net tangible book value per share as of June 30, 2017

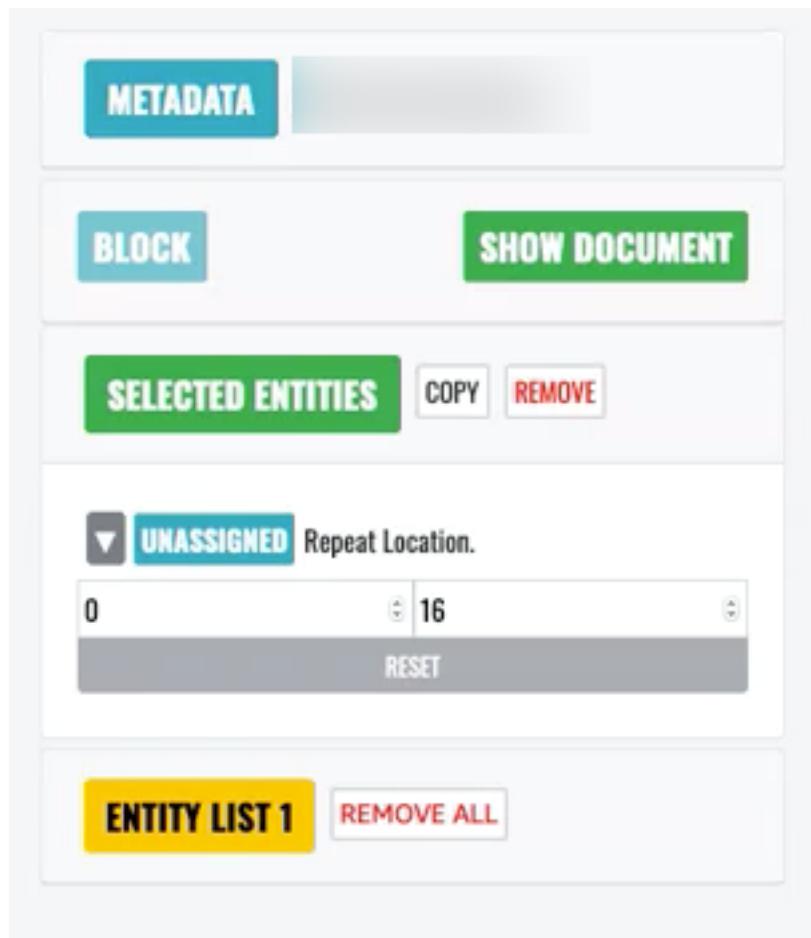
Increase per share attributable to this offering

As adjusted net tangible book value per share as of June 30, 2017, after giving effect to the sale of 3,265,309 units at a price of \$2.45 per unit payable by us, and attributing no value to the warrants, our as adjusted net tangible per share of common stock, as of June 30, 2017. This represents an immediate increase stockholders and an immediate dilution of approximately \$1.714 per share to new investors.

The foregoing table and discussion is based on 28,452,305 shares outstanding:

- 1,937,871 shares of our common stock subject to outstanding options and warrants
- 54,300 shares of our common stock subject to outstanding restricted stock units

Annotate the open document. You can also remove, undo, or auto tag your annotations on each document; these options are available in the right panel of the annotation tool.



To use auto tag, annotate an instance of one of your entities; all other instances of that specific word are then automatically annotated with that entity type.

Once you've finished, select **Submit** on the bottom right, then use the navigation arrows to move to the next document. Repeat this until you've annotated all your PDFs.

After you annotate all the training documents, you can find the annotations in JSON format in the Amazon S3 bucket at this location:

```
/output/your labeling job name/annotations/
```

The output folder also contains an output manifest file, which lists all the annotations within your training documents. You can find your output manifest file at the following location.

```
/output/your labeling job name/manifests/
```

## Entity lists (plain text only)

An entity list for custom entity recognition needs a comma-separated value (CSV) file, with the following columns:

- **Text**—The text of an entry example exactly as seen in the accompanying document corpus.

- **Type**—The customer-defined entity type. Entity types must be an uppercase, underscore separated string such as MANAGER or SENIOR\_MANAGER. Up to 25 entity types can be trained per model.

The file documents.txt contains four lines:

```
Jo Brown is an engineer in the high tech industry.  
John Doe has been a engineer for 14 years.  
Emilio Johnson is a judge on the Washington Supreme Court.  
Our latest new employee, Jane Smith, has been a manager in the industry for 4 years.
```

The CSV file with the list of entities has the following lines:

```
Text, Type  
Jo Brown, ENGINEER  
John Doe, ENGINEER  
Jane Smith, MANAGER
```

#### Note

In the entities list, the entry for Emilio Johnson is not present because it does not contain either the ENGINEER or MANAGER entity.

A minimum of 200 entity matches are needed per entity in the entity list to train a model for custom entity recognition.

#### Creating your data files

It is important that your entity list be in a properly configured CSV file so your chance of having problems with your entity list file is minimal. To manually configure your CSV file, the following must be true:

- UTF-8 encoding must be explicitly specified, even if it's used as a default in most cases.
- It must include the column names: Type and Text.

We highly recommend that CSV input files are generated programmatically to avoid potential issues.

The following example uses Python to generate a CSV for the annotations shown above:

```
import csv  
with open("./entitylist/entitylist.csv", "w", encoding="utf-8") as csv_file:  
    csv_writer = csv.writer(csv_file)  
    csv_writer.writerow(["Text", "Type"])  
    csv_writer.writerow(["Jo Brown", "ENGINEER"])  
    csv_writer.writerow(["John Doe", "ENGINEER"])  
    csv_writer.writerow(["Jane Smith", "MANAGER"])
```

## Best practices

There are a number of things to consider to get the best result when using an entity list, including:

- The order of the entities in your list has no effects on model training.
- Use entity list items that cover 80%-100% of positive entity examples mentioned in the unannotated corpus of documents.
- Avoid entity examples that match non-entities in the document corpus by removing common words and phrases. Even a handful of incorrect matches can significantly affect the accuracy of your resulting model. For example, a word like *the* in the entity list will result in a high number of matches which are unlikely to be the entities you are looking for and thus will significantly affect your accuracy.

- Input data should not contain duplicates. Presence of duplicate samples might result into test set contamination and therefore negatively affect training process, model metrics, and behavior.
- Provide documents that resemble real use cases as closely as possible. Don't use toy data or synthesized data for production systems. The input data should be as diverse as possible to avoid overfitting and help underlying model better generalize on real examples.
- The entity list is case sensitive, and regular expressions are not currently supported. However, the trained model can often still recognize entities even if they do not match exactly to the casing provided in the entity list.
- If you have an entity that is a substring of another entity (such as "Smith" and "Jane Smith"), provide both in the entity list.

Additional suggestions can be found at [Improving custom entity recognizer performance \(p. 147\)](#)

## Training recognizer models

A custom entity recognizer identifies only the entity types that you include when you train the model. It does not automatically include the preset entity types. If you want to also identify the preset entity types, such as LOCATION, DATE, or PERSON, you need to provide additional training data for those entities.

When you create a custom entity recognizer using annotated PDF files, you can use the recognizer with a variety of input file formats: plain text, image files (JPG, PNG, TIFF), PDF files, and Word documents, with no pre-processing or doc flattening required.

### Note

Amazon Comprehend doesn't support annotation of image files or Word documents.

After you create a custom entity recognizer, you can monitor the progress of the request using the [DescribeEntityRecognizer \(p. 315\)](#) operation. Once the Status field is TRAINED, the recognizer model is ready to use for custom entity recognition.

### Topics

- [Train custom recognizers \(console\) \(p. 138\)](#)
- [Train and run custom recognizers \(API\) \(p. 142\)](#)
- [Custom entity recognizer metrics \(p. 145\)](#)

## Train custom recognizers (console)

You can create custom entity recognizers using the Amazon Comprehend console. This section shows you how to create and train a custom entity recognizer.

### Creating a custom entity recognizer using the console - CSV format

To create the custom entity recognizer, first provide a dataset to train your model. With this dataset, include one of the following: a set of annotated documents or a list of entities and their type label, along with a set of documents containing those entities. For more information, see [Custom entity recognition \(p. 125\)](#)

#### To train a custom entity recognizer with a CSV file

1. Sign in to the AWS Management Console and open the [Amazon Comprehend console](#).
2. From the left menu, choose **Customization** and then choose **Custom entity recognition**.
3. Choose **Create new model**.

4. Give the recognizer a name. The name must be unique within the Region and account.
5. Select the language.
6. Under **Custom entity type**, enter a custom label that you want the recognizer to find in the dataset.

The entity type must be uppercase, and if it consists of more than one word, separate the words with an underscore.

7. Choose **Add type**.
8. If you want to add an additional entity type, enter it, and then choose **Add type**. If you want to remove one of the entity types you've added, choose **Remove type** and then choose the entity type to remove from the list. A maximum of 25 entity types can be listed.
9. To encrypt your training job, choose **Recognizer encryption** and then choose whether to use a KMS key associated with the current account, or one from another account.
  - If you are using a key associated with the current account, for **KMS key ID** choose the key ID.
  - If you are using a key associated with a different account, for **KMS key ARN** enter the ARN for the key ID.

**Note**

For more information on creating and using KMS keys and the associated encryption, see [AWS Key Management Service](#).

10. Under **Data specifications**, choose the format of your training documents:

- **CSV file** — A CSV file that supplements your training documents. The CSV file contains information about the custom entities that your trained model will detect. The required format of the file depends on whether you are providing annotations or an entity list.
- **Augmented manifest** — A labeled dataset that is produced by Amazon SageMaker Ground Truth. This file is in JSON lines format. Each line is a complete JSON object that contains a training document and its labels. Each label annotates a named entity in the training document. You can provide up to 5 augmented manifest files.

For more information about available formats, and for examples, see [Training recognizer models \(p. 138\)](#).

11. Under **Training type**, choose the training type to use:

- **Using annotations and training docs**
- **Using entity list and training docs**

If choosing annotations, enter the URL of the annotations file in Amazon S3. You can also navigate to the bucket or folder in Amazon S3 where the annotation files are located and choose **Browse S3**.

If choosing entity list, enter the URL of the entity list in Amazon S3. You can also navigate to the bucket or folder in Amazon S3 where the entity list is located and choose **Browse S3**.

12. Enter the URL of an input dataset containing the training documents in Amazon S3. You can also navigate to the bucket or folder in Amazon S3 where the training documents are located and choose **Select folder**.
13. Under **Test dataset** select how you want to evaluate the performance of your trained model - you can do this for both annotations and entity list training types.
  - **Autosplit**: Autosplit automatically selects 10% of your provided training data to use as testing data
  - (Optional) **Customer provided**: When you select customer provided, you can specify exactly what test data you want to use.

14. If you select Customer provided test dataset, enter the URL of the annotations file in Amazon S3. You can also navigate to the bucket or folder in Amazon S3 where the annotation files are located and choose **Select folder**.
15. In the **Choose an IAM role** section, either select an existing IAM role or create a new one.
  - **Choose an existing IAM role** – Select this option if you already have an IAM role with permissions to access the input and output Amazon S3 buckets.
  - **Create a new IAM role** – Select this option when you want to create a new IAM role with the proper permissions for Amazon Comprehend to access the input and output buckets.

**Note**

If the input documents are encrypted, the IAM role used must have `kms:Decrypt` permission. For more information, see [Permissions required to use KMS encryption \(p. 199\)](#).

16. (Optional) To launch your resources into Amazon Comprehend from a VPC, enter the VPC ID under **VPC** or choose the ID from the drop-down list.
  1. Choose the subnet under **Subnet(s)**. After you select the first subnet, you can choose additional ones.
  2. Under **Security Group(s)**, choose the security group to use if you specified one. After you select the first security group, you can choose additional ones.

**Note**

When you use a VPC with your custom entity recognition job, the `DataAccessRole` used for the Create and Start operations must have permissions to the VPC from which the input documents and the output bucket are accessed.

17. (Optional) To add a tag to the custom entity recognizer, enter a key-value pair under **Tags**. Choose **Add tag**. To remove this pair before creating the recognizer, choose **Remove tag**.
18. Choose **Train**.

The new recognizer will then appear in the list, showing its status. It will first show as `Submitted`. It will then show `Training` for a classifier that is processing training documents, `Trained` for a classifier that is ready to use, and `In error` for a classifier that has an error. You can click on a job to get more information about the recognizer, including any error messages.

## [Creating a custom entity recognizer using the console - augmented manifest](#)

### **To train a custom entity recognizer with a plain text, PDF, or word document**

1. Sign in to the AWS Management Console and open the [Amazon Comprehend console](#).
2. From the left menu, choose **Customization** and then choose **Custom entity recognition**.
3. Choose **Train recognizer**.
4. Give the recognizer a name. The name must be unique within the Region and account.
5. Select the language. Note: If you're training a PDF or Word document, English is the supported language.
6. Under **Custom entity type**, enter a custom label that you want the recognizer to find in the dataset.

The entity type must be uppercase, and if it consists of more than one word, separate the words with an underscore.

7. Choose **Add type**.
8. If you want to add an additional entity type, enter it, and then choose **Add type**. If you want to remove one of the entity types you've added, choose **Remove type** and then choose the entity type to remove from the list. A maximum of 25 entity types can be listed.

9. To encrypt your training job, choose **Recognizer encryption** and then choose whether to use a KMS key associated with the current account, or one from another account.
  - If you are using a key associated with the current account, for **KMS key ID** choose the key ID.
  - If you are using a key associated with a different account, for **KMS key ARN** enter the ARN for the key ID.

**Note**

For more information on creating and using KMS keys and the associated encryption, see [AWS Key Management Service](#).

10. Under **Training data**, choose **Augmented manifest** as your data format:

- **Augmented manifest** — is a labeled dataset that is produced by Amazon SageMaker Ground Truth. This file is in JSON lines format. Each line in the file is a complete JSON object that contains a training document and its labels. Each label annotates a named entity in the training document. You can provide up to 5 augmented manifest files. If you are using PDF documents for training data, you must select **Augmented manifest**. You can provide up to 5 augmented manifest files. For each file, you can name up to 5 attributes to use as training data.

For more information about available formats, and for examples, see [Training recognizer models \(p. 138\)](#).

11. Select the training model type.

If you selected **Plain text documents**, under **Input location**, enter the Amazon S3URL of the Amazon SageMakerGround Truth augmented manifest file. You can also navigate to the bucket or folder in Amazon S3 where the augmented manifest(s) is located and choose **Select folder**.

12. Under **Attribute name**, enter the name of the attribute that contains your annotations. If the file contains annotations from multiple chained labeling jobs, add an attribute for each job. In this case, each attribute contains the set of annotations from a labeling job. Note: You can provide up to 5 attribute names for each file.

13. Select **Add**.

14. If you selected **PDF, Word documents** under **Input location**, enter the Amazon S3URL of the Amazon SageMaker Ground Truth augmented manifest file. You can also navigate to the bucket or folder in Amazon S3 where the augmented manifest(s) is located and choose **Select folder**.

15. Enter the S3 prefix for your **Annotation** data files. These are the PDF documents that you labeled.

16. Enter the S3 prefix for your **Source** documents. These are the original PDF documents (data objects) that you provided to Ground Truth for your labeling job.

17. Enter the attribute names that contain your annotations. Note: You can provide up to 5 attribute names for each file. Any attributes in your file that you don't specify are ignored.

18. In the IAM role section, either select an existing IAM role or create a new one.

- **Choose an existing IAM role** – Select this option if you already have an IAM role with permissions to access the input and output Amazon S3 buckets.
- **Create a new IAM role** – Select this option when you want to create a new IAM role with the proper permissions for Amazon Comprehend to access the input and output buckets.

**Note**

If the input documents are encrypted, the IAM role used must have `kms:Decrypt` permission. For more information, see [Permissions required to use KMS encryption \(p. 199\)](#).

19. (Optional) To launch your resources into Amazon Comprehend from a VPC, enter the VPC ID under **VPC** or choose the ID from the drop-down list.

1. Choose the subnet under **Subnet(s)**. After you select the first subnet, you can choose additional ones.
2. Under **Security Group(s)**, choose the security group to use if you specified one. After you select the first security group, you can choose additional ones.

**Note**

When you use a VPC with your custom entity recognition job, the `DataAccessRole` used for the `Create` and `Start` operations must have permissions to the VPC from which the input documents and the output bucket are accessed.

20. (Optional) To add a tag to the custom entity recognizer, enter a key-value pair under **Tags**. Choose **Add tag**. To remove this pair before creating the recognizer, choose **Remove tag**.
21. Choose **Train**.

The new recognizer will then appear in the list, showing its status. It will first show as `Submitted`. It will then show `Training` for a classifier that is processing training documents, `Trained` for a classifier that is ready to use, and `In error` for a classifier that has an error. You can click on a job to get more information about the recognizer, including any error messages.

## Train and run custom recognizers (API)

To create the custom entities in a document, use the Amazon Comprehend [CreateEntityRecognizer \(p. 287\)](#) to create an entity recognizer. To identify those custom entities, use the [StartEntitiesDetectionJob \(p. 416\)](#) operation.

**Topics**

- [Creating and detecting custom entities using the AWS Command Line Interface \(p. 142\)](#)
- [Detecting custom entities using the AWS SDK for Java \(p. 143\)](#)
- [Detecting custom entities using the AWS SDK for Python \(Boto3\) \(p. 144\)](#)

## Creating and detecting custom entities using the AWS Command Line Interface

The following examples demonstrate using the `CreateEntityRecognizer` operation, `StartEntitiesDetectionJob` operation, and other associated APIs with the AWS CLI.

The examples are formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

Creating a custom entity recognizer using the `CreateEntityRecognizer` operation.

```
aws comprehend create-entity-recognizer \
    --language-code en \
    --recognizer-name test-6 \
    --data-access-role-arn "arn:aws:iam::account number:role/service-role/
AmazonComprehendServiceRole-role" \
    --input-data-config "EntityTypes=[{Type=PERSON}],Documents={S3Uri=s3://Bucket
Name/Bucket Path/documents},
Annotations={S3Uri=s3://Bucket Name/Bucket Path/annotations}" \
    --region region
```

Listing all entity recognizers in a region using the `ListEntityRecognizers` operation.

```
aws comprehend list-entity-recognizers \
```

```
--region region
```

Checking Job Status of custom entity recognizers using the `DescribeEntityRecognizer` operation.

```
aws comprehend describe-entity-recognizer \
    --entity-recognizer-arn arn:aws:comprehend:region:account number:entity-recognizer/
test-6 \
    --region region
```

Starting a custom entities recognition job using the `StartEntitiesDetectionJob` operation.

```
aws comprehend start-entities-detection-job \
    --entity-recognizer-arn "arn:aws:comprehend:region:account number:entity-recognizer/
test-6" \
    --job-name infer-1 \
    --data-access-role-arn "arn:aws:iam::account number:role/service-role/
AmazonComprehendServiceRole-role" \
    --language-code en \
    --input-data-config "S3Uri=s3://Bucket Name/Bucket Path" \
    --output-data-config "S3Uri=s3://Bucket Name/Bucket Path/" \
    --region region
```

## Detecting custom entities using the AWS SDK for Java

This example creates a custom entity recognizer, trains the model, and then runs it in an entity recognizer job using Java

```
import com.amazonaws.auth.AWSStaticCredentialsProvider;
import com.amazonaws.auth.DefaultAWSCredentialsProviderChain;
import com.amazonaws.services.comprehend.AmazonComprehend;
import com.amazonaws.services.comprehend.AmazonComprehendClientBuilder;
import com.amazonaws.services.comprehend.model.CreateEntityRecognizerRequest;
import com.amazonaws.services.comprehend.model.CreateEntityRecognizerResult;
import com.amazonaws.services.comprehend.model.DescribeEntityRecognizerRequest;
import com.amazonaws.services.comprehend.model.DescribeEntityRecognizerResult;
import com.amazonaws.services.comprehend.model.EntityRecognizerAnnotations;
import com.amazonaws.services.comprehend.model.EntityRecognizerDocuments;
import com.amazonaws.services.comprehend.model.EntityRecognizerInputDataConfig;
import com.amazonaws.services.comprehend.model.EntityTypesListItem;
import com.amazonaws.services.comprehend.model.InputDataConfig;
import com.amazonaws.services.comprehend.model.LanguageCode;
import com.amazonaws.services.comprehend.model.OutputDataConfig;
import com.amazonaws.services.comprehend.model.StartEntitiesDetectionJobRequest;
import com.amazonaws.services.comprehend.model.StartEntitiesDetectionJobResult;

public class CustomEntityRecognizerDemo {

    public static void main(String[] args) {
        // Create credentials using a provider chain. For more information, see
        // https://docs.aws.amazon.com/sdk-for-java/v1/developer-guide/credentials.html
        AWSCredentialsProvider awsCreds = DefaultAWSCredentialsProviderChain.getInstance();

        AmazonComprehend comprehendClient =
            AmazonComprehendClientBuilder.standard()
                .withCredentials(awsCreds)
                .withRegion("region")
                .build();

        final String dataAccessRoleArn = "arn:aws:iam::account number:role/service-role/
AmazonComprehendServiceRole-role";
```

```

        final CreateEntityRecognizerRequest createEntityRecognizerRequest = new
CreateEntityRecognizerRequest()
        .withRecognizerName("recognizer name")
        .withDataAccessRoleArn(dataAccessRoleArn)
        .withLanguageCode(LanguageCode.En)
        .withInputDataConfig(new EntityRecognizerInputDataConfig()
            .withEntityTypes(new EntityTypesListItem().withType("PERSON"))
            .withDocuments(new EntityRecognizerDocuments()
                .withS3Uri("s3://Bucket Name/Bucket Path/documents"))
            .withAnnotations(new EntityRecognizerAnnotations()
                .withS3Uri("s3://Bucket Name/Bucket Path/annotations")));

        final CreateEntityRecognizerResult createEntityRecognizerResult =
comprehendClient.createEntityRecognizer(createEntityRecognizerRequest);
        final String entityRecognizerArn =
createEntityRecognizerResult.getEntityRecognizerArn();
        System.out.println("Entity Recognizer ARN: " + entityRecognizerArn);

        DescribeEntityRecognizerRequest describeEntityRecognizerRequest = new
DescribeEntityRecognizerRequest()
        .withEntityRecognizerArn(entityRecognizerArn);
        final DescribeEntityRecognizerResult describeEntityRecognizerResult =
comprehendClient.describeEntityRecognizer(describeEntityRecognizerRequest);
        System.out.println("describeEntityRecognizerResult: " +
describeEntityRecognizerResult);

        if
("TRAINED".equals(describeEntityRecognizerResult.getEntityRecognizerProperties().getStatus()))
{
    // After model gets trained, launch an job to extract entities.
    final StartEntitiesDetectionJobRequest startEntitiesDetectionJobRequest = new
StartEntitiesDetectionJobRequest()
        .withJobName("Inference Job Name")
        .withEntityRecognizerArn(entityRecognizerArn)
        .withDataAccessRoleArn(dataAccessRoleArn)
        .withLanguageCode(LanguageCode.En)
        .withInputDataConfig(new InputDataConfig()
            .withS3Uri("s3://Bucket Name/Bucket Path"))
        .withOutputDataConfig(new OutputDataConfig()
            .withS3Uri("s3://Bucket Name/Bucket Path"));

    final StartEntitiesDetectionJobResult startEntitiesDetectionJobResult =
comprehendClient.startEntitiesDetectionJob(startEntitiesDetectionJobRequest);
    System.out.println("startEntitiesDetectionJobResult: " +
startEntitiesDetectionJobResult);
}
}
}

```

## Detecting custom entities using the AWS SDK for Python (Boto3)

Instantiate Boto3 SDK:

```

import boto3
import uuid
comprehend = boto3.client("comprehend", region_name="region")

```

Create entity recognizer:

```

response = comprehend.create_entity_recognizer(

```

```

RecognizerName="Recognizer-Name- Goes-Here-{}".format(str(uuid.uuid4())),
LanguageCode="en",
DataAccessRoleArn="Role ARN",
InputDataConfig={
    "EntityTypes": [
        {
            "Type": "ENTITY_TYPE"
        }
    ],
    "Documents": {
        "S3Uri": "s3://Bucket Name/Bucket Path/documents"
    },
    "Annotations": {
        "S3Uri": "s3://Bucket Name/Bucket Path/annotations"
    }
}
recognizer_arn = response["EntityRecognizerArn"]

```

List all recognizers:

```
response = comprehend.list_entity_recognizers()
```

Wait for recognizer to reach TRAINED status:

```

while True:
    response = comprehend.describe_entity_recognizer(
        EntityRecognizerArn=recognizer_arn
    )

    status = response["EntityRecognizerProperties"]["Status"]
    if "IN_ERROR" == status:
        sys.exit(1)
    if "TRAINED" == status:
        break

    time.sleep(10)

```

Start entities detection job:

```

response = comprehend.start_entities_detection_job(
    EntityRecognizerArn=recognizer_arn,
    JobName="Detection-Job-Name-{}".format(str(uuid.uuid4())),
    LanguageCode="en",
    DataAccessRoleArn="Role ARN",
    InputDataConfig={
        "InputFormat": "ONE_DOC_PER_LINE",
        "S3Uri": "s3://Bucket Name/Bucket Path/documents"
    },
    OutputDataConfig={
        "S3Uri": "s3://Bucket Name/Bucket Path/output"
    }
)

```

## Custom entity recognizer metrics

Amazon Comprehend provides you with metrics to help you estimate how well an entity recognizer should work for your job. They are based on training the recognizer model, and so while they accurately represent the performance of the model during training, they are only an approximation of the API performance during entity discovery.

Metrics are returned any time metadata from a trained entity recognizer is returned.

Amazon Comprehend supports training a model on up to 25 entities at a time. When metrics are returned from a trained entity recognizer, scores are computed against both the recognizer as a whole (global metrics) and for each individual entity (entity metrics).

Three metrics are available, both as global and entity metrics:

- **Precision**

This indicates the fraction of entities produced by the system that are correctly identified and correctly labeled. This shows how many times the model's entity identification is truly a good identification. It is a percentage of the total number of identifications.

In other words, precision is based on *true positives* (*tp*) and *false positives* (*fp*) and it is calculated as  $\text{precision} = \text{tp} / (\text{tp} + \text{fp})$ .

For example, if a model predicts that two examples of an entity are present in a document, where there's actually only one, the result is one true positive and one false positive. In this case,  $\text{precision} = 1 / (1 + 1)$ . The precision is 50%, as one entity is correct out of the two identified by the model.

- **Recall**

This indicates the fraction of entities present in the documents that are correctly identified and labeled by the system. Mathematically, this is defined in terms of the total number of correct identifications *true positives* (*tp*) and missed identificcations *false negatives* (*fn*).

It is calculated as  $\text{recall} = \text{tp} / (\text{tp} + \text{fn})$ . For example if a model correctly identifies one entity, but misses two other instances where that entity is present, the result is one true positive and two false negatives. In this case,  $\text{recall} = 1 / (1 + 2)$ . The recall is 33.33%, as one entity is correct out of a possible three examples.

- **F1 score**

This is a combination of the Precision and Recall metrics, which measures the overall accuracy of the model for custom entity recognition. The F1 score is the harmonic mean of the Precision and Recall metrics:  $F1 = 2 * \text{Precision} * \text{Recall} / (\text{Precision} + \text{Recall})$ .

**Note**

Intuitively, the harmonic mean penalizes the extremes more than the simple average or other means (example:  $\text{precision} = 0$ ,  $\text{recall} = 1$  could be achieved trivially by predicting all possible spans. Here, the simple average would be 0.5, but F1 would penalize it as 0).

In the examples above,  $\text{precision} = 50\%$  and  $\text{recall} = 33.33\%$ , therefore  $F1 = 2 * 0.5 * 0.3333 / (0.5 + 0.3333)$ . The F1 Score is .3975, or 39.75%.

## Global and individual entity metrics

The relationship between global and individual entity metrics can be seen when analyzing the following sentence for entities that are either a *place* or a *person*

John Washington and his friend Smith live in San Francisco, work in San Diego, and own a house in Seattle.

In our example, the model makes the following predictions.

John Washington = Person  
Smith = Place

```
San Francisco = Place
San Diego = Place
Seattle = Person
```

However, the predictions should have been the following.

```
John Washington = Person
Smith = Person
San Francisco = Place
San Diego = Place
Seattle = Place
```

The individual entity metrics for this would be:

```
entity: Person
True positive (TP) = 1 (because John Washington is correctly predicted to be a Person).
False positive (FP) = 1 (because Seattle is incorrectly predicted to be a Person, but is actually a Place).
False negative (FN) = 1 (because Smith is incorrectly predicted to be a Place, but is actually a Person).
Precision = 1 / (1 + 1) = 0.5 or 50%
Recall = 1 / (1+1) = 0.5 or 50%
F1 Score = 2 * 0.5 * 0.5 / (0.5 + 0.5) = 0.5 or 50%

entity: Place
TP = 2 (because San Francisco and San Diego are each correctly predicted to be a Place).
FP = 1 (because Smith is incorrectly predicted to be a Place, but is actually a Person).
FN = 1 (because Seattle is incorrectly predicted to be a Person, but is actually a Place).
Precision = 2 / (2+1) = 0.6667 or 66.67%
Recall = 2 / (2+1) = 0.6667 or 66.67%
F1 Score = 2 * 0.6667 * 0.6667 / (0.6667 + 0.6667) = 0.6667 or 66.67%
```

The global metrics for this would be:

Global:

```
Global:
TP = 3 (because John Washington, San Francisco and San Diego are predicted correctly. This is also the sum of all individual entity TP).
FP = 2 (because Seattle is predicted as Person and Smith is predicted as Place. This is the sum of all individual entity FP).
FN = 2 (because Seattle is predicted as Person and Smith is predicted as Place. This is the sum of all individual FN).
Global Precision = 3 / (3+2) = 0.6 or 60%
(Global Precision = Global TP / (Global TP + Global FP))
Global Recall = 3 / (3+2) = 0.6 or 60%
(Global Recall = Global TP / (Global TP + Global FN))
Global F1Score = 2 * 0.6 * 0.6 / (0.6 + 0.6) = 0.6 or 60%
(Global F1Score = 2 * Global Precision * Global Recall / (Global Precision + Global Recall))
```

## Improving custom entity recognizer performance

These metrics provide an insight into how accurately the trained model will perform when you use it to identify entities. Here are a few options you can use to improve your metrics if they are lower than your expectations:

1. Depending on whether you use [Annotations \(p. 127\)](#) or [Entity lists \(plain text only\) \(p. 136\)](#), make sure to follow the guidelines in the respective documentation to improve data quality. If you observe better metrics after improving your data and re-training the model, you can keep iterating and improving data quality to achieve better model performance.
2. If you are using an Entity List, consider using Annotations instead. Manual annotations can often improve your results.
3. If you are sure there is not a data quality issue, and yet the metrics remain unreasonably low, please submit a support request.

## Running custom recognizer models

After you train your custom recognizer model, you can run real-time or asynchronous custom entity recognition. You need to create an endpoint to run real-time analysis using a custom model.

### Before you begin

You need a custom entity recognition model (also known as a recognizer) before you can detect custom entities. A recognizer that is trained with plain-text annotations supports entity detection for plain-text documents only. A recognizer that is trained with PDF document annotations supports entity detection for plain-text documents, images, PDF files, and Word documents.

For more information about these models, see [the section called "Training recognizer models" \(p. 138\)](#).

### Topics

- [Best practices for image files \(p. 148\)](#)
- [Real-time analysis for custom entity recognition \(console\) \(p. 149\)](#)
- [Analysis jobs for custom entity recognition \(console\) \(p. 151\)](#)

## Best practices for image files

To analyze image files for custom entity recognition, use the following guidelines to achieve the best results:

- Provide a high quality image, ideally at least 150 DPI.
- If the input document is already in one of the supported file formats (TIFF, JPEG, or PNG for images), don't convert or downsample the document before uploading it to Amazon S3.

For the best results when extracting text from tables in documents, ensure that:

- Tables in your document are visually separated from surrounding elements on the page. For example, the table isn't overlaid onto an image or complex pattern.
- Text within the table is upright. For example, the text isn't rotated relative to other text on the page.

When extracting text from tables, you might see inconsistent results when:

- Merged table cells span multiple columns.
- Tables have cells, rows, or columns that are different than other parts of the same table.

## Real-time analysis for custom entity recognition (console)

With Amazon Comprehend, you can quickly detect custom entities in individual text documents by running real-time analysis. Unlike asynchronous batch jobs that analyze large documents or large sets of documents, real-time analysis is useful for applications that process small bodies of text as they arrive. For example, you can immediately detect custom entities in social media posts, support tickets, or customer reviews.

Before you can detect custom entities, you must train a custom entity recognition model. For more information about these models, see [Training recognizer models \(p. 138\)](#).

You create an endpoint to run real-time analysis using a custom model. After you create the endpoint, your custom model is available for real-time analysis, and you can detect entities by using the Amazon Comprehend console, the Amazon Comprehend API, the AWS CLI, or the AWS SDKs.

### Creating an endpoint for custom entity detection

You create an endpoint to make your custom model available for real-time analysis.

To meet your text processing needs, you assign *inference units* to the endpoint, and each unit allows a throughput of 100 characters per second for up to 2 documents per second. You can then adjust the throughput up or down.

The cost of real-time analysis is based on the throughput of an endpoint and the duration of time it is active. For more information on endpoint cost, see [Amazon Comprehend Pricing](#).

After you create an endpoint, you can monitor it with Amazon CloudWatch, update it to change its inference units, or delete it when you no longer need it. For more information, see [Managing Amazon Comprehend endpoints \(p. 171\)](#).

### Creating an Endpoint with the Console

#### To create an endpoint (console)

1. Sign in to the AWS Management Console and open the [Amazon Comprehend console](#).
2. From the left menu, choose **Endpoints** and choose the **Create endpoint** button. A **Create endpoint** screen opens.
3. Give the endpoint a name. The name must be unique within the AWS Region and account.
4. Choose a custom model you want to attach the new endpoint to. From the dropdown, you can search by model name.

#### Note

You need to create a model before you can attach an endpoint to it. If you don't have a model yet, go to [Custom entity recognition](#) to create one.

5. (Optional) To add a tag to the endpoint, enter a key-value pair under **Tags** and choose **Add tag**. To remove this pair before creating the endpoint, choose **Remove tag**.
6. Enter the number of inference units (IUs) to assign to the endpoint. Each unit represents a throughput of 100 characters per second for up to 2 documents per second.
7. (Optional) If you are creating a new endpoint, you have the option to use the IU estimator. It can be difficult to understand how many inference units you require depending on the throughput or the number of characters you want to analyze per second—especially at scale. This optional step can help you determine how many IUs to request.

#### Note

The range for IUs is 1 to 10. The maximum characters you can analyze per second is 1000.

8. From the **Purchase summary**, review your estimated hourly, daily, and monthly endpoint cost.
9. Select the checkbox if you understand that you will be charged for the endpoint from the time it starts until it is deleted.
10. Choose **Create endpoint**

## Creating an Endpoint with the AWS CLI

To create an endpoint by using the AWS CLI, use the `create-endpoint` command:

```
$ aws comprehend create-endpoint \
> --desired-inference-units number of inference units \
> --endpoint-name endpoint name \
> --model-arn arn:aws:comprehend:region:account-id:model/example \
> --tags Key=Key,Value=Value
```

If your command succeeds, Amazon Comprehend responds with the endpoint ARN:

```
{  
    "EndpointArn": "Arn"  
}
```

For more information about this command, its parameter arguments, and its output, see [create-endpoint](#) in the AWS CLI Command Reference

## Running real-time custom entity detection

After you create an endpoint for your custom entity recognizer model, you can run real-time analysis to quickly detect entities in individual bodies of text.

### Detecting entities with the console

Complete the following steps to detect custom entities in your text by using the Amazon Comprehend console.

1. Sign in to the AWS Management Console and open the Amazon Comprehend console at <https://console.aws.amazon.com/comprehend/>.
2. From the left menu, choose **Real-time analysis**.
3. In the **Input text** section, for **Analysis type**, choose **Custom**.
4. For **Select endpoint**, choose the endpoint that is associated with the entity-detection model that you want to use.
5. Under **Input text**, provide the text you want to analyze.
6. Choose **Analyze**. The text analysis based on your custom model is displayed, along with a confidence assessment of the analysis.

### Detecting entities with the AWS CLI

To detect custom entities by using the AWS CLI, use the `detect-entities` command:

```
$ aws comprehend detect-entities \
> --endpoint-arn arn \
> --language-code en \
> --text "Andy Jassy is the CEO of Amazon."
```

If your command succeeds, Amazon Comprehend responds with the analysis. For each entity that Amazon Comprehend detects, it provides the entity type, text, location, and confidence score.

For more information about this command, its parameter arguments, and its output, see [detect-entities](#) in the AWS CLI Command Reference

## Analysis jobs for custom entity recognition (console)

You can run an asynchronous analysis job to detect custom entities in a set of one or more documents. The input files can include text files, image files, PDFs, or Word documents. For files other than text files, Amazon Comprehend performs text extraction prior to the analysis.

To start the job, you perform the following steps:

1. Store the documents in an Amazon S3 bucket.
2. Invoke the [StartEntitiesDetectionJob \(p. 416\)](#) API operation to start the asynchronous job.
3. Monitor the progress of the analysis job.
4. When the job is complete, retrieve the results of the analysis from the S3 bucket that you specified when you started the job.

The custom entity recognition job searches for all the entities that the model was trained to find.

### Topics

- [Starting a custom entity detection job \(p. 152\)](#)
- [Setting text extraction options \(p. 155\)](#)

### To create a custom entity recognition job

1. Sign in to the AWS Management Console and open the [Amazon Comprehend console](#).
2. From the left menu, choose **Analysis jobs** and then choose **Create job**.
3. Give the classification job a name. The name must be unique in your account and current Region.
4. Under **Analysis type**, choose **Custom entity recognition**.
5. From **Recognizer model**, choose the custom entity recognizer to use.
6. From **Version**, choose the recognizer version to use.
7. (Optional) If you choose to encrypt the data in the storage volume while your entity recognition job is processed, choose **Job encryption** and then choose whether to use a KMS key associated with the current account, or one from another account.
  - If you are using a key associated with the current account, choose the key ID for **KMS key ID**.
  - If you are using a key associated with a different account, enter the ARN for the key ID under **KMS key ARN**.

### Note

For more information on creating and using KMS keys and the associated encryption, see [Key management service \(KMS\)](#).

8. Under **Input data**, enter the location of the Amazon S3 bucket that contains your input documents or navigate to it by choosing **Browse S3**. This bucket must be in the same region as the API that you are calling. The IAM role you're using for access permissions for the classification job must have reading permissions for the S3 bucket.
9. (Optional) Choose the format of the documents to be classified under **Input format**. These can be one document per file, or one document per line in a single file.

10. Under **Output data**, enter the location of the Amazon S3 bucket where Amazon Comprehend should write the job's output data or navigate to it by choosing **Browse S3**. This bucket must be in the same region as the API that you are calling. The IAM role you're using for access permissions for the classification job must have write permissions for the S3 bucket.
11. (Optional) If you choose to encrypt the output result from your job, choose **Encryption** and then choose whether to use a KMS key associated with the current account, or one from another account.
  - If you are using a key associated with the current account, choose the key alias or ID for **KMS key ID**.
  - If you are using a key associated with a different account, enter the ARN for the key alias or ID under **KMS key ID**.
12. (Optional) To launch your resources into Amazon Comprehend from a VPC, enter the VPC ID under **VPC** or choose the ID from the drop-down list.
  1. Choose the subnet under **Subnet(s)**. After you select the first subnet, you can choose additional ones.
  2. Under **Security Group(s)**, choose the security group to use if you specified one. After you select the first security group, you can choose additional ones.
13. Choose **Create job** to create the entity recognition job.

**Note**

When you use a VPC with your analysis job, the `DataAccessRole` used for the Create and Start operations must have permissions to the VPC from which the output bucket are accessed.

13. Choose **Create job** to create the entity recognition job.

## Starting a custom entity detection job

To start a custom entity detection job with the [StartEntitiesDetectionJob \(p. 416\)](#) operation, you must provide the `EntityRecognizerArn`, which is the Amazon Resource Name (ARN) of the trained model. You can find this ARN in the response to the [CreateEntityRecognizer \(p. 287\)](#) operation.

Use the following example for Unix, Linux, and macOS environments. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^). To detect custom entities in a document set, use the following request syntax:

```
aws comprehend start-entities-detection-job \
    --entity-recognizer-arn "entity recognizer arn" \
    --job-name job name \
    --data-access-role-arn "data access role arn" \
    --language-code en \
    --input-data-config "S3Uri=s3://Bucket Name/Bucket Path" \
    --output-data-config "S3Uri=s3://Bucket Name/Bucket Path/" \
    --region region
```

Amazon Comprehend responds with the `JobID` and `JobStatus` and will return the output from the job in the S3 bucket that you specified in your request.

### Example Example output from custom entity detection jobs for plain text and PDF documents

Plain text

```
{
```

```
"File": "50_docs",
"Line": 0,
"Entities":
[
    {
        "BeginOffset": 0,
        "EndOffset": 22,
        "Score": 0.9763959646224976,
        "Text": "John Johnson",
        "Type": "JUDGE"
    }
]
{
    "File": "50_docs",
    "Line": 1,
    "Entities":
    [
        {
            "BeginOffset": 11,
            "EndOffset": 15,
            "Score": 0.9615424871444702,
            "Text": "Thomas Kincaid",
            "Type": "JUDGE"
        }
    ]
}
```

PDF

```
{
    "Blocks": [
        {
            "BlockType": "LINE",
            "Geometry": {
                "BoundingBox": {
                    "Height": 0.012575757575757575,
                    "Left": 0.0,
                    "Top": 0.0015063131313131314,
                    "Width": 0.02262091503267974
                },
                "Polygon": [
                    {
                        "X": 0.0,
                        "Y": 0.0015063131313131314
                    },
                    {
                        "X": 0.02262091503267974,
                        "Y": 0.0015063131313131314
                    },
                    {
                        "X": 0.02262091503267974,
                        "Y": 0.014082070707070706
                    },
                    {
                        "X": 0.0,
                        "Y": 0.014082070707070706
                    }
                ]
            },
            "Id": "4330efed-6334-4fc4-ba48-e050afa95c8d",
            "Text": "John Johnson"
        }
    ]
}
```

```

    "Page": 1,
    "Relationships":
    [
        {
            "ids":
            [
                "f343ce48-583d-4abe-b84b-a232e266450f"
            ],
            "type": "CHILD"
        }
    ],
    "Text": "S-3"
},
{
    "BlockType": "WORD",
    "Geometry":
    {
        "BoundingBox":
        {
            "Height": 0.0125757575757575,
            "Left": 0.0,
            "Top": 0.0015063131313131314,
            "Width": 0.02262091503267974
        },
        "Polygon":
        [
            {
                "X": 0.0,
                "Y": 0.0015063131313131314
            },
            {
                "X": 0.02262091503267974,
                "Y": 0.0015063131313131314
            },
            {
                "X": 0.02262091503267974,
                "Y": 0.014082070707070706
            },
            {
                "X": 0.0,
                "Y": 0.014082070707070706
            }
        ]
    },
    "Id": "f343ce48-583d-4abe-b84b-a232e266450f",
    "Page": 1,
    "Relationships":
    [],
    "Text": "S-3"
}
],
"DocumentMetadata":
{
    "PageNumber": 1,
    "Pages": 1
},
"DocumentType": "NativePDF",
"Entities":
[
    {
        "BlockReferences":
        [
            {
                "BeginOffset": 25,
                "BlockId": "4330efed-6334-4fc4-ba48-e050afa95c8d",
                "ChildBlocks":

```

```
[  
  {  
    "BeginOffset": 1,  
    "ChildBlockId": "cbba5534-ac69-4bc4-beef-306c659f70a6",  
    "EndOffset": 6  
  }  
],  
  "EndOffset": 30  
}  
],  
  "Score": 0.9998825926329088,  
  "Text": "0.001",  
  "Type": "OFFERING_PRICE"  
},  
{  
  "BlockReferences":  
  [  
    {  
      "BeginOffset": 41,  
      "BlockId": "f343ce48-583d-4abe-b84b-a232e266450f",  
      "ChildBlocks":  
      [  
        {  
          "BeginOffset": 0,  
          "ChildBlockId": "292a2e26-21f0-401b-a2bf-03aa4c47f787",  
          "EndOffset": 9  
        }  
      ],  
      "EndOffset": 50  
    }  
  ],  
  "Score": 0.9809727537330395,  
  "Text": "6,097,560",  
  "Type": "OFFERED_SHARES"  
}  
],  
  "File": "example.pdf",  
  "Version": "2021-04-30"  
}  
]
```

## Setting text extraction options

If your input files include image files, PDFs, or Word documents, you can specify options for text extraction. In the [StartEntitiesDetectionJob \(p. 416\)](#) operation, configure the `DocumentReaderConfig` parameter in `InputDataConfig` to specify the following options :

- **DocumentReadMode** – If you set to `SERVICE_DEFAULT`, Amazon Comprehend automatically selects the text extraction actions based on the input document types. If you set to `FORCE_DOCUMENT_READ_ACTION`, Amazon Comprehend uses the Amazon Textract APIs to parse PDF, Word, or image files.
- **DocumentReadAction** – Set to `TEXTRACT_DETECT_DOCUMENT_TEXT` for Amazon Comprehend to invoke the Amazon Textract DetectDocumentText API. Set to `TEXTRACT_ANALYZE_DOCUMENT` for Amazon Comprehend to invoke the Amazon Textract AnalyzeDocument API.

If you set `DocumentReadMode` to `SERVICE_DEFAULT`, you do not need to configure `DocumentReadAction`.

You can pass the `InputDataConfig` parameter to `StartEntitiesDetectionJob` as a JSON file. The following example shows a JSON file to use the `DetectDocumentText` API:

### Example InputDataConfig Parameters in file myInputDataConfig.json

```
"InputDataConfig": {  
    "S3Uri": s3://Bucket Name/Bucket Path,  
    "InputFormat": "ONE_DOC_PER_FILE",  
    "DocumentReaderConfig": {  
        "DocumentReadAction": "EXTRACT_DETECT_DOCUMENT_TEXT",  
        "DocumentReadMode": "FORCE_DOCUMENT_READ_ACTION"  
    }  
}
```

In the StartEntitiesDetectionJob operation, specify the parameter as a file:

```
--input-data-config file://myInputDataConfig.json
```

For more information about the Amazon Textract options, see the section called ["DocumentReaderConfig" \(p. 502\)](#).

# Creating and managing custom models

Amazon Comprehend includes NLP (natural language processing) models that you can use for analyzing insights or topic modeling. You can also use Amazon Comprehend to create custom models for entity recognition and document classification.

With model versioning, you can keep track of your modeling history. You can also track the scores associated with a model when you run the model with additional data or different sets of data.

You can also share a custom model by allowing other AWS accounts to import a copy of your model.

## Topics

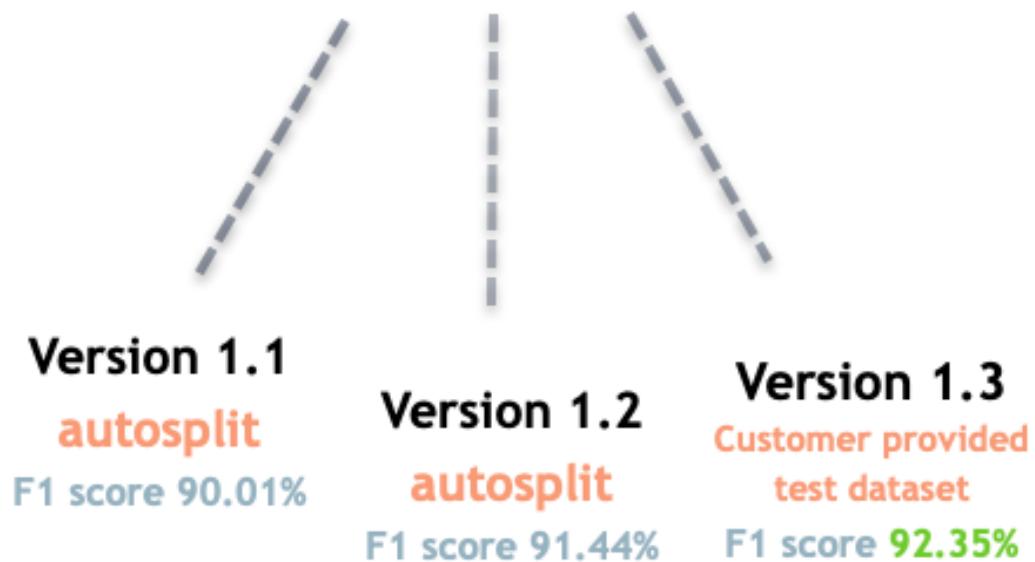
- [Model versioning with Amazon Comprehend \(p. 157\)](#)
- [Copying custom models between AWS accounts \(p. 159\)](#)

## Model versioning with Amazon Comprehend

Artificial intelligence and machine learning (AI/ML) is all about rapid experimentation. With Amazon Comprehend, you train and build out models which you use to gain insight on your data. With model versioning you can keep track of your modeling history and scores associated with running results of your models as you provide more or different sets of data. You can use versioning with your custom classification models or your custom entity recognition models. Taking a look at your different versions over time you can gain insight on how successful they've performed and gain insight on what parameters you used to get to your state of success.

When you train a new version of an existing custom classifier model or entity recognition model, all you need to do is create a new version from the model details page and all the details populate for you. The new version will have the same name as your earlier model — what we call the versionID — although you will give it a unique version name during creation. As you add new versions to a model, you can see all the previous versions and their details in one view from the model details page. With versioning, you can see how model performance changes as you make changes to your training dataset.

# Model 1.0



## Create a new Custom classifier version (console)

1. Sign in to the AWS Management Console and open the [Amazon Comprehend console](#).
2. From the left menu, choose **Customization** and then choose **Custom classification**.
3. From the **Classifiers** list, choose the name of the custom model from which you want to create a new version. The custom model details page is displayed.
4. On the top right, select **Create new model**. A screen opens with prepopulated details from the parent custom classification model.
5. Under **Version name** add a unique name to the new version.
6. Under version details, you can change the language and number of labels associated with your new model.
7. Under the **Data specifications** section configure how you want to provide the data to your new version—make sure to provide full data, which includes documents from your previous model and your new documents. You can change the **Classifier mode** (single-label, or multi-label), **Data format** (CSV file, Augmented manifest), your **Training dataset**, and your **Test dataset** (autosplit, or your custom test data configuration).
8. (Optional) update the S3 location for your output data
9. Under **Access permissions**, create or use an existing IAM role.
10. (Optional) Update your VPC settings

11. (Optional) Add tags to your new version to help keep track of the details.

For more information about creating custom classifiers, see [Create a Custom Classifier \(p. 105\)](#)

#### Create a new Custom entity recognizer version (console)

1. Sign in to the AWS Management Console and open the [Amazon Comprehend console](#).
2. From the left menu, choose **Customization** and then choose **Custom entity recognition**.
3. From the **Recognizer model** list, choose the name of the recognizer from which you want to create a new version. The details page is displayed.
4. On the top right, select **Train new version**. A screen opens with prepopulated details from the parent entity recognizer.
5. Under **Version name** add a unique name to the new version.
6. Under Custom entity type, add the custom labels or label you want the recognizer to identify in your dataset and select **Add type**. Choose a custom entity type from the annotations or entity list you've provided. The recognizer will then use all of the included entity types to identify entities in the data set when running your job. Each entity type must be upper-case and separated by and underscore if it uses multiple words. A maximum of 25 types are allowed.
7. (Optional) Select **Recognizer encryption** to encrypt the data in the storage volume while your job is being processed.
8. Under the Training data section, specify the **Annotation and data format** details (CSV file, Augmented manifest)single-label, or multi-label), **Data format** (CSV, Augmented manifest), your **Training dataset**, and your **Test dataset** (autosplit, or your custom test data configuration).
9. (Optional) update the S3 location for your output data
10. Under **Access permissions**, create or use an existing IAM role.
11. (Optional) Update your VPC settings
12. (Optional) Add tags to your new version to help keep track of the details.

To learn more about custom entity recognizers, see [Custom Entity Recognition \(p. 125\)](#) and [Creating a Custom Entity Recognizer Using the Console \(p. 138\)](#).

## Copying custom models between AWS accounts

Amazon Comprehend users can copy trained custom models between AWS accounts in a two-step process. First, a user in one AWS account (account A), *shares* a custom model that's in their account. Then, a user in another AWS account (account B) *imports* the model into their account. The account B user does not need to train the model, and does not need to copy (or access) the original training data or test data.

To share a custom model in account A, the user attaches an AWS Identity and Access Management (IAM) policy to a model version. This policy authorizes an entity in account B, such as an IAM user or role, to import the model version into Amazon Comprehend in their AWS account. The account B user must import the model into the same AWS Region as the original model.

To import the model in account B, the user of this account provides Amazon Comprehend with the necessary details, such as the Amazon Resource Name (ARN) of the model. By importing the model, this user creates a new custom model in their AWS account that replicates the model that they imported. This model is fully trained and ready for inference jobs, such as document classification or named entity recognition.

Copying a custom model is useful if:

- You belong to an organization that uses multiple AWS accounts. For example, your organization might have an AWS account for each phase of development, such as build, stage, test, and deploy. Or, it might have distinct AWS accounts for business functions, such as data science and engineering.
- Your organization works with another, such as an AWS Partner, that trains custom models in Amazon Comprehend and provides them to you as their client.

In scenarios like these, you can quickly copy a trained custom entity recognizer or document classifier from one AWS account to another. Copying a model in this way is easier than the alternative, where you copy training data between AWS accounts to train duplicate models.

#### Topics

- [Sharing a custom model with another AWS account \(p. 160\)](#)
- [Importing a custom model from another AWS account \(p. 166\)](#)

## Sharing a custom model with another AWS account

With Amazon Comprehend, you can share your custom models with others, so they can import your models into their AWS accounts. When a user imports one of your custom models, they create a new custom model in their account. Their new model duplicates the one that you shared.

To share a custom model, you attach a policy to it that authorizes others to import it. Then, you provide those users with the details that they need.

#### Note

When other users import a custom model that you've shared, they must use the same AWS Region—for example, US East (N. Virginia)—that contains your model.

#### Topics

- [Before you begin \(p. 160\)](#)
- [Resource-based policies for custom models \(p. 163\)](#)
- [Step 1: Add a resource-based policy to a custom model \(p. 164\)](#)
- [Step 2: Provide the details that others need to import \(p. 166\)](#)

## Before you begin

Before you can share a model, you must have a trained custom classifier or custom entity recognizer in Amazon Comprehend in your AWS account. For more information about training custom models, see [Custom classification \(p. 100\)](#) or [Custom entity recognition \(p. 125\)](#).

## Required permissions

### IAM policy statement

Before you can add a resource-based policy to a custom model, you require permissions in AWS Identity and Access Management (IAM). Your IAM user or group must have a policy attached so you can create, get, and delete model policies, as shown in the following example.

### Example IAM policy to manage resource-based policies for custom models

```
{  
    "Effect": "Allow",  
    "Action": [  
        "comprehend:PutResourcePolicy",  
        "comprehend:DeleteResourcePolicy",  
    ]  
}
```

```
    "comprehend:DescribeResourcePolicy"
],
"Resource": "arn:aws:comprehend:us-west-2:111122223333:document-classifier/foo/version/*"
}
```

For information about creating an IAM policy, see [Creating IAM policies](#) in the *IAM User Guide*. For information about attaching an IAM policy, see [Adding and removing IAM identity permissions](#) in the *IAM User Guide*.

### AWS KMS key policy statement

If you are sharing an encrypted model, then you might need to add permissions for AWS KMS. This requirement depends on the type of KMS key that you use to encrypt the model in Amazon Comprehend.

An **AWS owned key** is owned and managed by an AWS service. If you use an AWS owned key, you do not need to add permissions for AWS KMS, and you can skip this section.

A **Customer managed key** is a key that you create, own, and manage in your AWS account. If you use a customer managed key, you must add a statement to your KMS key policy.

The policy statement authorizes one or more entities (such as IAM users or AWS accounts) to perform the AWS KMS operations required to decrypt the model.

You use condition keys to help prevent the confused deputy problem. For more information, see [the section called “Cross-service confused deputy prevention” \(p. 189\)](#).

Use the following condition keys in the policy to validate the entities that access your KMS key. When a user imports the model, AWS KMS checks that the ARN of the source model version matches the condition. If you do not include a condition in the policy, the specified principals can use your KMS key to decrypt any model version:

- **aws:SourceArn** – Use this condition key with the `kms:GenerateDataKey` and `kms:Decrypt` actions.
- **kms:EncryptionContext** – Use this condition key with the `kms:GenerateDataKey`, `kms:Decrypt`, and `kms>CreateGrant` actions.

In the following example, the policy authorizes AWS account 444455556666 to use version 1 of the specified classifier model owned by AWS account 111122223333.

### Example KMS key policy to access a specific classifier model version

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Principal": {
        "AWS":
          "arn:aws:iam::444455556666:root"
      },
      "Action": [
        "kms:Decrypt",
        "kms:GenerateDataKey"
      ],
      "Resource": "*",
      "Condition": {
        "StringEquals": {
          "aws:SourceArn":
            "arn:aws:comprehend:us-west-2:111122223333:document-
classifier/classifierName/version/1"
        }
      }
    }
  ]
}
```

```

        },
        {
            "Effect": "Allow",
            "Principal": {
                "AWS": "arn:aws:iam::444455556666:root"
            },
            "Action": "kms>CreateGrant",
            "Resource": "*",
            "Condition": {
                "StringEquals": {
                    "kms:EncryptionContext:aws:comprehend:arn":
                        "arn:aws:comprehend:us-west-2:111122223333:document-
classifier/classifierName/version/1"
                }
            }
        }
    ]
}

```

The following example policy authorizes user **ExampleUser** from AWS account 444455556666 and **ExampleRole** from AWS account 123456789012 to access this KMS key via the Amazon Comprehend service.

#### **Example KMS key policy to allow access to the Amazon Comprehend service (alternative 1).**

```

{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Principal": {
                "AWS": [
                    "arn:aws:iam::444455556666:user/ExampleUser",
                    "arn:aws:iam::123456789012:role/ExampleRole"
                ]
            },
            "Action": [
                "kms:Decrypt",
                "kms:GenerateDataKey"
            ],
            "Resource": "*",
            "Condition": {
                "StringLike": {
                    "aws:SourceArn": "arn:aws:comprehend:*
                }
            }
        },
        {
            "Effect": "Allow",
            "Principal": {
                "AWS": [
                    "arn:aws:iam::444455556666:user/ExampleUser",
                    "arn:aws:iam::123456789012:role/ExampleRole"
                ]
            },
            "Action": "kms>CreateGrant",
            "Resource": "*",
            "Condition": {
                "StringLike": {
                    "kms:EncryptionContext:aws:comprehend:arn": "arn:aws:comprehend:*
                }
            }
        }
    ]
}

```

```
    ],
}
```

The following example policy authorizes AWS account 444455556666 to access this KMS key via the Amazon Comprehend service, using an alternative syntax to the previous example.

#### **Example KMS key policy to allow access to the Amazon Comprehend service (alternative 2).**

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Principal": {
        "AWS": "arn:aws:iam::444455556666:root"
      },
      "Action": [
        "kms:Decrypt",
        "kms:GenerateDataKey",
        "kms>CreateGrant"
      ],
      "Resource": "*",
      "Condition": {
        "StringLike": {
          "kms:EncryptionContext:aws:comprehend:arn": "arn:aws:comprehend:/*"
        }
      }
    }
  ]
}
```

For more information, see [Key policies in AWS KMS](#) in the *AWS Key Management Service Developer Guide*.

## Resource-based policies for custom models

Before an Amazon Comprehend user in another AWS account can import a custom model from your AWS account, you must authorize them to do so. To authorize them, you add a *resource-based policy* to the model version that you want to share. A resource-based policy is an IAM policy that you attach to a resource in AWS.

When you attach a resource policy to a custom model version, the policy authorizes one or more entities, such as IAM users or AWS accounts, to perform the `comprehend:ImportModel` action on the model version.

#### **Example Resource-based policy for a custom model version**

This example specifies the authorized entities in the `Principal` attribute. Resource "\*" refers to the specific model version that you attach the policy to.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": "comprehend:ImportModel",
      "Resource": "*",
      "Principal": [
        "AWS": [
          "arn:aws:iam::111122223333:root",
          "arn:aws:iam::444455556666:user/ExampleUser",
        ]
      ]
    }
  ]
}
```

```

        "arn:aws:iam::123456789012:role/ExampleRole"
    }
}
}
}

```

For policies that you attach to custom models, `comprehend:ImportModel` is the only action that Amazon Comprehend supports.

For more information about resource-based policies, see [Identity-based policies and resource-based policies](#) in the *IAM User Guide*.

## Step 1: Add a resource-based policy to a custom model

You can add a resource-based policy by using the AWS Management Console, AWS CLI, or Amazon Comprehend API.

### AWS Management Console

You can use Amazon Comprehend in the AWS Management Console.

#### To add a resource-based policy

1. Sign in to the AWS Management Console and open the [Amazon Comprehend console](#).
2. In the navigation menu on the left, under **Customization**, choose the page that contains your custom model:
  - a. If you are sharing a custom document classifier, choose **Custom classification**.
  - b. If you are sharing a custom entity recognizer, choose **Custom entity recognition**.
3. In the list of models, choose the model name to open its details page.
4. Under **Versions**, choose the name of the model version that you want to share.
5. On the version details page, choose the **Tags, VPC & Policy** tab.
6. In the **Resource-based policy** section, choose **Edit**.
7. On the **Edit resource-based policy** page, do the following:
  - a. For **Policy name**, enter a name that will help you recognize the policy after you create it.
  - b. Under **Authorize**, specify one or more of the following entities to authorize them to import your model:
    - Service principals
    - AWS account IDs
    - IAM entities

Field	Definition and examples
<b>Service principals</b>	Service principal identifiers for the services that can access this model version. For example: <b>comprehend.amazonaws.com</b>
<b>AWS account IDs</b>	AWS accounts that can access this model version. Authorizes all users who belong to the account. For example: <b>111122223333, 123456789012</b>
<b>IAM entities</b>	ARNs for IAM users or roles that can access this model version. For example: <b>arn:aws:iam::111122223333:user/ExampleUser, arn:aws:iam::444455556666:role/ExampleRole</b>

8. Under **Share**, you can copy the ARN of the model version to help you share it with the person who will import your model. When someone imports a custom model from a different AWS account, the model version ARN is required.
9. Choose **Save**. Amazon Comprehend creates your resource-based policy and attaches it to your model.

## AWS CLI

To add a resource-based policy to a custom model with the AWS CLI, use the [PutResourcePolicy](#) command. The command takes the following parameters:

- **resource-arn** – The ARN of the custom model, including the model version.
- **resource-policy** – A JSON file that defines the resource-based policy to attach to your custom model.

You can also provide the policy as an inline JSON string. To provide valid JSON for your policy, enclose the attribute names and values in double quotes. If the JSON body is also enclosed in double quotes, you escape the double quotes that are inside the policy.

- **policy-revision-id** – The revision ID that Amazon Comprehend assigned to the policy that you are updating. If you are creating a new policy that has no prior version, don't use this parameter. Amazon Comprehend creates the revision ID for you.

### Example Add a resource-based policy to a custom model using the `put-resource-policy` command

This example defines a policy in a JSON file named **policyFile.json** and associates the policy to a model. The model is version **v2** of a classifier named **mycf1**.

```
$ aws comprehend put-resource-policy \
> --resource-arn arn:aws:comprehend:us-west-2:111122223333:document-classifier/mycf1/
> version/v2 \
> --resource-policy file://policyFile.json \
> --policy-revision-id revision-id
```

The JSON file for the resource policy contains the following contents:

- **Action** – The policy authorizes the named principals to use `comprehend:ImportModel`.
- **Resource** – The ARN of the custom model. Resource "\*" refers to the model version that you specify in the `put-resource-policy` command.
- **Principal** – The policy authorizes user `jane` from AWS account `444455556666` and all users from AWS account `123456789012`.

```
{
"Version": "2012-10-17",
"Statement": [
    {"Sid": "ResourcePolicyForImportModel",
     "Effect": "Allow",
     "Action": ["comprehend:ImportModel"],
     "Resource": "*",
     "Principal": {
         "AWS": [
             "arn:aws:iam::444455556666:user/jane",
             "123456789012"
         ]
     }
}
```

```
    }  
]  
}
```

## Amazon Comprehend API

To add a resource-based policy to a custom model by using the Amazon Comprehend API, use the [PutResourcePolicy](#) API operation.

You can also add a policy to a custom model in the API request that creates the model. To do this, provide the policy JSON for the ModelPolicy parameter when you submit a [CreateDocumentClassifier](#) or [CreateEntityRecognizer](#) request.

## Step 2: Provide the details that others need to import

Now that you have added the resource-based policy to your custom model, you have authorized other Amazon Comprehend users to import your model into their AWS accounts. However, before they can import, you must provide them with the following details:

- The Amazon Resource Name (ARN) of the model version.
- The AWS Region that contains the model. Anyone who imports your model must use the same AWS Region.
- Whether the model is encrypted, and if it is, the type of AWS KMS key that you use: AWS owned key or customer managed key.
- If your model is encrypted with a customer managed key, then you must provide the ARN of the KMS key. Anyone who imports your model must include the ARN in an IAM service role in their AWS account. This role authorizes Amazon Comprehend to use the KMS key to decrypt the model during the import.

For more information about how other users import your model, see [Importing a custom model from another AWS account \(p. 166\)](#).

## Importing a custom model from another AWS account

In Amazon Comprehend, you can import a custom model that's in another AWS account. When you import a model, you create a new custom model in your account. Your new custom model is a fully-trained duplicate of the model that you imported.

### Topics

- [Before you begin \(p. 166\)](#)
- [Importing a custom model \(p. 169\)](#)

## Before you begin

Before you can import a custom model from another AWS account, ensure that the person who shared the model with you does the following:

- Authorizes you to do the import. This authorization is granted in the resource-based policy that is attached to the model version. For more information, see [Resource-based policies for custom models \(p. 163\)](#).

- Provides you with the following information:
  - The Amazon Resource Name (ARN) of the model version.
  - The AWS Region that contains the model. You must use the same AWS Region when you import.
  - Whether the model is encrypted with an AWS KMS key and, if it is, the type of key that is used.

If the model is encrypted, you might need to take additional steps, depending on the type of KMS key that is used:

- **AWS owned key** – This type of KMS key is owned and managed by AWS. If the model is encrypted with an AWS owned key, no additional steps are needed.
- **Customer managed key** – This type of KMS key is created, owned, and managed by an AWS customer in their AWS account. If the model is encrypted with a customer managed key, then the person who shared the model must:
  - Authorize you to decrypt the model. This authorization is granted in the KMS key policy for the customer managed key. For more information, see [AWS KMS key policy statement \(p. 161\)](#).
  - Provide the ARN of the customer managed key. You use this ARN when you create an IAM service role. This role authorizes Amazon Comprehend to use the KMS key to decrypt the model.

## Required permissions

Before you can import a custom model, you or your administrator must authorize the required actions in AWS Identity and Access Management (IAM). As an Amazon Comprehend user, you must be authorized to import by an IAM policy statement. If encryption or decryption is required during the import, then Amazon Comprehend must be authorized to use the necessary AWS KMS keys.

### IAM policy statement

Your IAM user or group must have a policy attached that allows the `ImportModel` action, as shown in the following example.

#### Example IAM policy to import a custom model

```
{  
    "Effect": "Allow",  
    "Action": [  
        "comprehend:ImportModel"  
    ],  
    "Resource": "arn:aws:comprehend:us-west-2:111122223333:document-classifier/foo/version/\*"  
}
```

For information about creating an IAM policy, see [Creating IAM policies](#) in the *IAM User Guide*. For information about attaching an IAM policy, see [Adding and removing IAM identity permissions](#) in the *IAM User Guide*.

### IAM service role for AWS KMS encryption

When you import a custom model, you must authorize Amazon Comprehend to use AWS KMS keys in either of the following cases:

- You are importing a custom model that is encrypted with a customer managed key in AWS KMS. In this case, Amazon Comprehend needs access to the KMS key so that it can decrypt the model during the import.
- You want to encrypt the new custom model that you create with the import, and you want to use a customer managed key. In this case, Amazon Comprehend needs access to your KMS key so that it can encrypt the new model.

To authorize Amazon Comprehend to use these AWS KMS keys, you create an *IAM service role*. This type of IAM role allows an AWS service to access resources in other services on your behalf. For more information about service roles, see [Creating a role to delegate permissions to an AWS service](#) in the *IAM User Guide*.

If you use the Amazon Comprehend console to import, you can have Amazon Comprehend create the service role for you. Otherwise, you must create a service role in IAM before you import.

The IAM service role must have a permissions policy and a trust policy, as shown by the following examples.

### Example permissions policy

The following permissions policy allows the AWS KMS operations that Amazon Comprehend uses to encrypt and decrypt custom models. It grants access to two KMS keys:

- One KMS key is in the AWS account that contains the model to import. It was used to encrypt the model, and Amazon Comprehend uses it to decrypt the model during the import.
- The other KMS key is in the AWS account that imports the model. Amazon Comprehend uses this key to encrypt the new custom model that is created by the import.

```
{  
    "Version": "2012-10-17",  
    "Statement": [  
        {  
            "Effect": "Allow",  
            "Action": [  
                "kms>CreateGrant"  
            ],  
            "Resource": [  
                "arn:aws:kms:us-west-2:111122223333:key/key-id",  
                "arn:aws:kms:us-west-2:444455556666:key/key-id"  
            ]  
        },  
        {  
            "Effect": "Allow",  
            "Action": [  
                "kmsDecrypt",  
                "kmsGenerateDatakey"  
            ],  
            "Resource": [  
                "arn:aws:kms:us-west-2:111122223333:key/key-id",  
                "arn:aws:kms:us-west-2:444455556666:key/key-id"  
            ],  
            "Condition": {  
                "StringEquals": {  
                    "kmsViaService": [  
                        "s3.us-west-2.amazonaws.com"  
                    ]  
                }  
            }  
        }  
    ]  
}
```

### Example trust policy

The following trust policy allows Amazon Comprehend to assume the role and gain its permissions. It allows the `comprehend.amazonaws.com` service principal to perform the `sts:AssumeRole` operation. To help with [confused deputy prevention \(p. 189\)](#), you restrict the scope of the permission by using one

or more global condition context keys. For `aws:SourceAccount`, specify the account Id of the user who is importing the model.

```
{  
    "Version": "2012-10-17",  
    "Statement": [  
        {  
            "Effect": "Allow",  
            "Principal": {  
                "Service": "comprehend.amazonaws.com"  
            },  
            "Action": "sts:AssumeRole",  
            "Condition": {  
                "StringEquals": {  
                    "aws:SourceAccount": "444455556666"  
                }  
            }  
        }  
    ]  
}
```

## Importing a custom model

You can import a custom model by using the AWS Management Console, AWS CLI, or Amazon Comprehend API.

### AWS Management Console

You can use Amazon Comprehend in the AWS Management Console.

#### To import a custom model

1. Sign in to the AWS Management Console and open the [Amazon Comprehend console](#).
2. In the navigation menu on the left, under **Customization**, choose the page for the type of model that you are importing:
  - a. If you are importing a custom document classifier, choose **Custom classification**.
  - b. If you are importing a custom entity recognizer, choose **Custom entity recognition**.
3. Choose **Import version**.
4. On the **Import model version** page, enter the following details:
  - **Model version ARN** – The ARN of the model version to import.
  - **Model name** – A custom name for the new model that is created by the import.
  - **Version name** – A custom name for the new model version that is created by the import.
5. For **Model encryption**, choose the type of KMS key to use to encrypt the new custom model that you create with the import:
  - **Use AWS owned key** – Amazon Comprehend encrypts your model by using a key in AWS Key Management Service (AWS KMS) that is created, managed, and used on your behalf by AWS.
  - **Choose a different AWS KMS key (advanced)** – Amazon Comprehend encrypts your model by using a customer managed key that you manage in AWS KMS.

If you choose this option, select a KMS key that's in your AWS account, or create a new one by choosing **Create an AWS KMS key**.
6. In the **Service access** section, grant Amazon Comprehend access to any AWS KMS keys that it needs to:

- Decrypt the custom model that you import.
- Encrypt that the new custom model that you create with the import.

You grant access with an IAM service role that allows Amazon Comprehend to use the KMS keys.

For **Service role**, do one of the following:

- If you have an existing service role that you want to use, choose **Use an existing IAM role**. Then, select it under **Role name**.
  - If you want Amazon Comprehend to create a role for you, choose **Create an IAM role**.
7. If you chose to have Amazon Comprehend create the role for you, do the following:
- a. For **Role name**, enter a role name suffix that will help you recognize the role later.
  - b. For **Source KMS key ARN**, enter the ARN of the KMS key that is used to encrypt the model that you're importing. Amazon Comprehend uses this key to decrypt the model during the import.
8. (Optional) In the **Tags** section, you can add tags to the new custom model that you create by importing. For more information about tagging custom models, see [Tagging a new resource \(p. 183\)](#).
9. Choose **Confirm**.

## AWS CLI

You can use Amazon Comprehend by running commands with the AWS CLI.

### Example Import-model command

To import a custom model, use the `import-model` command:

```
$ aws comprehend import-model \
> --source-model arn:aws:comprehend:us-west-2:111122223333:document-classifier/foo/version/
  bar \
> --model-name importedDocumentClassifier \
> --version-name versionOne \
> --data-access-role-arn arn:aws:iam::444455556666:role/comprehendAccessRole \
> --model-kms-key-id kms-key-id
```

This example uses the following parameters:

- `source-model` – The ARN of the custom model to import.
- `model-name` – A custom name for the new model that is created by the import.
- `version-name` – A custom name for the new model version that is created by the import.
- `data-access-role-arn` – The ARN of the IAM service role that allows Amazon Comprehend to use the necessary AWS KMS keys to encrypt or decrypt the custom model.
- `model-kms-key-id` – The ARN or ID of the KMS key that Amazon Comprehend uses to encrypt the custom model that you create with this import. This key must be in AWS KMS in your AWS account.

## Amazon Comprehend API

To import a custom model by using the Amazon Comprehend API, use the [ImportModel](#) API action.

# Managing Amazon Comprehend endpoints

In Amazon Comprehend, endpoints make your custom models available for real-time classification or entity detection. After you create an endpoint, you can make changes to it as your business needs evolve. For example, you can monitor your endpoint utilization and apply auto scaling to automatically set endpoint provisioning to fit your capacity needs. You can manage all your endpoints from a single view, and when you no longer need an endpoint you can delete it to save costs.

Before you can manage an endpoint, you must create one. For more information, see the following procedures:

- [Creating an endpoint for custom classification \(p. 118\)](#)
- [Creating an endpoint for custom entity detection \(p. 149\)](#)

## Topics

- [Overview of Amazon Comprehend endpoints \(p. 171\)](#)
- [Monitoring Amazon Comprehend endpoints \(p. 172\)](#)
- [Updating Amazon Comprehend endpoints \(p. 173\)](#)
- [Using Trusted Advisor with Amazon Comprehend \(p. 174\)](#)
- [Deleting Amazon Comprehend endpoints \(p. 177\)](#)
- [Auto scaling with endpoints \(p. 177\)](#)

## Overview of Amazon Comprehend endpoints

The endpoints page from Amazon Comprehend console provides you a global view of your endpoints. From the endpoints overview page, you can view all of your endpoints in one place to understand your endpoint usage versus your actual resource usage. On the top right of the endpoints page you can specify what endpoints you want to view—all of them, custom classifier endpoints, or your custom entity endpoints.

You can create, update, monitor, and delete endpoints from this page. From the endpoints overview section, you can view a list of your endpoints, what custom models the endpoints are hosting, their creation time, the provisioned throughput, and the status of the endpoint. When you select a specific endpoint from the endpoint overview table, the endpoint details are displayed.

Also, if you are a [AWS Business Support](#) or an [AWS Enterprise Support](#) customer, you have access to Trusted Advisor checks specific to your endpoints. To learn more, see [Using Trusted Advisor with Amazon Comprehend \(p. 174\)](#). For a complete list of checks and descriptions, see the [Trusted Advisor Best Practices](#).

For more information on managing your endpoints, see the following topics.

- [Monitoring Amazon Comprehend endpoints \(p. 172\)](#)
- [Updating Amazon Comprehend endpoints \(p. 173\)](#)
- [Using Trusted Advisor with Amazon Comprehend \(p. 174\)](#)
- [Deleting Amazon Comprehend endpoints \(p. 177\)](#)

**Important**

The cost for real-time custom classification is based on both the throughput you set and the length of time the endpoint is active. If you are no longer using the endpoint, or are not using it for an extended period, you should set up an auto scaling policy to reduce your costs. Or, if you are no longer using an endpoint you can delete the endpoint to avoid incurring additional cost. For more information, see [Auto scaling with endpoints \(p. 177\)](#).

## Monitoring Amazon Comprehend endpoints

Depending on your needs, you might need to adjust the throughput of your endpoint after creating it. This can be achieved by updating the endpoint's inference units (IUs). When you edit an endpoint, you can add more IUs to an endpoint, or you can decrease the IUs. A single endpoint can have 1 to 10 IUs.

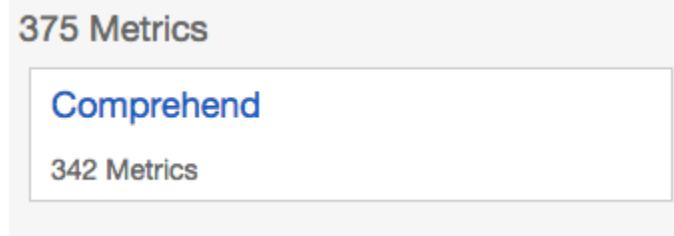
For more information on updating your endpoint, see [the section called "Updating endpoints" \(p. 173\)](#).

To view all of your endpoints, see [the section called "Endpoints overview" \(p. 171\)](#).

You can determine how to best adjust your endpoint's throughput by monitoring its usage with the Amazon CloudWatch console.

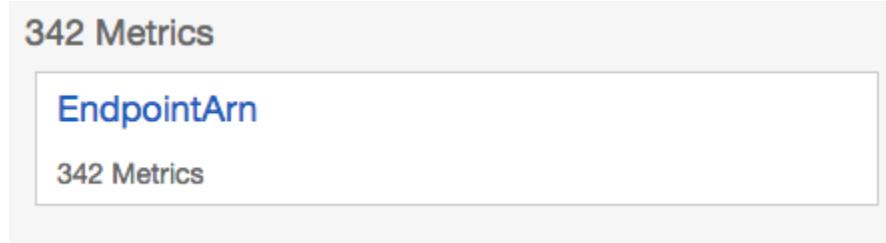
### Monitor your endpoint usage with CloudWatch

1. Sign in to the AWS Management Console and open the [CloudWatch console](#).
2. On the left, choose **Metrics** and select **All metrics**.
3. Under **All metrics**, choose **Comprehend**.



The CloudWatch console will show the dimensions for the metrics.

4. Choose the **EndpointArn** dimension.



The console displays **ConsumedInferenceUnits**, **ProvisionedInferenceUnits**, and **InferenceUtilization** for each of your endpoints.

Metric Name
ConsumedInferenceUnits
ProvisionedInferenceUnits
InferenceUtilization

5. Set the Statistic column for **ConsumedInferenceUnits** and **InferenceUtilization** to **Sum**.
6. Set the Statistic column for **ProvisionedInferenceUnits** to **Average**.
7. Change the Period column for all metrics to **1 Minute**.
8. Select **InferenceUtilization** and select the arrow to move it to a separate **Y Axis**.

Your graph is ready for analysis.

Based on the CloudWatch metrics, you can also set up auto scaling to automatically adjust the throughput of your endpoint. For more information about using auto scaling with your endpoints, see [Auto scaling with endpoints \(p. 177\)](#).

- **ProvisionedInferenceUnits**- This metric represents the number of average provisioned IUs at the time the request was made.
- **ConsumedInferenceUnits** - This is based on the usage of each request submitted to the service that was successfully processed. This can be helpful when you compare what you're consuming against your provisioned IUs. The value for this metric is calculated by taking the number of characters processed and dividing it by the number of characters that can be processed in a minute for 1 IU.
- **InferenceUtilization** - This is emitted per request. This value is calculated by taking the consumed IUs defined in **ConsumedInferenceUnits** and dividing it by **ProvisionedInferenceUnits** and converting to a percentage out of 100.

#### Note

All of the metrics are emitted only for successful requests. The metric won't appear if it's from a request that is throttled or fails with an internal server error or a customer error.

## Updating Amazon Comprehend endpoints

Frequently, the level of throughput you need changes after creating an endpoint, or your first estimation of your needs changes. When this happens, it may be necessary to update your endpoint to adjust the throughput up or down. Throughput is governed by the number of inference units with which you've provisioned your endpoint. Each inference unit represents a throughput of 100 characters per second for up to 2 documents per second. You might also want to update the version of the model associated with the endpoint. When you edit an endpoint, you can choose a different version of the model for the endpoint.

It can also be helpful to add tags to your endpoint to help keep them organized. This can also be done while updating your endpoint. For more information on endpoints, see [Tagging your resources \(p. 183\)](#)

#### To update an endpoint (console)

1. Sign in to the AWS Management Console and open the [Amazon Comprehend console](#).

2. From the left menu, choose **Endpoints**.
3. From the **Classifiers** list, choose the name of the custom model from which you want to update the endpoint and follow the link. The model details page displays.
4. From the model details page, select the version details. The endpoints list displays.
5. Select the endpoint checkbox for your endpoint. At the top right of the endpoints table, select the **Actions** icon.
6. Choose **Edit**. You can update provisioned IUs and edit tags.
7. Save your changes.
8. To edit the number of inference units with which the endpoint is provisioned, choose **Edit**.
9. Enter the updated number of inference units to assign to the endpoint. Each unit represents a throughput of 100 characters per second. You can assign up to a maximum of 10 inference units per endpoint.

**Note**

The cost of using an endpoint is based on the amount of time operating and the throughput (based on the number of inference units). Increasing the number of inference units will thus increase the cost of operation. For more information, see [Amazon Comprehend pricing](#).

10. Choose **Edit endpoint**. The endpoint details page is displayed.
11. Confirm that the endpoint is updating by choosing the model name from the breadcrumbs at the top of the page. On the custom model details page, navigate to the **Endpoints** list and verify that it shows **Updating** next to the endpoint. When the update is complete, it will show **Ready**.

The following example demonstrates using the *UpdateEndpoint* operation with the AWS CLI.

The example is formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

```
aws comprehend update-endpoint \
    --desired-inference-units updated number of inference units \
    --desired-model-arn arn:aws:comprehend:region:account-id:model type/model name \
    --desired-data-access-role-arn arn:aws:iam:account id:role/role name
    --endpoint-arn arn:aws:comprehend:region:account id:endpoint/endpoint name
```

If the action is successful, Amazon Comprehend responds with an HTTP 200 response with an empty HTTP body.

12. To edit the custom model attached to your endpoint, from the custom model details page, navigate to the **Endpoints** list.
13. Select the endpoint you want to change and select **Edit**.
14. From the endpoint settings page, under **Select classifier model** or **Select recognizer model** depending on your endpoint, you can search for a model in the dropdown. Select the model you want.
15. Under **Select version** you can search for the model version you want. Select the version.
16. Select **Edit endpoint** to save.

## Using Trusted Advisor with Amazon Comprehend

AWS Trusted Advisor is an online tool that provides recommendations to help you provision your resources following AWS best practices.

If you have a Basic or Developer Support plan, you can use the Trusted Advisor console to access all checks in the Service Limits category and six checks in the Security category. If you have a Business or

Enterprise Support Plan, you can use the Trusted Advisor console and the [AWS Support API](#) to access all of the Trusted Advisor checks.

Amazon Comprehend supports the following Trusted Advisor checks to help customers optimize the cost and the security of their Amazon Comprehend endpoints by providing actionable recommendations.

## Amazon Comprehend underutilized endpoints

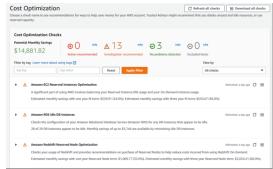
The **Amazon Comprehend underutilized endpoints** check evaluates the throughput configuration of your endpoints. This check alerts you when endpoints are not actively used for real-time inference requests. An endpoint that isn't used for more than 15 days is considered underutilized. All endpoints accrue charges based on both the throughput set and the length of time that the endpoint is active. For the endpoint not used in last 15 days, we recommend that you define a scaling policy for the resource using [Application Autoscaling](#). For an endpoint that hasn't been used in the last 30 days and does have an auto scaling policy defined we recommend that you use asynchronous inference or delete it. These check results are automatically refreshed once every day and can be viewed under the **CostOptimization** category on the Trusted Advisor console.

### To view the utilization status of all your endpoints and the corresponding recommendations

1. Sign in to the AWS Management Console and open the Trusted Advisor console.
2. In the navigation pane, choose the **CostOptimization** check category.
3. On the category page, you can view the summary for each check category:
  - **Action recommended (red)** – Trusted Advisor recommends an action for the check.
  - **Investigation recommended (yellow)** – Trusted Advisor detects a possible issue for the check.
  - **No problems detected (green)** – Trusted Advisor doesn't detect an issue for the check.
  - **Excluded items (gray)**– The number of checks that have excluded items, such as resources that you want a check to ignore.
4. Choose **Amazon Comprehend Underutilized Endpoints check** to view the check description and the following details:
  - **Alert Criteria** – Describes the threshold when a check will change status.
  - **Recommended Action** – Describes the recommended actions for this check.
  - **Resource Table:** A table that lists your endpoint details and the status for each based on your recommendations.
5. In the Resource table, if an endpoint is flagged with a **Investigation Recommended** because of a **Not used in last 30 days** warning, you can navigate to the Endpoint Details page on the Amazon Comprehend console.
  - If you do not want to use this endpoint anymore, choose **Delete**.
  - Choose **Delete** again to confirm the deletion. The custom model details page is displayed. Confirm that the endpoint you deleted shows **deleting** next to it. When it has deleted, the endpoint is removed from the **Endpoints** list.
6. In the Resource table on the Trusted Advisor console, if an endpoint is flagged with an **Investigation Recommended** status because it hasn't been used in the last 15 days, and if it has AutoScaling disabled, you can navigate to the Endpoint Details page on the Amazon Comprehend console to adjust the endpoint.
  - If you want to reduce the throughput configured for this endpoint, click **Edit**. Enter the updated number of inference units to assign to the endpoint, then select the checkbox to acknowledge and then choose **Edit Endpoint**. When the update is complete, the status will show as **Ready**.
  - If you want to automatically set endpoint provisioning on your endpoint instead of manually adjusting the throughput configuration, we recommend you use [Application Autoscaling](#).

7. In the Resource table on the Trusted Advisor console, if an endpoint is flagged with the **No problems detected** status because of the **Used Actively** reason, then it implies the endpoint is being utilized actively for running real-time inference requests and no actions are recommended.

Here's an example which shows the CostOptimization category view on the Trusted Advisor console:



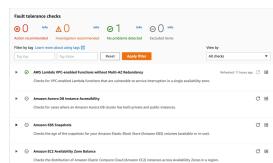
## Amazon Comprehend endpoint access risk

The **Amazon Comprehend endpoint access risk** check evaluates the AWS Key Management Service (AWS KMS) key permissions for an endpoint where the underlying model was encrypted using customer managed keys. If the customer managed key is disabled or the key policy was changed to alter the allowed permissions for Amazon Comprehend, the endpoint availability might be affected. If the key has been disabled, we recommend that you enable it. If the key policy has been altered and you wish to continue using this endpoint, we recommend that you update the key policy. The check results are automatically refreshed multiple times during the day. This check can be viewed under the **Fault Tolerance** category of the Trusted Advisor console.

### To view the AWS KMS key status of your Amazon Comprehend endpoints

1. Sign in to the AWS Management Console and open the Trusted Advisor console.
2. In the navigation pane, choose the **FaultTolerance** check category.
3. On the category page, you can view the summary for each check category:
  - **Action recommended (red)** – Trusted Advisor recommends an action for the check.
  - **Investigation recommended (yellow)**– Trusted Advisor detects a possible issue for the check.
  - **No problems detected (green)** – Trusted Advisor doesn't detect an issue for the check.
  - **Excluded items (gray)** – The number of checks that have excluded items, such as resources that you want a check to ignore.
4. Choose Amazon Comprehend Endpoint Access Risk Check and you can view the check description and the following details:
  - **Alert Criteria**– Describes the threshold when a check will change status.
  - **Recommended Action** – Describes the recommended actions for this check.
  - **Resource Table:** A table that lists your KMS encrypted endpoint details and the status for each one based on if there are recommended actions.
5. In the Resource table, if an endpoint is flagged with an **Action Recommended** status, select the link in the KMS KeyId column and you will be redirected to the corresponding AWS KMS key page.
  - To enable a disabled AWS KMS key, choose **Key Actions**, and select **Enable**.
  - If the Key Status is listed as **Enabled**, update the key policy by choosing **Switch to policy view** in the Key Policy section. Edit the key policy document to provide the necessary permissions to Amazon Comprehend and then choose **Save changes**.

Here's an example of the FaultTolerance category view on the Trusted Advisor console:



These checks and their results can also be viewed by referring the Trusted Advisor section of the AWS Support API.

To learn more about setting up alarms using CloudWatch, see: [Creating Trusted Advisor alarms using CloudWatch](#). For a full set of Trusted Advisor Best Practice Checks, see: [AWS Trusted Advisor best practice checklist](#).

## Deleting Amazon Comprehend endpoints

Once you no longer need your endpoint, you should delete it so that you stop incurring costs from it. You can easily create another endpoint whenever you need it from the **Endpoints** section.

### To delete an endpoint (console)

1. Sign in to the AWS Management Console and open the [Amazon Comprehend console](#).
2. From the left menu, choose **Endpoints**.
3. From the **Endpoints table** locate the endpoint you want to delete. You can search or filter all of the endpoints to find the one you need.
4. Select the endpoint checkbox for the endpoint you want to delete. At the top right of the endpoints table, select the **Actions** icon.
5. Choose **Delete**.
6. Choose **Delete** again to confirm the deletion. The endpoints page is displayed. Confirm that the endpoint you deleted shows **Deleting** next to it. When it's deleted, the endpoint is removed from the **Endpoints** list.

### To delete an endpoint (AWS CLI)

The following example demonstrates using the *DeleteEndpoint* operation with the AWS CLI.

The example is formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

```
aws comprehend delete-endpoint \
--endpoint-arn arn:aws:comprehend:region:account-id endpoint/endpoint name
```

If the action is successful, Amazon Comprehend responds with an HTTP 200 response with an empty HTTP body.

## Auto scaling with endpoints

Instead of manually adjusting the number of inference units provisioned for your document classification endpoints and entity recognizer endpoints, you can use auto scaling to automatically set endpoint provisioning to fit your capacity needs.

There are two ways to use auto scaling to adjust the number of inference units provisioned for your endpoint:

- [Target tracking \(p. 178\)](#): Set auto scaling to adjust endpoint provisioning to fit capacity needs based on usage.
- [Scheduled scaling \(p. 180\)](#): Set auto scaling to adjust endpoint provisioning to fit capacity needs on a specified schedule.

You can set auto scaling only with the AWS Command Line Interface (AWS CLI). For more information about auto scaling, see [What is Application Auto Scaling?](#)

## Target tracking

With target tracking, you can adjust endpoint provisioning to fit your capacity needs based on usage. The number of inference units automatically adjust so that the utilized capacity is within a target percentage of the provisioned capacity. You can use target tracking to accommodate temporary surges of use for your document classification endpoints and entity recognizer endpoints. For more information, see [Target tracking scaling policies for Application Auto Scaling](#).

### Note

The following examples are formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

## Setting up target tracking

To set up target tracking for an endpoint, you use AWS CLI commands to register a scalable target and then create a scaling policy. The scalable target defines inference units as the resource used to adjust endpoint provisioning, and the scaling policy defines the metrics that control the auto scaling of the provisioned capacity.

### To set up target tracking

1. Register a scalable target. The following examples register a scalable target to adjust endpoint provisioning with a minimum capacity of 1 inference unit and a maximum capacity of 2 inference units.

For a document classification endpoint, use the following AWS CLI command:

```
aws application-autoscaling register-scalable-target \
    --service-namespace comprehend \
    --resource-id arn:aws:comprehend:region:account-id:document-classifier-
endpoint/name \
    --scalable-dimension comprehend:document-classifier-endpoint:DesiredInferenceUnits
    \
    --min-capacity 1 \
    --max-capacity 2
```

For an entity recognizer endpoint, use the following AWS CLI command:

```
aws application-autoscaling register-scalable-target \
    --service-namespace comprehend \
    --resource-id arn:aws:comprehend:region:account-id:entity-recognizer-endpoint/name
    \
    --scalable-dimension comprehend:entity-recognizer-endpoint:DesiredInferenceUnits \
    --min-capacity 1 \
    --max-capacity 2
```

2. To verify the registration of the scalable target, use the following AWS CLI command:

```
aws application-autoscaling describe-scalable-targets \
--service-namespace comprehend \
--resource-id endpoint ARN
```

3. Create a target tracking configuration for the scaling policy and save the configuration in a file called config.json. The following is an example of a target tracking configuration that automatically adjusts the number of inference units so that utilized capacity is always 70% of the provisioned capacity.

```
{
  "TargetValue": 70,
  "PredefinedMetricSpecification":
  {
    "PredefinedMetricType": "ComprehendInferenceUtilization"
  }
}
```

4. Create a scaling policy. The following examples create a scaling policy based on the target tracking configuration defined in the config.json file.

For a document classification endpoint, use the following AWS CLI command:

```
aws application-autoscaling put-scaling-policy \
--service-namespace comprehend \
--resource-id arn:aws:comprehend:region:account-id:document-classifier-
endpoint/name \
--scalable-dimension comprehend:document-classifier-endpoint:DesiredInferenceUnits \
 \
--policy-name TestPolicy \
--policy-type TargetTrackingScaling \
--target-tracking-scaling-policy-configuration file://config.json
```

For an entity recognizer endpoint, use the following AWS CLI command:

```
aws application-autoscaling put-scaling-policy \
--service-namespace comprehend \
--resource-id arn:aws:comprehend:region:account-id:entity-recognizer-endpoint/name
 \
--scalable-dimension comprehend:entity-recognizer-endpoint:DesiredInferenceUnits \
--policy-name TestPolicy \
--policy-type TargetTrackingScaling \
--target-tracking-scaling-policy-configuration file://config.json
```

## Removing target tracking

To remove target tracking for an endpoint, you use AWS CLI commands to delete the scaling policy and then deregister the scalable target.

### To remove target tracking

1. Delete the scaling policy. The following examples delete a specified scaling policy.

For a document classification endpoint, use the following AWS CLI command:

```
aws application-autoscaling delete-scaling-policy \
    --service-namespace comprehend \
    --resource-id arn:aws:comprehend:region:account-id:document-classifier-
endpoint/name \
    --scalable-dimension comprehend:document-classifier-endpoint:DesiredInferenceUnits
\ \
    --policy-name TestPolicy \
```

For an entity recognizer endpoint, use the following AWS CLI command:

```
aws application-autoscaling delete-scaling-policy \
    --service-namespace comprehend \
    --resource-id arn:aws:comprehend:region:account-id:entity-recognizer-endpoint/name
\ \
    --scalable-dimension comprehend:entity-recognizer-endpoint:DesiredInferenceUnits \
    --policy-name TestPolicy
```

2. Deregister the scalable target. The following examples deregister a specified scalable target.

For a document classification endpoint, use the following AWS CLI command:

```
aws application-autoscaling deregister-scalable-target \
    --service-namespace comprehend \
    --resource-id arn:aws:comprehend:region:account-id:document-classifier-
endpoint/name \
    --scalable-dimension comprehend:document-classifier-endpoint:DesiredInferenceUnits
```

For an entity recognizer endpoint, use the following AWS CLI command:

```
aws application-autoscaling deregister-scalable-target \
    --service-namespace comprehend \
    --resource-id arn:aws:comprehend:region:account-id:entity-recognizer-endpoint/name
\ \
    --scalable-dimension comprehend:entity-recognizer-endpoint:DesiredInferenceUnits
```

## Scheduled scaling

With scheduled scaling, you can adjust endpoint provisioning to fit your capacity needs on a specified schedule. Scheduled scaling automatically adjusts the number of inference units to accommodate surges of use at specific times. You can use scheduled scaling for document classification endpoints and entity recognizer endpoints. For additional information about scheduled scaling, see [Scheduled scaling for Application Auto Scaling](#).

### Note

The following examples are formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

## Setting up scheduled scaling

To set up scheduled scaling for an endpoint, you use AWS CLI commands to register a scalable target and then create a scheduled action. The scalable target defines inference units as the resource used to adjust endpoint provisioning, and the scheduled action controls the auto scaling of the provisioned capacity at specific times.

## To set up scheduled scaling

1. Register a scalable target. The following examples register a scalable target to adjust endpoint provisioning with a minimum capacity of 1 inference unit and a maximum capacity of 2 inference units.

For a document classification endpoint, use the following AWS CLI command:

```
aws application-autoscaling register-scalable-target \
    --service-namespace comprehend \
    --resource-id arn:aws:comprehend:region:account-id:document-classifier-
endpoint/name \
    --scalable-dimension comprehend:document-classifier-endpoint:DesiredInferenceUnits
\ \
    --min-capacity 1 \
    --max-capacity 2
```

For an entity recognizer endpoint, use the following AWS CLI command:

```
aws application-autoscaling register-scalable-target \
    --service-namespace comprehend \
    --resource-id arn:aws:comprehend:region:account-id:entity-recognizer-endpoint/name
\ \
    --scalable-dimension comprehend:entity-recognizer-endpoint:DesiredInferenceUnits \
    --min-capacity 1 \
    --max-capacity 2
```

2. Create a scheduled action. The following examples create a scheduled action to automatically adjust the provisioned capacity every day at 12:00 UTC with a minimum of 2 inference units and a maximum of 5 inference units. For more information about chronological expressions and scheduled scaling, see [Schedule expressions](#).

For a document classification endpoint, use the following AWS CLI command:

```
aws application-autoscaling put-scheduled-action \
    --service-namespace comprehend \
    --resource-id arn:aws:comprehend:region:account-id:document-classifier-
endpoint/name \
    --scalable-dimension comprehend:document-classifier-endpoint:DesiredInferenceUnits
\ \
    --scheduled-action-name TestScheduledAction \
    --schedule "cron(0 12 * * ? *)" \
    --scalable-target-action MinCapacity=2,MaxCapacity=5
```

For an entity recognizer endpoint, use the following AWS CLI command:

```
aws application-autoscaling put-scheduled-action \
    --service-namespace comprehend \
    --resource-id arn:aws:comprehend:region:account-id:entity-recognizer-endpoint/name
\ \
    --scalable-dimension comprehend:entity-recognizer-endpoint:DesiredInferenceUnits \
    --scheduled-action-name TestScheduledAction \
    --schedule "cron(0 12 * * ? *)" \
    --scalable-target-action MinCapacity=2,MaxCapacity=5
```

## Removing scheduled scaling

To remove scheduled scaling for an endpoint, you use AWS CLI commands to delete the scheduled action and then deregister the scalable target.

### To remove scheduled scaling

1. Delete the scheduled action. The following examples delete a specified scheduled action.

For a document classification endpoint, use the following AWS CLI command:

```
aws application-autoscaling delete-scheduled-action \
  --service-namespace comprehend \
  --resource-id arn:aws:comprehend:region:account-id:document-classifier-
  endpoint/name \
  --scalable-dimension comprehend:document-classifier-endpoint:DesiredInferenceUnits
  \
  --scheduled-action-name TestScheduledAction
```

For an entity recognizer endpoint, use the following AWS CLI command:

```
aws application-autoscaling delete-scheduled-action \
  --service-namespace comprehend \
  --resource-id arn:aws:comprehend:region:account-id:entity-recognizer-endpoint/name
  \
  --scalable-dimension comprehend:entity-recognizer-endpoint:DesiredInferenceUnits \
  --scheduled-action-name TestScheduledAction
```

2. Deregister the scalable target. The following examples deregister a specified scalable target.

For a document classification endpoint, use the following AWS CLI command:

```
aws application-autoscaling deregister-scalabe-target \
  --service-namespace comprehend \
  --resource-id arn:aws:comprehend:region:account-id:document-classifier-
  endpoint/name \
  --scalable-dimension comprehend:document-classifier-endpoint:DesiredInferenceUnits
```

For an entity recognizer endpoint, use the following AWS CLI command:

```
aws application-autoscaling deregister-scalabe-target \
  --service-namespace comprehend \
  --resource-id arn:aws:comprehend:region:account-id:entity-recognizer-endpoint/name
  \
  --scalable-dimension comprehend:entity-recognizer-endpoint:DesiredInferenceUnits
```

# Tagging your resources

A tag is a key-value pair that you can add to an Amazon Comprehend resource as metadata. You can use tags on **Analysis jobs**, **Custom classification** models, **Custom entity recognition** models, and **endpoints**. Tags have two major functions: organizing your resources and providing tag-based access control.

To organize your resources with tags, you could add the tag key 'Department' and tag values 'Sales' or 'Legal'. You can then search and filter for resources that are pertinent to your company's legal department.

To provide tag-based access control, create IAM policies with permissions based on tags. A policy can allow or disallow an operation based on the tags provided in your request (request-tags) or tags associated with the resource you're calling (resource-tags). For more information on using tags with IAM, see [Controlling access using tags](#) in the *IAM User Guide*.

Considerations for using tags with Amazon Comprehend:

- You can add up to 50 tags per resource, and tags can be added at the time you create the resource, or retroactively.
- A tag *key* is a required field but a tag *value* is optional.
- Tags do not have to be unique between resources, but a given resource cannot have duplicate tag keys.
- Tag keys and values are case sensitive.
- A tag key can have a maximum of 127 characters; a tag value can have a maximum of 255 characters.
- The 'aws :' prefix is reserved for AWS use; you cannot add, edit, or delete tags whose key begins with aws :. These tags don't count against your tags-per-resource limit of 50.

#### Note

If you plan to use your tagging schema across multiple AWS services and resources, remember that other services may have different requirements for allowed characters.

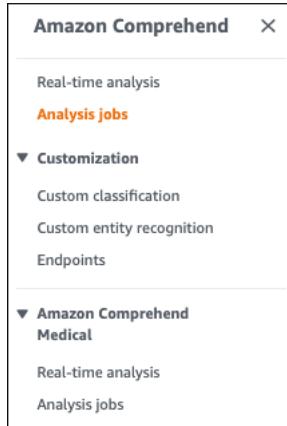
#### Topics

- [Tagging a new resource \(p. 183\)](#)
- [Viewing, editing, and deleting tags associated with a resource \(p. 184\)](#)

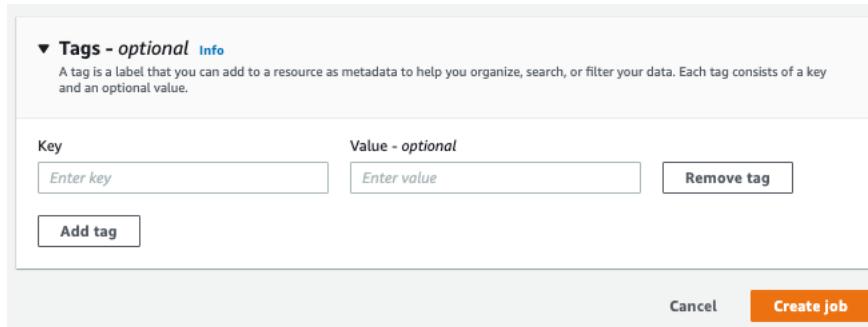
## Tagging a new resource

You can add tags to an **Analysis job**, a **Custom classification** model, a **Custom entity recognition** model, or **endpoints**.

1. Sign in to the [Amazon Comprehend console](#) and select the resource (Analysis job, Custom classification, or Custom entity recognition) you want to create from the left navigation pane.



2. Click **Create job** (or **Create new model**). This takes you to the main 'create' page for your resource. At the bottom of this page, you'll see a '**Tags - optional**' box.



Enter a tag key and, optionally, a tag value. Choose **Add tag** to add another tag to the resource. Repeat this process until all your tags are added. Note that tag keys must be unique per resource.

3. Select the **Create** or **Create job** button to continue creating your resource.

You can also add tags using the AWS CLI. This example shows how to add tags with the [start-entities-detection-job](#) command.

```
aws comprehend start-entities-detection-job \
--language-code "en" \
--input-data-config "{\"S3Uri\": \"s3://test-input/TEST.csv\"}" \
--output-data-config "{\"S3Uri\": \"s3://test-output\"}" \
--data-access-role-arn arn:aws:iam::123456789012:role/test \
--tags "[{\\"Key\\": \"color\", \\"Value\\": \"orange\"}]"
```

## Viewing, editing, and deleting tags associated with a resource

You can view tags associated with an **Analysis job**, a **Custom classification** model, or a **Custom entity recognition** model.

1. Sign in to the [Amazon Comprehend console](#) and select the resource (Analysis job, Custom classification, or Custom entity recognition) that contains the file with the tags you want to view, modify, or delete. This displays the list of existing files for your selected resource.

The screenshot shows the 'Analysis jobs' section of the Amazon Comprehend console. On the left, there's a sidebar with options like 'Real-time analysis', 'Analysis jobs' (which is selected and highlighted in orange), 'Customization', 'Endpoints', and 'Amazon Comprehend Medical'. The main area is titled 'Analysis jobs' and shows a table with one item:

Name	Analysis type	Start	End
my-comprehend-analysis-job	Key phrases	10/22/2021, 10:43:57 AM	10/22/2021, 10:52:07 AM

- Click the name of the file (or model) whose tags you want to view, modify, or delete. This takes you to the details page for that file (or model). Scroll down until you see a **Tags** box. Here, you can see all the tags associated with your selected file (or model).

This screenshot shows the 'Tags (2)' section. It has a table with two rows:

Key	Value
color	orange
type	PDF

At the top right of this section is a 'Manage tags' button.

- Select **Manage tags** to edit or remove tags from your resource.
- Click on the text you want to modify, then edit your tag. You can also remove the tag by selecting **Remove tag**. To add a new tag, select **Add tag**, then enter your desired text in the blank fields.

### Manage my-comprehend-analysis-job - No Version Name tags

This screenshot shows the 'Tags' configuration dialog. It includes an 'Info' section with a brief description of what tags are used for. Below is a table where tags can be modified or removed:

Key	Value - optional	
color	orange	<b>Remove tag</b>
type	PDF	<b>Remove tag</b>

At the bottom left is an 'Add tag' button, and at the bottom right are 'Cancel' and 'Save' buttons.

When you're finished modifying your tags, select **Save**.

# Security in Amazon Comprehend

Cloud security at AWS is the highest priority. As an AWS customer, you benefit from a data center and network architecture that is built to meet the requirements of the most security-sensitive organizations.

Security is a shared responsibility between AWS and you. The [shared responsibility model](#) describes this as security of the cloud and security *in the cloud*:

- **Security of the cloud** – AWS is responsible for protecting the infrastructure that runs AWS services in the AWS Cloud. AWS also provides you with services that you can use securely. Third-party auditors regularly test and verify the effectiveness of our security as part of the [AWS Compliance Programs](#). To learn about the compliance programs that apply to Amazon Comprehend, see [AWS Services in Scope by Compliance Program](#).
- **Security in the cloud** – Your responsibility is determined by the AWS service that you use. You are also responsible for other factors including the sensitivity of your data, your company's requirements, and applicable laws and regulations.

This documentation helps you understand how to apply the shared responsibility model when using Amazon Comprehend. The following topics show you how to configure Amazon Comprehend to meet your security and compliance objectives. You also learn how to use other AWS services that help you to monitor and secure your Amazon Comprehend resources.

## Topics

- [Data protection in Amazon Comprehend \(p. 186\)](#)
- [Authentication and access control for Amazon Comprehend \(p. 195\)](#)
- [Logging Amazon Comprehend API calls with AWS CloudTrail \(p. 207\)](#)
- [Compliance validation for Amazon Comprehend \(p. 216\)](#)
- [Resilience in Amazon Comprehend \(p. 216\)](#)
- [Infrastructure security in Amazon Comprehend \(p. 217\)](#)
- [Permissions required for a custom asynchronous analysis job \(p. 217\)](#)

## Data protection in Amazon Comprehend

The AWS [shared responsibility model](#) applies to data protection in Amazon Comprehend. As described in this model, AWS is responsible for protecting the global infrastructure that runs all of the AWS Cloud. You are responsible for maintaining control over your content that is hosted on this infrastructure. This content includes the security configuration and management tasks for the AWS services that you use. For more information about data privacy, see the [Data Privacy FAQ](#). For information about data protection in Europe, see the [AWS Shared Responsibility Model and GDPR](#) blog post on the [AWS Security Blog](#).

For data protection purposes, we recommend that you protect AWS account credentials and set up individual user accounts with AWS Identity and Access Management (IAM). That way each user is given only the permissions necessary to fulfill their job duties. We also recommend that you secure your data in the following ways:

- Use multi-factor authentication (MFA) with each account.
- Use SSL/TLS to communicate with AWS resources. We recommend TLS 1.2 or later.

- Set up API and user activity logging with AWS CloudTrail.
- Use AWS encryption solutions, along with all default security controls within AWS services.
- Use advanced managed security services such as Amazon Macie, which assists in discovering and securing personal data that is stored in Amazon S3.
- If you require FIPS 140-2 validated cryptographic modules when accessing AWS through a command line interface or an API, use a FIPS endpoint. For more information about the available FIPS endpoints, see [Federal Information Processing Standard \(FIPS\) 140-2](#).

We strongly recommend that you never put confidential or sensitive information, such as your customers' email addresses, into tags or free-form fields such as a **Name** field. This includes when you work with Amazon Comprehend or other AWS services using the console, API, AWS CLI, or AWS SDKs. Any data that you enter into tags or free-form fields used for names may be used for billing or diagnostic logs. If you provide a URL to an external server, we strongly recommend that you do not include credentials information in the URL to validate your request to that server.

#### Topics

- [KMS encryption in Amazon Comprehend \(p. 187\)](#)
- [Cross-service confused deputy prevention \(p. 189\)](#)
- [Protect jobs by using an Amazon Virtual Private Cloud \(p. 191\)](#)
- [Amazon Comprehend and interface VPC endpoints \(AWS PrivateLink\) \(p. 194\)](#)

## KMS encryption in Amazon Comprehend

Amazon Comprehend works with AWS Key Management Service (AWS KMS) to provide enhanced encryption for your data. Amazon S3 already enables you to encrypt your input documents when creating a text analysis, topic modeling, or custom Amazon Comprehend job. Integration with AWS KMS enables you to encrypt the data in the storage volume for Start\* and Create\* jobs, and it encrypts the output results of Start\* jobs using your own KMS key.

For the AWS Management Console, Amazon Comprehend encrypts custom models with its own KMS key. For the AWS CLI, Amazon Comprehend can encrypt custom models using either its own KMS key or a provided customer managed key (CMK).

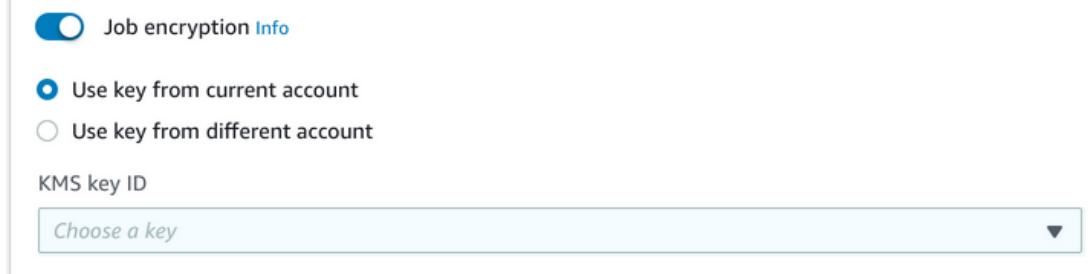
#### KMS encryption using the AWS Management Console

Two encryption options are available when using the console:

- Volume encryption
- Output result encryption

#### To enable volume encryption

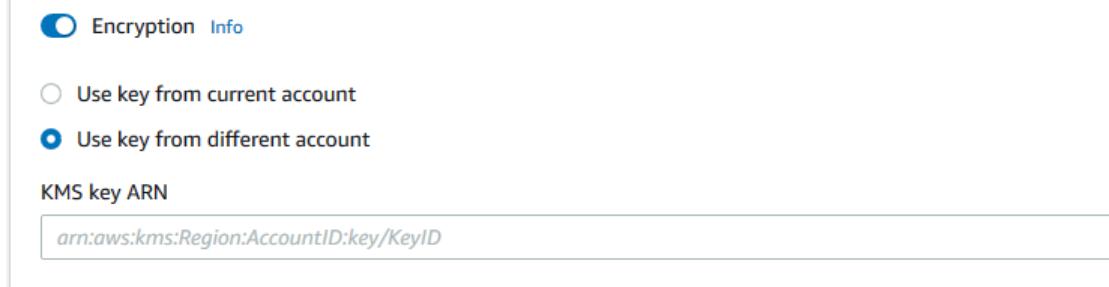
1. Under **Job Settings**, choose the **Job encryption** option.



2. Choose whether the KMS customer-managed key (CMK) is from the account you're currently using or from a different account. If you want to use a key from the current account, choose the key alias from **KMS key ID**. If you're using a key from a different account, you must enter the key's ARN.

### To enable output result encryption

1. Under **Output Settings**, choose the **Encryption** option.



2. Choose whether the customer-managed key (CMK) is from the account you're currently using or from a different account. If you want to use a key from the current account, choose the key ID from **KMS key ID**. If you're using a key from a different account, you must enter the key's ARN.

If you have previously setup encryption using SSE-KMS on your S3 input documents, this can provide you with additional security. However, if you do this, the IAM role used must have `kms:Decrypt` permission for the KMS key with which the input documents are encrypted. For more information, see [Permissions required to use KMS encryption \(p. 199\)](#).

### KMS encryption with API operations

All Amazon Comprehend `Start*` and `Create*` API operations support KMS encrypted input documents. `Describe*` and `List*` API operations return the `KmsKeyId` in `OutputDataConfig` if the original job had `KmsKeyId` provided as an input. If it was not provided as input, it isn't returned.

This can be seen in the following AWS CLI example using the [StartEntitiesDetectionJob \(p. 416\)](#) operation:

```
aws comprehend start-entities-detection-job \
  --region region \
  --data-access-role-arn "data access role arn" \
  --entity-recognizer-arn "entity recognizer arn" \
  --input-data-config "S3Uri=s3://Bucket Name/Bucket Path" \
  --job-name job name \
  --language-code en \
  --output-data-config "KmsKeyId=Output S3 KMS key ID" "S3Uri=s3://Bucket Name/Bucket Path/" \
  --volumeKmsKeyId "Volume KMS key ID"
```

#### Note

This example is formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

### Customer Managed Key (CMK) encryption with API operations

Amazon Comprehend custom model API operations, `CreateEntityRecognizer`, `CreateDocumentClassifier`, and `CreateEndpoint`, support encryption using customer managed keys via the AWS CLI.

You need an IAM policy to allow a principal to use or manage customer managed keys. These keys are specified in the `Resource` element of the policy statement. As best practice, limit customer managed keys to only those that the principals must use in your policy statement.

The following AWS CLI example creates a custom entity recognizer with model encryption using the [CreateEntityRecognizer \(p. 287\)](#) operation:

```
aws comprehend create-entity-recognizer \
    --recognizer-name name \
    --data-access-role-arn data access role arn \
    --language-code en \
    --model-kms-key-id Model KMS Key ID \
    --input-data-config file:///path/input-data-config.json
```

**Note**

This example is formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

## Cross-service confused deputy prevention

The confused deputy problem is a security issue where an entity that doesn't have permission to perform an action can coerce a more-privileged entity to perform the action. In AWS, cross-service impersonation can result in the confused deputy problem. Cross-service impersonation can occur when one service (the *calling service*) calls another service (the *called service*). The calling service can be manipulated to use its permissions to act on another customer's resources in a way it should not otherwise have permission to access. To prevent this, AWS provides tools that help you protect your data for all services with service principals that have been given access to resources in your account.

We recommend using the `aws:SourceArn` and `aws:SourceAccount` global condition context keys in resource policies to limit the permissions that Amazon Comprehend gives another service to the resource. If you use both global condition context keys, the `aws:SourceAccount` value and the account in the `aws:SourceArn` value must use the same account ID when used in the same policy statement.

The most effective way to protect against the confused deputy problem is to use the `aws:SourceArn` global condition context key with the full ARN of the resource. If you don't know the full ARN of the resource or if you are specifying multiple resources, use the `aws:SourceArn` global context condition key with wildcards (\*) for the unknown portions of the ARN. For example, `arn:aws:servicename::123456789012:*`.

### Using source account

The following example shows how you can use the `aws:SourceAccount` global condition context key in Amazon Comprehend.

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Sid": "ConfusedDeputyPreventionExamplePolicy",
            "Effect": "Allow",
            "Principal": [
                "Service": "comprehend.amazonaws.com"
            ],
            "Action": "sts:AssumeRole",
            "Condition": [
                "StringEquals": {
                    "aws:SourceAccount": "111122223333"
                }
            ]
        }
    ]
}
```

```
    }
}
```

## Trust policy for endpoints of encrypted models

You need to create a trust policy to create or update an endpoint for an encrypted model. Set the `aws:SourceAccount` value to your account ID. If you use the `ArnEquals` condition, set the `aws:SourceArn` value to the ARN of the endpoint.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "",
      "Effect": "Allow",
      "Principal": {
        "Service": "comprehend.amazonaws.com"
      },
      "Action": "sts:AssumeRole",
      "Condition": {
        "StringEquals": {
          "aws:SourceAccount": "111122223333"
        },
        "ArnEquals": {
          "aws:SourceArn": "arn:aws:comprehend:us-west-2:111122223333:document-classifier-endpoint/endpoint-name"
        }
      }
    }
  ]
}
```

## Create custom model

You need to create a trust policy to create a custom model. Set the `aws:SourceAccount` value to your account ID. If you use the `ArnEquals` condition, set the `aws:SourceArn` value to the ARN of the custom model version.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "",
      "Effect": "Allow",
      "Principal": {
        "Service": "comprehend.amazonaws.com"
      },
      "Action": "sts:AssumeRole",
      "Condition": {
        "StringEquals": {
          "aws:SourceAccount": "111122223333"
        },
        "ArnEquals": {
          "aws:SourceArn": "arn:aws:comprehend:us-west-2:111122223333:document-classifier/smallest-classifier-test/version/version-name"
        }
      }
    }
  ]
}
```

## Protect jobs by using an Amazon Virtual Private Cloud

Amazon Comprehend uses a variety of security measures to ensure the safety of your data with our job containers where it's stored while being used by Amazon Comprehend. However, job containers access AWS resources—such as the Amazon S3 buckets where you store data and model artifacts—over the internet.

To control access to your data, we recommend that you create a *virtual private cloud (VPC)* and configure it so that the data and containers aren't accessible over the internet. For information about creating and configuring a VPC, see [Getting Started With Amazon VPC](#) in the *Amazon VPC User Guide*. Using a VPC helps to protect your data because you can configure your VPC so that it is not connected to the internet. Using a VPC also allows you to monitor all network traffic in and out of our job containers by using VPC flow logs. For more information, see [VPC Flow Logs](#) in the *Amazon VPC User Guide*.

You specify your VPC configuration when you create a job, by specifying the subnets and security groups. When you specify the subnets and security groups, Amazon Comprehend creates *elastic network interfaces (ENIs)* that are associated with your security groups in one of the subnets. ENIs allow our job containers to connect to resources in your VPC. For information about ENIs, see [Elastic Network Interfaces](#) in the *Amazon VPC User Guide*.

### Note

For jobs, you can only configure subnets with a default tenancy VPC in which your instance runs on shared hardware. For more information on the tenancy attribute for VPCs, see [Dedicated Instances](#) in the *Amazon EC2 User Guide for Linux Instances*.

## Configure a job for Amazon VPC access

To specify subnets and security groups in your VPC, use the `VpcConfig` request parameter of the applicable API, or provide this information when you create a job in the Amazon Comprehend console. Amazon Comprehend uses this information to create ENIs and attach them to our job containers. The ENIs provide our job containers with a network connection within your VPC that is not connected to the internet.

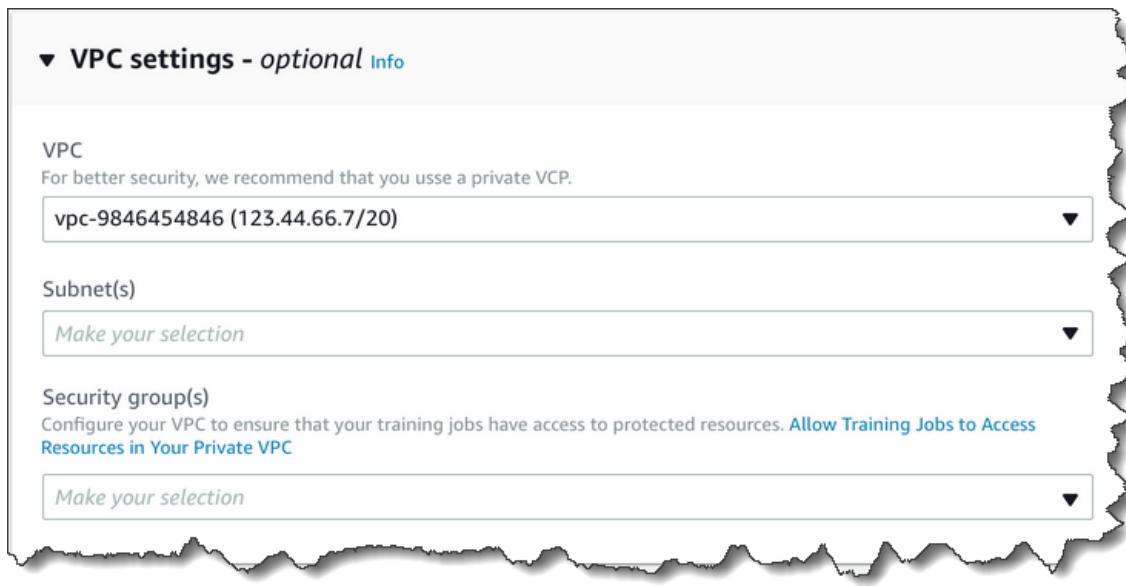
The following APIs contain the `VpcConfig` request parameter:

- **Create\*** APIs: [CreateDocumentClassifier](#) (p. 277), [CreateEntityRecognizer](#) (p. 287)
- **Start\*** APIs: [StartDocumentClassificationJob](#) (p. 406),  
[StartDominantLanguageDetectionJob](#) (p. 411), [StartEntitiesDetectionJob](#) (p. 416),  
[StartKeyPhrasesDetectionJob](#) (p. 425), [StartSentimentDetectionJob](#) (p. 434),  
[StartTargetedSentimentDetectionJob](#) (p. 439), [StartTopicsDetectionJob](#) (p. 444)

The following is an example of the `VpcConfig` parameter that you include in your API call:

```
"VpcConfig": {  
    "SecurityGroupIds": [  
        "sg-0123456789abcdef0"  
    ],  
    "Subnets": [  
        "subnet-0123456789abcdef0",  
        "subnet-0123456789abcdef1",  
        "subnet-0123456789abcdef2"  
    ]  
}
```

To configure a VPC from the Amazon Comprehend console, choose the configuration details from the optional **VPC Settings** section when creating the job.



## Configure your VPC for Amazon Comprehend jobs

When configuring the VPC for your Amazon Comprehend jobs, use the following guidelines. For information about setting up a VPC, see [Working with VPCs and Subnets](#) in the *Amazon VPC User Guide*.

### Ensure That Subnets Have Enough IP Addresses

Your VPC subnets should have at least two private IP addresses for each instance in a job. For more information, see [VPC and Subnet Sizing for IPv4](#) in the *Amazon VPC User Guide*.

### Create an Amazon S3 VPC Endpoint

If you configure your VPC so that job containers don't have access to the internet, they can't connect to the Amazon S3 buckets that contain your data unless you create a VPC endpoint that allows access. By creating a VPC endpoint, you allow our job containers to access the model artifacts and your data. We recommend that you also create a custom policy that allows only requests from your VPC to access to your S3 buckets. For more information, see [Endpoints for Amazon S3](#) in the *Amazon VPC User Guide*.

The following policy allows access to S3 buckets. Edit this policy to allow access only the resources that your job needs.

```
{  
    "Version": "2008-10-17",  
    "Statement": [  
        {  
            "Effect": "Allow",  
            "Principal": "*",  
            "Action": [  
                "s3:GetObject",  
                "s3:PutObject",  
                "s3>ListBucket",  
                "s3:GetBucketLocation",  
                "s3>DeleteObject",  
                "s3>ListMultipartUploadParts",  
                "s3:AbortMultipartUpload"  
            ],  
            "Resource": "*"  
        }  
    ]  
}
```

```
    ]
}
```

Use default DNS settings for your endpoint route table, so that standard Amazon S3 URLs (for example, `http://s3-aws-region.amazonaws.com/MyBucket`) resolve. If you don't use default DNS settings, ensure that the URLs that you use to specify the locations of the data in your jobs resolve by configuring the endpoint route tables. For information about VPC endpoint route tables, see [Routing for Gateway Endpoints](#) in the *Amazon VPC User Guide*.

The default endpoint policy allows users to install packages from the Amazon Linux and Amazon Linux 2 repositories on our jobs container. If you don't want users to install packages from that repository, create a custom endpoint policy that explicitly denies access to the Amazon Linux and Amazon Linux 2 repositories. Comprehend itself doesn't need any such packages, so there won't be any functionality impact. The following is an example of a policy that denies access to these repositories:

```
{
  "Statement": [
    {
      "Sid": "AmazonLinuxAMIRRepositoryAccess",
      "Principal": "*",
      "Action": [
        "s3:GetObject"
      ],
      "Effect": "Deny",
      "Resource": [
        "arn:aws:s3:::packages.*.amazonaws.com/*",
        "arn:aws:s3:::repo.*.amazonaws.com/*"
      ]
    }
  ]
}

{
  "Statement": [
    {
      "Sid": "AmazonLinux2AMIRRepositoryAccess",
      "Principal": "*",
      "Action": [
        "s3:GetObject"
      ],
      "Effect": "Deny",
      "Resource": [
        "arn:aws:s3:::amazonlinux.*.amazonaws.com/*"
      ]
    }
  ]
}
```

#### Permissions for the `DataAccessRole`

When you use a VPC with your analysis job, the `DataAccessRole` used for the `Create*` and `Start*` operations must also have permissions to the VPC from which the input documents and the output bucket are accessed.

The following policy provides the access needed to the `DataAccessRole` used for the `Create*` and `Start*` operations.

```
{
  "Version": "2008-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [

```

```
        "ec2:CreateNetworkInterface",
        "ec2:CreateNetworkInterfacePermission",
        "ec2:DeleteNetworkInterface",
        "ec2:DeleteNetworkInterfacePermission",
        "ec2:DescribeNetworkInterfaces",
        "ec2:DescribeVpcs",
        "ec2:DescribeDhcpOptions",
        "ec2:DescribeSubnets",
        "ec2:DescribeSecurityGroups"
    ],
    "Resource": "*"
}
]
```

### Configure the VPC security group

With distributed jobs, you must allow communication between the different job containers in the same job. To do that, configure a rule for your security group that allows inbound connections between members of the same security group. For information, see [Security Group Rules](#) in the *Amazon VPC User Guide*.

### Connect to resources outside your VPC

If you configure your VPC so that it doesn't have internet access, jobs that use that VPC do not have access to resources outside your VPC. If your jobs need access to resources outside your VPC, provide access with one of the following options:

- If your job needs access to an AWS service that supports interface VPC endpoints, create an endpoint to connect to that service. For a list of services that support interface endpoints, see [VPC Endpoints](#) in the *Amazon VPC User Guide*. For information about creating an interface VPC endpoint, see [Interface VPC Endpoints \(AWS PrivateLink\)](#) in the *Amazon VPC User Guide*.
- If your job needs access to an AWS service that doesn't support interface VPC endpoints or to a resource outside of AWS, create a NAT gateway and configure your security groups to allow outbound connections. For information about setting up a NAT gateway for your VPC, see [Scenario 2: VPC with Public and Private Subnets \(NAT\)](#) in the *Amazon VPC User Guide*.

## Amazon Comprehend and interface VPC endpoints (AWS PrivateLink)

You can establish a private connection between your VPC and Amazon Comprehend by creating an *interface VPC endpoint*. Interface endpoints are powered by [AWS PrivateLink](#), a technology that enables you to privately access Amazon Comprehend APIs without an internet gateway, NAT device, VPN connection, or AWS Direct Connect connection. Instances in your VPC don't need public IP addresses to communicate with Amazon Comprehend APIs. Traffic between your VPC and Amazon Comprehend does not leave the Amazon network.

Each interface endpoint is represented by one or more [Elastic network interfaces](#) in your subnets.

For more information, see [Interface VPC endpoints \(AWS PrivateLink\)](#) in the *Amazon VPC User Guide*.

## Considerations for Amazon Comprehend VPC endpoints

Before you set up an interface VPC endpoint for Amazon Comprehend, ensure that you review [Interface endpoint properties and limitations](#) in the *Amazon VPC User Guide*.

Amazon Comprehend supports making calls to all of its API actions from your VPC.

## Creating an interface VPC endpoint for Amazon Comprehend

You can create a VPC endpoint for the Amazon Comprehend service using either the Amazon VPC console or the AWS Command Line Interface (AWS CLI). For more information, see [Creating an interface endpoint](#) in the *Amazon VPC User Guide*.

Create a VPC endpoint for Amazon Comprehend using the following service name:

- com.amazonaws.*region*.comprehend

If you enable private DNS for the endpoint, you can make API requests to Amazon Comprehend using its default DNS name for the Region, for example, *comprehend.us-east-1.amazonaws.com*.

For more information, see [Accessing a service through an interface endpoint](#) in the *Amazon VPC User Guide*.

## Creating a VPC endpoint policy for Amazon Comprehend

You can attach an endpoint policy to your VPC endpoint that controls access to Amazon Comprehend. The policy specifies the following information:

- The principal that can perform actions.
- The actions that can be performed.
- The resources on which actions can be performed.

For more information, see [Controlling access to services with VPC endpoints](#) in the *Amazon VPC User Guide*.

### Example: VPC endpoint policy for Amazon Comprehend actions

The following is an example of an endpoint policy for Amazon Comprehend. When attached to an endpoint, this policy grants access to the Amazon Comprehend `DetectEntities` action for all principals on all resources.

```
{  
    "Statement": [  
        {  
            "Principal": "*",  
            "Effect": "Allow",  
            "Action": [  
                "comprehend:DetectEntities"  
            ],  
            "Resource": "*"  
        }  
    ]  
}
```

## Authentication and access control for Amazon Comprehend

Access to Amazon Comprehend requires credentials that AWS can use to authenticate your requests. Those credentials must have permissions to access Amazon Comprehend actions. The following sections provide details on how you can use [AWS Identity and Access Management \(IAM\)](#) and Amazon Comprehend to help secure your resources by controlling who can access them.

- [Authentication \(p. 196\)](#)
- [Access control \(p. 196\)](#)

## Authentication

You can access AWS as any of the following types of identities:

- **AWS account root user** – When you first create an AWS account, you begin with a single sign-in identity that has complete access to all AWS services and resources in the account. This identity is called the AWS account *root user* and is accessed by signing in with the email address and password that you used to create the account. We strongly recommend that you do not use the root user for your everyday tasks, even the administrative ones. Instead, adhere to the [best practice of using the root user only to create your first IAM user](#). Then securely lock away the root user credentials and use them to perform only a few account and service management tasks.
- **IAM user** – An [IAM user](#) is an identity within your AWS account that has specific custom permissions (for example, permissions to create in Amazon Comprehend). You can use an IAM user name and password to sign in to secure AWS webpages like the [AWS Management Console](#), [AWS Discussion Forums](#), or the [AWS Support Center](#).

In addition to a user name and password, you can also generate [access keys](#) for each user. You can use these keys when you access AWS services programmatically, either through [one of the several SDKs](#) or by using the [AWS Command Line Interface \(CLI\)](#). The SDK and CLI tools use the access keys to cryptographically sign your request. If you don't use AWS tools, you must sign the request yourself. Amazon Comprehend supports *Signature Version 4*, a protocol for authenticating inbound API requests. For more information about authenticating requests, see [Signature Version 4 signing process in the AWS General Reference](#).

- **IAM role** – An [IAM role](#) is an IAM identity that you can create in your account that has specific permissions. An IAM role is similar to an IAM user in that it is an AWS identity with permissions policies that determine what the identity can and cannot do in AWS. However, instead of being uniquely associated with one person, a role is intended to be assumable by anyone who needs it. Also, a role does not have standard long-term credentials such as a password or access keys associated with it. Instead, when you assume a role, it provides you with temporary security credentials for your role session. IAM roles with temporary credentials are useful in the following situations:
  - **Federated user access** – Instead of creating an IAM user, you can use existing identities from AWS Directory Service, your enterprise user directory, or a web identity provider. These are known as *federated users*. AWS assigns a role to a federated user when access is requested through an [identity provider](#). For more information about federated users, see [Federated users and roles](#) in the *IAM User Guide*.
  - **AWS service access** – A service role is an [IAM role](#) that a service assumes to perform actions on your behalf. An IAM administrator can create, modify, and delete a service role from within IAM. For more information, see [Creating a role to delegate permissions to an AWS service](#) in the *IAM User Guide*.
  - **Applications running on Amazon EC2** – You can use an IAM role to manage temporary credentials for applications that are running on an EC2 instance and making AWS CLI or AWS API requests. This is preferable to storing access keys within the EC2 instance. To assign an AWS role to an EC2 instance and make it available to all of its applications, you create an instance profile that is attached to the instance. An instance profile contains the role and enables programs that are running on the EC2 instance to get temporary credentials. For more information, see [Using an IAM role to grant permissions to applications running on Amazon EC2 instances](#) in the *IAM User Guide*.

## Access control

You must have valid credentials to authenticate your requests. The credentials must have permissions to call an Amazon Comprehend action.

The following sections describe how to manage permissions for Amazon Comprehend. We recommend that you read the overview first.

- [Overview of managing access permissions to Amazon Comprehend resources \(p. 197\)](#)
- [Using identity-based policies \(IAM policies\) for Amazon Comprehend \(p. 199\)](#)

## Overview of managing access permissions to Amazon Comprehend resources

Permissions to access an action are governed by permissions policies. An account administrator can attach permissions policies to IAM identities (that is, users, groups, and roles) to manage access to actions.

### Note

An *account administrator* (or administrator user) is a user with administrator privileges. For more information, see [IAM best practices](#) in the *IAM User Guide*.

When granting permissions, you decide who is getting the permissions and the actions they get permissions for.

### Topics

- [Managing access to actions \(p. 197\)](#)
- [Specifying policy elements: Actions, effects, and principals \(p. 198\)](#)
- [Specifying conditions in a policy \(p. 198\)](#)

## Managing access to actions

A *permissions policy* describes who has access to what. The following section explains the available options for creating permissions policies.

### Note

This section discusses using IAM in the context of Amazon Comprehend. It doesn't provide detailed information about the IAM service. For complete IAM documentation, see [What is IAM?](#) in the *IAM User Guide*. For information about IAM policy syntax and descriptions, see [AWS IAM policy reference](#) in the *IAM User Guide*.

Policies attached to an IAM identity are referred to as *identity-based* policies (IAM policies) and policies attached to a resource are referred to as *resource-based* policies.

## Identity-based policies (IAM policies)

You can attach policies to IAM identities. For example, you can do the following:

- **Attach a permissions policy to a user or a group in your account** – To grant a user or a group of users permissions to call an Amazon Comprehend action, you can attach a permissions policy to a user or group that the user belongs to.
- **Attach a permissions policy to a role (grant cross-account permissions)** – To grant cross-account permissions, you can attach an identity-based permissions policy to an IAM role. For example, the administrator in Account A can create a role to grant cross-account permissions to another AWS account (for example, Account B) or an AWS service as follows:
  1. Account A administrator creates an IAM role and attaches a permissions policy to the role that grants permissions on resources in Account A.
  2. Account A administrator attaches a trust policy to the role identifying Account B as the principal who can assume the role.

3. Account B administrator can then delegate permissions to assume the role to any users in Account B. Doing this allows users in Account B to create or access resources in Account A. If you want to grant an AWS service permission to assume the role, the principal in the trust policy can also be an AWS service principal.

For more information about using IAM to delegate permissions, see [Access management](#) in the *IAM User Guide*.

For more information about using identity-based policies with Amazon Comprehend, see [Using identity-based policies \(IAM policies\) for Amazon Comprehend \(p. 199\)](#). For more information about users, groups, roles, and permissions, see [Identities \(users, groups, and roles\)](#) in the *IAM User Guide*.

## Resource-based policies

Resource-based policies are JSON policy documents that you attach to a resource. For example, you can attach a policy to an S3 bucket to manage access permissions to that bucket.

Service administrators can use resource-based policies to control access to specific resources. For the resource where the policy is attached, the policy defines what actions a specified principal can perform on that resource and under what conditions. You must specify a [principal](#) in a resource-based policy. Principals can include accounts, users, roles, federated users, or AWS services.

For a list of Amazon Comprehend resources, see [Resource types defined by Amazon Comprehend](#) in the *Service Authorization Reference*.

## Specifying policy elements: Actions, effects, and principals

Amazon Comprehend defines a set of API operations (see [Actions \(p. 254\)](#)). To grant permissions for these API operations, Amazon Comprehend defines a set of actions that you can specify in a policy.

The following are the most basic policy elements:

- **Resource** – In a policy, you use an Amazon Resource Name (ARN) to identify the resource to which the policy applies. For Amazon Comprehend, the resource is always “\*”.
- **Action** – You use action keywords to identify operations that you want to allow or deny. For example, depending on the specified `Effect`, `comprehend:DetectEntities` either allows or denies the user permissions to perform the Amazon Comprehend `DetectEntities` operation.
- **Effect** – You specify the effect of the action that occurs when the user requests the specific action —this can be either allow or deny. If you don't explicitly grant access to (allow) a resource, access is implicitly denied. You can also explicitly deny access to a resource. You might do this to make sure that a user cannot access the resource, even if a different policy grants access.
- **Principal** – In identity-based policies (IAM policies), the user that the policy is attached to is the implicit principal.

To learn more about IAM policy syntax and descriptions, see [AWS IAM policy reference](#) in the *IAM User Guide*.

For a table showing all of the Amazon Comprehend API actions, see [Actions, resources, and condition keys for Amazon Comprehend](#) in the *Service Authorization Reference*.

## Specifying conditions in a policy

Conditions are an optional policy element that applies additional logic to determine if an action is allowed. AWS provides a set of [common conditions](#) supported by all actions.

When you grant permissions, you use the IAM policy language to specify the conditions under which a policy should take effect. For example, you can use the `aws:userid` condition key to require a

specific AWS ID when requesting an action. For more information about specifying conditions in a policy language, see [Condition](#) in the *IAM User Guide*.

**Note**

Condition keys are case-sensitive.

Amazon Comprehend provides additional condition keys that you can use to restrict the values of parameters on specific resources. For details about the supported resources and condition types, see [Actions, resources, and condition keys for Amazon Comprehend](#) in the *Service Authorization Reference*.

## Using identity-based policies (IAM policies) for Amazon Comprehend

This topic provides examples of identity-based policies that demonstrate how an account administrator can attach permissions policies to IAM identities (that is, users, groups, and roles) and thereby grant permissions to perform Amazon Comprehend actions.

**Important**

Before you proceed, we recommend that you review [Overview of managing access permissions to Amazon Comprehend resources \(p. 197\)](#).

The following is the permissions policy required to use the Amazon Comprehend document analysis actions:

```
{  
    "Version": "2012-10-17",  
    "Statement": [ {  
        "Sid": "AllowDetectActions",  
        "Effect": "Allow",  
        "Action": [  
            "comprehend:DetectEntities",  
            "comprehend:DetectKeyPhrases",  
            "comprehend:DetectDominantLanguage",  
            "comprehend:DetectSentiment",  
            "comprehend:DetectSyntax"  
        ],  
        "Resource": "*"  
    }  
]
```

The policy has one statement that grants permission to use the `DetectEntities`, `DetectKeyPhrases`, `DetectDominantLanguage` and `DetectSentiment`, and `DetectSyntax` actions. A user with this policy would not be able to perform batch actions or asynchronous actions in your account.

The policy doesn't specify the `Principal` element because you don't specify the principal who gets the permission in an identity-based policy. When you attach a policy to a user, the user is the implicit principal. When you attach a permissions policy to an IAM role, the principal identified in the role's trust policy gets the permissions.

For a table showing all of the Amazon Comprehend API actions and the resources that they apply to, see [Actions, resources, and condition keys for Amazon Comprehend](#) in the *Service Authorization Reference*.

## Permissions required to use KMS encryption

To fully use Amazon Key Management Service (KMS) for data and job encryption in an asynchronous job, you need to grant permissions for the actions shown in the following policy:

```
{
```

```
"Version": "2012-10-17",
"Statement": [
    {
        "Action": [
            "kms>CreateGrant"
        ],
        "Effect": "Allow",
        "Resource": "*"
    },
    {
        "Action": [
            "kms:Decrypt",
            "kms:GenerateDatakey"
        ],
        "Effect": "Allow",
        "Resource": "*",
        "Condition": {
            "StringEquals": {
                "kms:ViaService": [
                    "s3.region.amazonaws.com"
                ]
            }
        }
    }
]
```

When you create an asynchronous job with Amazon Comprehend you use input data stored on Amazon S3. With S3, you have the option to encrypt your stored data, which is encrypted by S3, not by Amazon Comprehend. We can decrypt and read that encrypted input data if you provide `kms:Decrypt` permission for the key with which the original input data was encrypted to the data access role used by the Amazon Comprehend job.

You also have the option of using KMS customer-managed keys (CMK) to encrypt the output results on S3, as well as the storage volume used during job processing. When you do this, you can use the same KMS key for both types of encryption, but this is not necessary. Separate fields are available when creating the job to specify the keys for output encryption and volume encryption and you can even use a KMS key from a different account.

When using KMS encryption, `kms>CreateGrant` permission is required for volume encryption and `kms:GenerateDataKey` permission is needed for output data encryption. For reading encrypted input (as when the input data is already encrypted by Amazon S3), `kms:Decrypt` permission is required. The IAM role needs to give these permissions as needed. However, if the key is from a different account than is currently being used, the KMS key policy for that kms key must also give these permissions to the data access role for the job.

## Permissions required to use the Amazon Comprehend console

The permissions reference table lists the Amazon Comprehend API operations and shows the required permissions for each operation. For more information about Amazon Comprehend API permissions, see [Amazon Comprehend API permissions: Actions, resources, and conditions reference \(p. 204\)](#).

To use the Amazon Comprehend console, you need to grant permissions for the actions shown in the following policy:

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Action": [
                "comprehend:*",
                "iam>ListRoles",
                "iam>GetRole"
            ],
            "Effect": "Allow",
            "Resource": "*"
        }
    ]
}
```

```
        "iam:GetRole",
        "s3>ListAllMyBuckets",
        "s3>ListBucket",
        "s3:GetBucketLocation"
    ],
    "Effect": "Allow",
    "Resource": "*"
}
]
}
```

The Amazon Comprehend console needs these additional permissions for the following reasons:

- `iam` permissions to list the available IAM roles for your account.
- `s3` permissions to access the Amazon S3 buckets and objects that contain the data for topic modeling.

When you create an asynchronous batch job or a topic modeling job using the console, you have the option to have the console create an IAM role for your job. To create an IAM role, users must be granted the following additional permissions to create IAM roles and policies, and to attach policies to roles:

```
{
  "Version": "2012-10-17",
  "Statement":
  [
    {
      "Action":
      [
        "iam>CreateRole",
        "iam>CreatePolicy",
        "iam:AttachRolePolicy"
      ],
      "Effect": "Allow",
      "Resource": "*"
    },
    {
      "Action":
      [
        "iam:PassRole"
      ],
      "Effect": "Allow",
      "Resource": "arn:aws:iam::*:role/*Comprehend*"
    }
  ]
}
```

The Amazon Comprehend console needs these additional permissions for the following reasons:

- `iam` permissions to create roles and policies and to attach roles and policies. The `iam:PassRole` action enables the console to pass the role to Amazon Comprehend.

## AWS managed (predefined) policies for Amazon Comprehend

AWS addresses many common use cases by providing standalone IAM policies that are created and administered by AWS. These AWS managed policies grant necessary permissions for common use cases so that you can avoid having to investigate what permissions are needed. For more information, see [AWS managed policies](#) in the *IAM User Guide*.

The following AWS managed policies, which you can attach to users in your account, are specific to Amazon Comprehend:

- **ComprehendFullAccess** – Grants full access to Amazon Comprehend resources including running topic modeling jobs. Includes permission to list and get IAM roles.
- **ComprehendReadOnly** – Grants permission to run all Amazon Comprehend actions except StartDominantLanguageDetectionJob, StartEntitiesDetectionJob, StartKeyPhrasesDetectionJob, StartSentimentDetectionJob, StartTargetedSentimentDetectionJob, and StartTopicsDetectionJob.

You need to apply the following additional policy to any user that will use Amazon Comprehend:

```
{  
    "Version": "2012-10-17",  
    "Statement": [  
        {  
            "Action": [  
                "iam:PassRole"  
            ],  
            "Effect": "Allow",  
            "Resource": "arn:aws:iam::*:role/*Comprehend*"  
        }  
    ]  
}
```

You can review the managed permissions policies by signing in to the IAM console and searching for specific policies there.

These policies work when you are using AWS SDKs or the AWS CLI.

You can also create your own custom IAM policies to allow permissions for Amazon Comprehend actions and resources. You can attach these custom policies to the IAM users or groups that require those permissions.

## Role-based permissions required for asynchronous operations

To use the Amazon Comprehend asynchronous operations, you must grant Amazon Comprehend access to the Amazon S3 bucket that contains your document collection. You do this by creating a data access role in your account with a trust policy to trust the Amazon Comprehend service principal. For more information about creating a role, see [Creating a role to delegate permissions to an AWS service](#) in the *AWS Identity and Access Management User Guide*.

The following shows an example trust policy for the role that you create. To help with [confused deputy prevention](#) (p. 189), you restrict the scope of the permission by using one or more global condition context keys. Set the aws:SourceAccount value to your account ID. If you use the ArnEquals condition, set the aws:SourceArn value to the ARN of the job. Use a wildcard for the job number in the ARN, because Amazon Comprehend generates this number as part of job creation.

```
{  
    "Version": "2012-10-17",  
    "Statement": [  
        {  
            "Effect": "Allow",  
            "Principal": {  
                "Service": "comprehend.amazonaws.com"  
            },  
            "Action": "sts:AssumeRole",  
            "Condition": {  
                "StringEquals": {  
                    "aws:SourceAccount": "111122223333"  
                }  
            }  
        }  
    ]  
}
```

```
        },
        "ArnEquals": {
            "aws:SourceArn": "arn:aws:comprehend:us-west-2:111122223333:pii-entities-
detection-job/*"
        }
    }
}
```

After you create the role, create an access policy for that role. This should grant the Amazon S3 GetObject and ListBucket permissions to the Amazon S3 bucket that contains your input data, and the Amazon S3 PutObject permission to your Amazon S3 output data bucket.

## Customer managed policy examples

In this section, you can find example user policies that grant permissions for various Amazon Comprehend actions. These policies work when you are using AWS SDKs or the AWS CLI. When you are using the console, you need to grant permissions to all the Amazon Comprehend APIs. This is discussed in [Permissions required to use the Amazon Comprehend console \(p. 200\)](#).

**Note**

All examples use the us-east-2 region and contain fictitious account IDs.

### Examples

#### Example 1: Allow all Amazon Comprehend actions

After you sign up for AWS, you create an administrator user to manage your account, including creating users and managing their permissions.

You might choose to create a user who has permissions for all Amazon Comprehend actions (think of this user as a service-specific administrator) for working with Amazon Comprehend. You can attach the following permissions policy to this user.

```
{
    "Version": "2012-10-17",
    "Statement":
    [
        {
            "Sid": "AllowAllComprehendActions",
            "Effect": "Allow",
            "Action":
            [
                "comprehend:*",
                "iam>ListRoles",
                "iam>GetRole",
                "s3>ListAllMyBuckets",
                "s3>ListBucket",
                "s3>GetBucketLocation",
                "iam>CreateRole",
                "iam>CreatePolicy",
                "iam>AttachRolePolicy",
                "kms>CreateGrant",
                "kms>Decrypt",
                "kms>GenerateDatakey"
            ],
            "Resource": "*"
        },
        {
            "Action": "
```

```
[  
    "iam:PassRole"  
,  
    "Effect": "Allow",  
    "Resource": "arn:aws:iam::*:role/*Comprehend*"  
}  
]  
}
```

These permissions can be modified with regard to encryption in the following ways:

- To enable Amazon Comprehend to analyze documents stored in an encrypted S3 bucket, the IAM role must have the `kms:Decrypt` permission.
- To enable Amazon Comprehend to encrypt documents stored on a storage volume attached to the compute instance that processes the analysis job, the IAM role must have the `kms>CreateGrant` permission.
- To enable Amazon Comprehend to encrypt the output results in their S3 bucket, the IAM role must have the `kms:GenerateDataKey` permission.

## Example 2: Allow topic modeling actions

The following permissions policy grants user permissions to perform the Amazon Comprehend topic modeling operations.

```
{  
    "Version": "2012-10-17",  
    "Statement": [  
        {  
            "Sid": "AllowTopicModelingActions",  
            "Effect": "Allow",  
            "Action": [  
                "comprehend:DescribeTopicsDetectionJob",  
                "comprehend>ListTopicsDetectionJobs",  
                "comprehend:StartTopicsDetectionJob",  
            ],  
            "Resource": "*"  
        }  
    ]  
}
```

## Amazon Comprehend API permissions: Actions, resources, and conditions reference

Use the tables in the [Actions, resources, and condition keys for Amazon Comprehend](#) section of the [Service Authorization Reference](#) as a reference when setting up [Access control \(p. 196\)](#). The tables include each Amazon Comprehend API operation, the corresponding action for which you can grant permissions to perform the action, and the AWS resource for which you can grant the permissions. You specify the actions in the policy's `Action` field, and you specify the resource value in the policy's `Resource` field.

To specify conditions in your policy statements, you can use the condition keys that are specific to Amazon Comprehend. You can also use AWS-wide condition keys in your Amazon Comprehend policies. For a complete list of AWS-wide keys, see [Available keys](#) in the [IAM User Guide](#).

### Note

To specify an action, use the `comprehend:` prefix followed by the API operation name, for example, `comprehend:DetectEntities`.

## AWS managed policies for Amazon Comprehend

To add permissions to users, groups, and roles, it is easier to use AWS managed policies than to write policies yourself. It takes time and expertise to [create IAM customer managed policies](#) that provide your team with only the permissions they need. To get started quickly, you can use our AWS managed policies. These policies cover common use cases and are available in your AWS account. For more information about AWS managed policies, see [AWS managed policies](#) in the *IAM User Guide*.

AWS services maintain and update AWS managed policies. You can't change the permissions in AWS managed policies. Services occasionally add additional permissions to an AWS managed policy to support new features. This type of update affects all identities (users, groups, and roles) where the policy is attached. Services are most likely to update an AWS managed policy when a new feature is launched or when new operations become available. Services do not remove permissions from an AWS managed policy, so policy updates won't break your existing permissions.

Additionally, AWS supports managed policies for job functions that span multiple services. For example, the **ReadOnlyAccess** AWS managed policy provides read-only access to all AWS services and resources. When a service launches a new feature, AWS adds read-only permissions for new operations and resources. For a list and descriptions of job function policies, see [AWS managed policies for job functions](#) in the *IAM User Guide*.

### AWS managed policy: ComprehendFullAccess

This policy grants full access to Amazon Comprehend resources including running topic modeling jobs. This policy also grants list and get permissions for Amazon S3 buckets and IAM roles.

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "comprehend:*",
                "iam:GetRole",
                "iam>ListRoles",
                "s3:GetBucketLocation",
                "s3>ListAllMyBuckets",
                "s3>ListBucket",
            ],
            "Resource": "*"
        }
    ]
}
```

### AWS managed policy: ComprehendReadOnly

This policy grants read-only permissions to run all Amazon Comprehend actions **except** the following:

- StartDominantLanguageDetectionJob
- StartEntitiesDetectionJob
- StartKeyPhrasesDetectionJob
- StartSentimentDetectionJob
- StartTargetedSentimentDetectionJob
- StartTopicsDetectionJob

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Action": [
                "comprehend:BatchDetectDominantLanguage",
                "comprehend:BatchDetectEntities",
                "comprehend:BatchDetectKeyPhrases",
                "comprehend:BatchDetectSentiment",
                "comprehend:BatchDetectSyntax",
                "comprehend:ClassifyDocument",
                "comprehend:ContainsPiiEntities",
                "comprehend:DescribeDocumentClassificationJob",
                "comprehend:DescribeDocumentClassifier",
                "comprehend:DescribeDominantLanguageDetectionJob",
                "comprehend:DescribeEndpoint",
                "comprehend:DescribeEntitiesDetectionJob",
                "comprehend:DescribeEntityRecognizer",
                "comprehend:DescribeKeyPhrasesDetectionJob",
                "comprehend:DescribePiiEntitiesDetectionJob",
                "comprehend:DescribeResourcePolicy",
                "comprehend:DescribeSentimentDetectionJob",
                "comprehend:DescribeTargetedSentimentDetectionJob",
                "comprehend:DescribeTopicsDetectionJob",
                "comprehend:DetectDominantLanguage",
                "comprehend:DetectEntities",
                "comprehend:DetectKeyPhrases",
                "comprehend:DetectPiiEntities",
                "comprehend:DetectSentiment",
                "comprehend:DetectSyntax",
                "comprehend>ListDocumentClassificationJobs",
                "comprehend>ListDocumentClassifiers",
                "comprehend>ListDocumentClassifierSummaries",
                "comprehend>ListDominantLanguageDetectionJobs",
                "comprehend>ListEndpoints",
                "comprehend>ListEntitiesDetectionJobs",
                "comprehend>ListEntityRecognizers",
                "comprehend>ListEntityRecognizerSummaries",
                "comprehend>ListKeyPhrasesDetectionJobs",
                "comprehend>ListPiiEntitiesDetectionJobs",
                "comprehend>ListSentimentDetectionJobs",
                "comprehend>ListTargetedSentimentDetectionJobs",
                "comprehend>ListTagsForResource",
                "comprehend>ListTopicsDetectionJobs"
            ],
            "Effect": "Allow",
            "Resource": "*"
        }
    ]
}
```

## Amazon Comprehend updates to AWS managed policies

View details about updates to AWS managed policies for Amazon Comprehend since this service began tracking these changes. For automatic alerts about changes to this page, subscribe to the RSS feed on the Amazon Comprehend [Document history](#) page.

Change	Description	Date
<a href="#">ComprehendReadOnly (p. 205)</a> – Update to an existing policy	Amazon Comprehend now allows the	Mar 30, 2022

Change	Description	Date
	comprehend:DescribeTargetedSentimentDetectionJob and comprehend>ListTargetedSentimentDetectionJobs actions in the ComprehendReadOnly policy	
ComprehendReadOnly (p. 205) – Update to an existing policy	Amazon Comprehend now allows the comprehend:DescribeResourcePolicy action in the ComprehendReadOnly policy	Feb 2, 2022
ComprehendReadOnly (p. 205) – Update to an existing policy	Amazon Comprehend now allows the ListDocumentClassifierSummaries and ListEntityRecognizerSummaries actions in the ComprehendReadOnly policy	September 21, 2021
ComprehendReadOnly (p. 205) – Update to an existing policy	Amazon Comprehend now allows the ContainsPIIEntities action in the ComprehendReadOnly policy	March 26, 2021
Amazon Comprehend started tracking changes	Amazon Comprehend started tracking changes for its AWS managed policies.	March 1, 2021

## Logging Amazon Comprehend API calls with AWS CloudTrail

Amazon Comprehend is integrated with AWS CloudTrail, a service that provides a record of actions taken by a user, role, or an AWS service in Amazon Comprehend. CloudTrail captures API calls for Amazon Comprehend as events. The calls captured include calls from the Amazon Comprehend console and code calls to the Amazon Comprehend API operations. If you create a trail, you can enable continuous delivery of CloudTrail events to an Amazon S3 bucket, including events for Amazon Comprehend. If you don't configure a trail, you can still view the most recent events in the CloudTrail console in **Event history**. Using the information collected by CloudTrail, you can determine the request that was made to Amazon Comprehend, the IP address from which the request was made, who made the request, when it was made, and additional details.

To learn more about CloudTrail, including how to configure and enable it, see the [AWS CloudTrail User Guide](#).

### Amazon Comprehend information in CloudTrail

CloudTrail is enabled on your AWS account when you create the account. When supported event activity occurs in Amazon Comprehend, that activity is recorded in a CloudTrail event along with other AWS service events in **Event history**. You can view, search, and download recent events in your AWS account. For more information, see [Viewing events with CloudTrail event history](#).

For an ongoing record of events in your AWS account, including events for Amazon Comprehend, create a trail. A *trail* enables CloudTrail to deliver log files to an Amazon S3 bucket. By default, when you create a trail in the console, the trail applies to all AWS Regions. The trail logs events from all Regions in the AWS partition and delivers the log files to the Amazon S3 bucket that you specify. Additionally, you can configure other AWS services to further analyze and act upon the event data collected in CloudTrail logs. For more information, see the following:

- [Overview for creating a trail](#)
- [CloudTrail supported services and integrations](#)
- [Configuring Amazon SNS notifications for CloudTrail](#)
- [Receiving CloudTrail log files from multiple regions](#) and [Receiving CloudTrail log files from multiple accounts](#)

Amazon Comprehend supports logging the following actions as events in CloudTrail log files:

- [BatchDetectDominantLanguage](#)
- [BatchDetectEntities](#)
- [BatchDetectKeyPhrases](#)
- [BatchDetectSentiment](#)
- [BatchDetectSyntax](#)
- [ClassifyDocument](#)
- [CreateDocumentClassifier](#)
- [CreateEndpoint](#)
- [CreateEntityRecognizer](#)
- [DeleteDocumentClassifier](#)
- [DeleteEndpoint](#)
- [DeleteEntityRecognizer](#)
- [DescribeDocumentClassificationJob](#)
- [DescribeDocumentClassifier](#)
- [DescribeDominantLanguageDetectionJob](#)
- [DescribeEndpoint](#)
- [DescribeEntitiesDetectionJob](#)
- [DescribeEntityRecognizer](#)
- [DescribeKeyPhrasesDetectionJob](#)
- [DescribePiiEntitiesDetectionJob](#)
- [DescribeSentimentDetectionJob](#)
- [DescribeTargetedSentimentDetectionJob](#)
- [DescribeTopicsDetectionJob](#)
- [DetectDominantLanguage](#)
- [DetectEntities](#)
- [DetectKeyPhrases](#)
- [DetectPiiEntities](#)
- [DetectSentiment](#)
- [DetectSyntax](#)
- [ListDocumentClassificationJobs](#)
- [ListDocumentClassifiers](#)
- [ListDominantLanguageDetectionJobs](#)
- [ListEndpoints](#)

- [ListEntitiesDetectionJobs](#)
- [ListEntityRecognizers](#)
- [ListKeyPhrasesDetectionJobs](#)
- [ListPiiEntitiesDetectionJobs](#)
- [ListSentimentDetectionJobs](#)
- [ListTargetedSentimentDetectionJobs](#)
- [ListTagsForResource](#)
- [ListTopicsDetectionJobs](#)
- [StartDocumentClassificationJob](#)
- [StartDominantLanguageDetectionJob](#)
- [StartEntitiesDetectionJob](#)
- [StartKeyPhrasesDetectionJob](#)
- [StartPiiEntitiesDetectionJob](#)
- [StartSentimentDetectionJob](#)
- [StartTargetedSentimentDetectionJob](#)
- [StartTopicsDetectionJob](#)
- [StopDominantLanguageDetectionJob](#)
- [StopEntitiesDetectionJob](#)
- [StopKeyPhrasesDetectionJob](#)
- [StopPiiEntitiesDetectionJob](#)
- [StopSentimentDetectionJob](#)
- [StopTargetedSentimentDetectionJob](#)
- [StopTrainingDocumentClassifier](#)
- [StopTrainingEntityRecognizer](#)
- [TagResource](#)
- [UntagResource](#)
- [UpdateEndpoint](#)

Every event or log entry contains information about who generated the request. The identity information helps you determine the following:

- Whether the request was made with root or AWS Identity and Access Management (IAM) user credentials.
- Whether the request was made with temporary security credentials for a role or federated user.
- Whether the request was made by another AWS service.

For more information, see the [CloudTrail userIdentity element](#).

## Examples: Amazon Comprehend log file entries

A trail is a configuration that enables delivery of events as log files to an Amazon S3 bucket that you specify. CloudTrail log files contain one or more log entries. An event represents a single request from any source and includes information about the requested action, the date and time of the action, request parameters, and so on. CloudTrail log files aren't an ordered stack trace of the public API calls, so they don't appear in any specific order.

The following example shows a CloudTrail log entry that demonstrates the [ListKeyPhrasesDetectionJobs](#) action.

```
{
    "eventVersion": "1.05",
    "userIdentity": {
        "type": "AssumedRole",
        "principalId": "AROAICFHPEXAMPLE:kapil",
        "arn": "arn:aws:sts::12345678910:assumed-role/UserRole/kapil",
        "accountId": "12345678910",
        "accessKeyId": "ASIA3VZEXAMPLE",
        "sessionContext": {
            "sessionIssuer": {
                "type": "Role",
                "principalId": "AROAICFHPEXAMPLE",
                "arn": "arn:aws:iam::12345678910:role/UserRole",
                "accountId": "12345678910",
                "userName": "UserRole"
            },
            "webIdFederationData": {},
            "attributes": {
                "mfaAuthenticated": "false",
                "creationDate": "2020-04-29T15:46:04Z"
            }
        }
    },
    "eventTime": "2020-04-29T17:57:06Z",
    "eventSource": "comprehend.amazonaws.com",
    "eventName": "ListKeyPhrasesDetectionJobs",
    "awsRegion": "us-east-2",
    "sourceIPAddress": "3.22.248.29",
    "userAgent": "aws-internal/3 aws-sdk-java/1.11.761 Linux/4.14.165-102.205.amzn2.x86_64 OpenJDK_64-Bit_Server_VM/25.201-b09 java/1.8.0_201 vendor/Oracle_Corporation, canary-generated exec-env/AWS_Lambda_java8",
    "requestParameters": {
        "filter": {
            "submitTimeAfter": "Apr 29, 2020 5:54:04 PM"
        }
    },
    "responseElements": null,
    "requestID": "59bee2bc-e45c-436e-aae7-493af0328a8c",
    "eventID": "eabb7b59-edf3-44c8-8833-416bbdb16eae",
    "readOnly": true,
    "eventType": "AwsApiCall",
    "recipientAccountId": "802699264198"
}
```

The following example shows a CloudTrail log entry that demonstrates the StartKeyPhrasesDetectionJob action.

```
{
    "eventVersion": "1.05",
    "userIdentity": {
        "type": "AssumedRole",
        "principalId": "AROAICFHPEXAMPLE:kapil",
        "arn": "arn:aws:sts::12345678910:assumed-role/UserRole/kapil",
        "accountId": "12345678910",
        "accessKeyId": "ASIA3VZEXAMPLE",
        "sessionContext": {
            "sessionIssuer": {
                "type": "Role",
                "principalId": "AROAICFHPEXAMPLE",
                "arn": "arn:aws:iam::12345678910:role/UserRole",
                "accountId": "12345678910",
                "userName": "UserRole"
            },
            "webIdFederationData": {},
```

```

        "attributes": {
            "mfaAuthenticated": "false",
            "creationDate": "2020-04-29T15:46:04Z"
        }
    }
},
"eventTime": "2020-04-29T16:42:39Z",
"eventSource": "comprehend.amazonaws.com",
"eventName": "StartKeyPhrasesDetectionJob",
"awsRegion": "us-east-2",
"sourceIPAddress": "3.20.236.234",
"userAgent": "aws-internal/3 aws-sdk-java/1.11.761 Linux/4.14.165-102.205.amzn2.x86_64
OpenJDK_64-Bit_Server_VM/25.201-b09 java/1.8.0_201 vendor/Oracle_Corporation, canary-
generated exec-env/AWS_Lambda_java8",
"requestParameters": {
    "inputDataConfig": {
        "s3Uri": "s3://dataset-prod-us-east-2/ONE_DOC_PER_LINE/KP/FOUR_KB",
        "inputFormat": "ONE_DOC_PER_LINE"
    },
    "outputDataConfig": {
        "s3Uri": "s3://datasets3bucke-y6icltvagurj/JSON/00f706b3-6d84-4b09-
bea3-88084f9cb6b0",
        "kmsKeyId": "arn:aws:kms:us-
east-2:12345678910:key/2e107fe3-6ab3-4bab-90ab-966e85b14678"
    },
    "dataAccessRoleArn": "arn:aws:iam::12345678910:role/DataAccessRoleXYZ",
    "languageCode": "en",
    "clientRequestToken": "d9e4f777-8b4e-4249-8ebb-b7495acb800b",
    "volumeKmsKeyId": "arn:aws:kms:us-east-2:12345678910:key/7b9b8aff-c459-4d20-
bb39-64d6e3756e85"
},
"responseElements": {
    "jobId": "2102905798f0d44a04da91fdbd12ed60e",
    "jobStatus": "SUBMITTED"
},
"requestID": "f202914c-f5cf-4f2d-a4c7-5f30d101fe19",
"eventId": "692e3a17-40a2-491a-a4ce-a275c4c4ce76",
"readOnly": false,
"resources": [
    {
        "accountId": "12345678910",
        "type": "AWS::KMS::Key",
        "ARN": "arn:aws:kms:us-
east-2:12345678910:key/2e107fe3-6ab3-4bab-90ab-966e85b14678"
    },
    {
        "accountId": "12345678910",
        "type": "AWS::KMS::Key",
        "ARN": "arn:aws:kms:us-east-2:12345678910:key/7b9b8aff-c459-4d20-
bb39-64d6e3756e85"
    },
    {
        "accountId": "12345678910",
        "type": "AWS::S3::Object",
        "ARN": "s3://dataset-prod-us-east-2/ONE_DOC_PER_LINE/KP/FOUR_KB"
    },
    {
        "accountId": "12345678910",
        "type": "AWS::S3::Object",
        "ARN": "s3://datasets3bucke-y6icltvagurj/JSON/00f706b3-6d84-4b09-
bea3-88084f9cb6b0"
    },
    {
        "accountId": "12345678910",
        "type": "AWS::IAM::Role",
        "ARN": "arn:aws:iam::12345678910:role/DataAccessRoleXYZ"
    }
]
}

```

```

        },
        ],
        "eventType": "AwsApiCall",
        "recipientAccountId": "12345678910"
    }
}

```

The following example shows a CloudTrail log entry that demonstrates the `DescribeDocumentClassifier` action.

```

{
    "eventVersion": "1.05",
    "userIdentity": {
        "type": "AssumedRole",
        "principalId": "AROAIKFHPEXAMPLE:SomeServiceCa-CheckAsyncJobStatusLambd-TICR23C65S42",
        "arn": "arn:aws:sts::12345678910:assumed-role/SomeServiceCa-SomeLambdaR-ADLIAGB0VT9X/SomeServiceCa-CheckAsyncJobStatusLambd-TICR23C65S42",
        "accountId": "12345678910",
        "accessKeyId": "ASIA3VZEXAMPLE",
        "sessionContext": {
            "sessionIssuer": {
                "type": "Role",
                "principalId": "AROAIKFHPEXAMPLE",
                "arn": "arn:aws:iam::12345678910:role/SomeServiceCa-SomeLambdaR-ADLIAGB0VT9X",
                "accountId": "12345678910",
                "userName": "SomeServiceCa-SomeLambdaR-ADLIAGB0VT9X"
            },
            "webIdFederationData": {},
            "attributes": {
                "mfaAuthenticated": "false",
                "creationDate": "2020-04-29T15:30:41Z"
            }
        }
    },
    "eventTime": "2020-04-29T17:02:44Z",
    "eventSource": "comprehend.amazonaws.com",
    "eventName": "DescribeDocumentClassifier",
    "awsRegion": "us-east-2",
    "sourceIPAddress": "18.191.40.153",
    "userAgent": "aws-internal/3 aws-sdk-java/1.11.761 Linux/4.14.165-102.205.amzn2.x86_64 OpenJDK_64-Bit_Server_VM/25.201-b09 java/1.8.0_201 vendor/Oracle_Corporation, canary-generated exec-env/AWS_Lambda_java8",
    "errorCode": "ResourceNotFoundException",
    "errorMessage": "RESOURCE_NOT_FOUND: Could not find specified resource.",
    "requestParameters": {
        "documentClassifierArn": "arn:aws:comprehend:us-east-2:12345678910:document-classifier/DocumentClassifier-FOUR-KB-MULTI-LABEL-1588162272420"
    },
    "responseElements": null,
    "requestID": "e5bf2476-a894-4204-af77-4a84857ff2f8",
    "eventID": "bc77875f-9fe5-4b65-8384-c9f82c392f46",
    "readOnly": true,
    "resources": [
        {
            "accountId": "12345678910",
            "type": "AWS::Comprehend::DocumentClassifier",
            "ARN": "arn:aws:comprehend:us-east-2:12345678910:document-classifier/DocumentClassifier-FOUR-KB-MULTI-LABEL-1588162272420"
        }
    ],
    "eventType": "AwsApiCall",
    "recipientAccountId": "12345678910"
}

```

The following example shows a CloudTrail log entry that demonstrates the `CreateDocumentClassifier` action.

```
{
    "eventVersion": "1.05",
    "userIdentity": {
        "type": "AssumedRole",
        "principalId": "AROAICFHPEXAMPLE:SomeServiceCanary-StartAsyncJobLambda-1STGUG0X870YM",
        "arn": "arn:aws:sts::12345678910:assumed-role/SomeServiceCa-SomeLambdaR-ADLIAGB0VT9X/SomeServiceCanary-StartAsyncJobLambda-1STGUG0X870YM",
        "accountId": "12345678910",
        "accessKeyId": "ASIA3VZEXAMPLE",
        "sessionContext": {
            "sessionIssuer": {
                "type": "Role",
                "principalId": "AROAICFHPEXAMPLE",
                "arn": "arn:aws:iam::12345678910:role/SomeServiceCa-SomeLambdaR-ADLIAGB0VT9X",
                "accountId": "12345678910",
                "userName": "SomeServiceCa-SomeLambdaR-ADLIAGB0VT9X"
            },
            "webIdFederationData": {},
            "attributes": {
                "mfaAuthenticated": "false",
                "creationDate": "2020-04-29T15:46:04Z"
            }
        }
    },
    "eventTime": "2020-04-29T17:01:33Z",
    "eventSource": "comprehend.amazonaws.com",
    "eventName": "CreateDocumentClassifier",
    "awsRegion": "us-east-2",
    "sourceIPAddress": "3.20.236.234",
    "userAgent": "aws-internal/3 aws-sdk-java/1.11.761 Linux/4.14.165-102.205.amzn2.x86_64 OpenJDK_64-Bit_Server_VM/25.201-b09 java/1.8.0_201 vendor/Oracle_Corporation, canary-generated exec-env/AWS_Lambda_java8",
    "requestParameters": {
        "documentClassifierName": "DocumentClassifier-FOUR-KB-MULTI-CLASS-1588179693504",
        "dataAccessRoleArn": "arn:aws:iam::12345678910:role/SomeServiceCanary-CMH-p-DataAccessRole-1DI9T5MJ973BK",
        "tags": [
            {
                "key": "CreationTag",
                "value": "TagValue"
            }
        ],
        "inputDataConfig": {
            "s3Uri": "s3://aws-deepinsight-async-canary-datasets-prod-us-east-2/ONE_DOC_PER_LINE/DOCUMENT_CLASSIFIER/FOUR_KB",
            "clientRequestToken": "eb545dbf-52bd-474f-b0a2-b21010371e1b",
            "languageCode": "en",
            "volumeKmsKeyId": "arn:aws:kms:us-east-2:12345678910:key/7b9b8aff-c459-4d20-bb39-64d6e3756e85",
            "mode": "MULTI_CLASS"
        },
        "responseElements": {
            "documentClassifierArn": "arn:aws:comprehend:us-east-2:12345678910:document-classifier/DocumentClassifier-FOUR-KB-MULTI-CLASS-1588179693504"
        },
        "requestID": "20300c29-29bf-48fd-8275-e5a805ee8999",
        "eventID": "3444051d-3616-438f-b80e-a3be9bbc0341",
        "readOnly": false,
        "resources": [

```

```
{
    "accountId": "12345678910",
    "type": "AWS::Comprehend::DocumentClassifier",
    "ARN": "arn:aws:comprehend:us-east-2:12345678910:document-classifier/
DocumentClassifier-FOUR-KB-MULTI-CLASS-1588179693504"
},
{
    "accountId": "12345678910",
    "type": "AWS::KMS::Key",
    "ARN": "arn:aws:kms:us-east-2:12345678910:key/7b9b8aff-c459-4d20-
bb39-64d6e3756e85"
},
{
    "accountId": "12345678910",
    "type": "AWS::S3::Object",
    "ARN": "s3://aws-deepinsight-async-canary-datasets-prod-us-east-2/
ONE_DOC_PER_LINE/DOCUMENT_CLASSIFIER/FOUR_KB"
},
{
    "accountId": "12345678910",
    "type": "AWS::IAM::Role",
    "ARN": "arn:aws:iam::12345678910:role/SomeServiceCanary-CMH-p-
DataAccessRole-1DI9T5MJ973BK"
}
],
"eventType": "AwsApiCall",
"recipientAccountId": "12345678910"
}
```

The following example shows a CloudTrail log entry that demonstrates the `DeleteEntityRecognizer` action.

```
{
    "eventVersion": "1.05",
    "userIdentity": {
        "type": "AssumedRole",
        "principalId": "AROAICFHPEXAMPLE:SomeServiceCanary-
StartAsyncJobLambda-1STGUG0X870YM",
        "arn": "arn:aws:sts::12345678910:assumed-role/SomeServiceCa-SomeLambdaR-
ADLIAGB0VT9X/SomeServiceCanary-StartAsyncJobLambda-1STGUG0X870YM",
        "accountId": "12345678910",
        "accessKeyId": "ASIA3VZEXAMPLE",
        "sessionContext": {
            "sessionIssuer": {
                "type": "Role",
                "principalId": "AROAICFHPEXAMPLE",
                "arn": "arn:aws:iam::12345678910:role/SomeServiceCa-SomeLambdaR-
ADLIAGB0VT9X",
                "accountId": "12345678910",
                "userName": "SomeServiceCa-SomeLambdaR-ADLIAGB0VT9X"
            },
            "webIdFederationData": {},
            "attributes": {
                "mfaAuthenticated": "false",
                "creationDate": "2020-04-29T15:46:04Z"
            }
        }
    },
    "eventTime": "2020-04-29T17:01:13Z",
    "eventSource": "comprehend.amazonaws.com",
    "eventName": "DeleteEntityRecognizer",
    "awsRegion": "us-east-2",
    "sourceIPAddress": "3.20.236.234",
```

```

"userAgent": "aws-internal/3 aws-sdk-java/1.11.761 Linux/4.14.165-102.205.amzn2.x86_64
OpenJDK_64-Bit_Server_VM/25.201-b09 java/1.8.0_201 vendor/Oracle_Corporation, canary-
generated exec-env/AWS_Lambda_java8",
"requestParameters": {
    "entityRecognizerArn": "arn:aws:comprehend:us-east-2:12345678910:entity-recognizer/
EntityRecognizer-DOCS-2K-ONE-DOC-PER-LINE-1588161691587"
},
"responseElements": null,
"requestID": "ab49a08d-3579-4f10-a62f-eb72e359e516",
"eventID": "fb9860a1-b158-4764-a306-d19cfbace7fc",
"readOnly": false,
"resources": [
{
    "accountId": "12345678910",
    "type": "AWS::Comprehend::EntityRecognizer",
    "ARN": "arn:aws:comprehend:us-east-2:12345678910:entity-recognizer/
EntityRecognizer-DOCS-2K-ONE-DOC-PER-LINE-1588161691587"
}
],
"eventType": "AwsApiCall",
"recipientAccountId": "12345678910"
}

```

The following example shows a CloudTrail log entry that demonstrates the `ClassifyDocument` action.

```

{
    "eventVersion": "1.05",
    "userIdentity": {
        "type": "AssumedRole",
        "principalId": "AROAICFHPEXAMPLE:SomeServiceCa-ValidateEndpointOutputLa-
C5F50672CNDK",
        "arn": "arn:aws:sts::12345678910:assumed-role/SomeServiceCa-SomeLambdaR-
ADLIAGB0VT9X/SomeServiceCa-ValidateEndpointOutputLa-C5F50672CNDK",
        "accountId": "12345678910",
        "accessKeyId": "ASIA3VZEXAMPLE",
        "sessionContext": {
            "sessionIssuer": {
                "type": "Role",
                "principalId": "AROAICFHPEXAMPLE",
                "arn": "arn:aws:iam::12345678910:role/SomeServiceCa-SomeLambdaR-
ADLIAGB0VT9X",
                "accountId": "12345678910",
                "userName": "SomeServiceCa-SomeLambdaR-ADLIAGB0VT9X"
            },
            "webIdFederationData": {},
            "attributes": {
                "mfaAuthenticated": "false",
                "creationDate": "2020-04-29T16:15:11Z"
            }
        }
    },
    "eventTime": "2020-04-29T17:10:26Z",
    "eventSource": "comprehend.amazonaws.com",
    "eventName": "ClassifyDocument",
    "awsRegion": "us-east-2",
    "sourceIPAddress": "3.21.185.237",
    "userAgent": "aws-internal/3 aws-sdk-java/1.11.761 Linux/4.14.165-102.205.amzn2.x86_64
OpenJDK_64-Bit_Server_VM/25.201-b09 java/1.8.0_201 vendor/Oracle_Corporation, canary-
generated exec-env/AWS_Lambda_java8",
    "requestParameters": {
        "endpointArn": "arn:aws:comprehend:us-east-2:12345678910:document-classifier-
endpoint/canary86644"
    },
    "responseElements": null,
    "requestID": "fd916e66-caac-46c9-a1fc-81a0ef33e61b",
}

```

```
"eventID": "535ca22b-b3a3-4c13-b2c5-bf51ab082794",
"readOnly": true,
"resources": [
    {
        "accountId": "12345678910",
        "type": "AWS::Comprehend::DocumentClassifierEndpoint",
        "ARN": "arn:aws:comprehend:us-east-2:12345678910:document-classifier-endpoint/
canary86644"
    }
],
"eventType": "AwsApiCall",
"recipientAccountId": "12345678910"
}
```

## Compliance validation for Amazon Comprehend

Third-party auditors assess the security and compliance of Amazon Comprehend as part of multiple AWS compliance programs. These include PCI, FedRAMP, HIPAA, and others. You can download third-party audit reports using AWS Artifact. For more information, see [Downloading Reports in AWS Artifact](#).

Your compliance responsibility when using Amazon Comprehend is determined by the sensitivity of your data, your company's compliance objectives, and applicable laws and regulations. AWS provides the following resources to help with compliance:

- [Security and Compliance Quick Start Guides](#) – These deployment guides discuss architectural considerations and provide steps for deploying security- and compliance-focused baseline environments on AWS.
- [Architecting for HIPAA Security and Compliance Whitepaper](#) – This whitepaper describes how companies can use AWS to create HIPAA-compliant applications.
- [AWS Compliance Resources](#) – This collection of workbooks and guides might apply to your industry and location.
- [AWS Config](#) – This AWS service assesses how well your resource configurations comply with internal practices, industry guidelines, and regulations.
- [AWS Security Hub](#) – This AWS service provides a comprehensive view of your security state within AWS that helps you check your compliance with security industry standards and best practices.

For a list of AWS services in scope of specific compliance programs, see [AWS Services in Scope by Compliance Program](#). For general information, see [AWS Compliance Programs](#).

## Resilience in Amazon Comprehend

The AWS global infrastructure is built around AWS Regions and Availability Zones. AWS Regions provide multiple physically separated and isolated Availability Zones, which are connected with low-latency, high-throughput, and highly redundant networking. With Availability Zones, you can design and operate applications and databases that automatically fail over between Availability Zones without interruption. Availability Zones are more highly available, fault tolerant, and scalable than traditional single or multiple data center infrastructures.

For more information about AWS Regions and Availability Zones, see [AWS Global Infrastructure](#).

# Infrastructure security in Amazon Comprehend

As a managed service, Amazon Comprehend adheres to the [AWS Best Practices for Security, Identity, and Compliance](#).

To access Amazon Comprehend through the network, you use AWS published API calls. Clients must support Transport Layer Security (TLS) 1.0 or later. We recommend TLS 1.2 or later. Clients must also support cipher suites with perfect forward secrecy (PFS), such as Ephemeral Diffie-Hellman (DHE) or Elliptic Curve Ephemeral Diffie-Hellman (ECDHE). Most modern systems, such as Java 7 and later, support these modes.

Additionally, requests must be signed by using an access key ID and a secret access key that is associated with an AWS Identity and Access Management (IAM) principal. Or you can use the [AWS Security Token Service](#) (AWS STS) to generate temporary security credentials to sign requests.

## Permissions required for a custom asynchronous analysis job

### Important

If you have an IAM policy which restricts model access, you won't be able to complete an inference job with a custom model. Your IAM policy should be updated to having a wildcard resource for a custom async analysis job.

If you are using the [StartDocumentClassificationJob](#) and [StartEntitiesDetectionJob](#) APIs, you need to update your IAM policy unless you are currently using wildcards as resources. If you are using a [StartEntitiesDetectionJob](#) using a pretrained model this does not impact you and you don't need to make any changes.

The following example policy contains an **outdated** reference.

```
{  
    "Action": [  
        "comprehend:StartDocumentClassificationJob",  
        "comprehend:StartEntitiesDetectionJob",  
    ],  
    "Resource": [  
        "arn:aws:comprehend:us-east-1:123456789012:document-classifier/myClassifier",  
        "arn:aws:comprehend:us-east-1:123456789012:entity-recognizer/myRecognizer"  
    ],  
    "Effect": "Allow"  
}
```

This is the **updated** policy you need to use to successfully run [StartDocumentClassificationJob](#) and [StartEntitiesDetectionJob](#).

```
{  
    "Action": [  
        "comprehend:StartDocumentClassificationJob",  
        "comprehend:StartEntitiesDetectionJob",  
    ],  
    "Resource": [  
        "arn:aws:comprehend:us-east-1:123456789012:document-classifier/myClassifier",  
        "arn:aws:comprehend:us-east-1:123456789012:document-classification-job/*",  
        "arn:aws:comprehend:us-east-1:123456789012:entity-recognizer/myRecognizer",  
        "arn:aws:comprehend:us-east-1:123456789012:entities-detection-job/*"  
    ],  
    "Effect": "Allow"  
}
```

```
    "Effect": "Allow"  
}
```

# Guidelines and quotas

Many of the Amazon Comprehend quotas shown here can be increased if needed for your applications. For information about service quotas and to request a quota increase, see [AWS Service Quotas](#).

Remember the following information when using Amazon Comprehend.

## Topics

- [Supported Regions \(p. 219\)](#)
- [Overall Quotas \(p. 219\)](#)
- [Throttling for single transactions \(p. 220\)](#)
- [Multiple document operations \(p. 220\)](#)
- [Concurrent active asynchronous jobs \(p. 220\)](#)
- [Asynchronous jobs \(p. 220\)](#)
- [Targeted sentiment \(p. 221\)](#)
- [Document classification \(p. 221\)](#)
- [Language detection \(p. 222\)](#)
- [Events \(p. 222\)](#)
- [Topic modeling \(p. 223\)](#)
- [Entity recognition \(p. 223\)](#)

## Supported Regions

For a list of AWS Regions where Amazon Comprehend is available, see [AWS Regions and Endpoints](#) in the *Amazon Web Services General Reference*.

## Overall Quotas

All operations except asynchronous operations and topic modeling operations have the following quotas:

Description	Quota/Guideline
Character encoding	UTF-8
Document size (UTF-8 characters)	5,000 bytes

Synchronous requests to label documents with PII using the [ContainsPiiEntities \(p. 275\)](#) operation have the following quotas:

Description	Quota/Guideline
Character encoding	UTF-8
Document size (UTF-8 characters)	50,000 bytes

Amazon Comprehend may store your content to continuously improve the quality of its analysis models. See the [Amazon Comprehend FAQ](#) to learn more.

## Throttling for single transactions

You may be able to avoid throttling by using the batch operations instead of the single transaction operations. For more information, see [Multiple document operations \(p. 220\)](#).

## Multiple document operations

The [BatchDetectDominantLanguage \(p. 257\)](#), [BatchDetectEntities \(p. 260\)](#), [BatchDetectKeyPhrases \(p. 263\)](#), and [BatchDetectSentiment \(p. 266\)](#) operations have the following quotas:

Description	Quota/Guideline
Documents per request	25

If you plan to send more than 20 requests per second, you should consider using the batch operations. With batch operations, you send more documents in each request, which may result in higher throughput. For example, when you use the `DetectDominantLanguage` operation, you can send up to 20 documents per second. However, if you use the `BatchRequestDominantLanguage` operation, you can send up to 250 documents per second, but processing speed may be lower. For more information about throttling quotas, see [Amazon Comprehend Quotas](#) in the *Amazon Web Services General Reference*. For more information about using the multiple document API operations, see [Multiple document synchronous processing \(p. 32\)](#).

## Concurrent active asynchronous jobs

You create new analysis jobs using the Amazon Comprehend console or one of the `API_Start*` operations. Each account can have up to 10 concurrent active jobs of a given job type.

Description	Quota/Guideline
Maximum number of concurrent active jobs per job type	10

## Asynchronous jobs

Asynchronous analysis jobs that you run using one of the `API_Start*` operations have the following limits:

Description	Quota/Guideline
Maximum size of each document in jobs that detect entities, key phrases, PII, and languages	1 MB
Maximum size of each document in jobs that detect sentiment	5 KB

Description	Quota/Guideline
Total size of all files in batch	5 GB
Maximum number of files, one document per file	1,000,000

You should use the asynchronous operations:

- To analyze more than 25 documents at a time
- To analyze documents larger than 5,000 bytes for keywords and entities

For more information, see [Asynchronous batch processing \(p. 34\)](#).

## Targeted sentiment

Targeted sentiment supports only asynchronous analysis jobs. Jobs created with the [StartTargetedSentimentDetectionJob \(p. 439\)](#) operation have the following limits:

### Targeted sentiment detection - inference ([StartTargetedSentimentDetectionJob](#))

Description	Quota/Guideline
Supported document formats	UTF-8
Maximum size of each document in a job	10 KB
Maximum size of all documents in a job	300 MB
Maximum number of files, one document per file	30,000
Maximum number of lines, one document per line (for all files in a request)	30,000

## Document classification

Document classifier training jobs started with the [CreateDocumentClassifier \(p. 277\)](#) operation, asynchronous document classification jobs started with the [StartDocumentClassificationJob \(p. 406\)](#), and synchronous document classification requests started with the [ClassifyDocument \(p. 272\)](#) operation have the following limits:

### General

Description	Quota/Guideline
Character encoding	UTF-8
Maximum number of classes (multi-class mode)	1,000
Maximum number of classes (multi-label mode)	100
Maximum length of class name	5,000 characters
Minimum number of training documents per class (multi-class mode)	50

Description	Quota/Guideline
Minimum number of training documents per class, (multi-label mode)	10
Total size of all files in training job	5 GB
Total size of all files in asynchronous job	5 GB
Maximum file size for one file, one document per file	10 MB
Maximum number of files, one document per file	1,000,000
Maximum number of lines, one document per line (for all files in request)	1,000,000
Maximum number of documents per synchronous request	1
Maximum number of augmented manifest files for training a custom classifier	5
Maximum number of attribute names for each augmented manifest file	5
Maximum length of attribute name	63 characters

### Real-time analysis

Description	Quota/Guideline
Maximum number of inference units per account	100
Maximum number of inference units per endpoint	10
Maximum throughput per inference unit (characters)	100/second
Maximum throughput per inference unit (documents)	2/second

## Language detection

The [BatchDetectDominantLanguage \(p. 257\)](#), [DetectDominantLanguage \(p. 338\)](#) operations and asynchronous jobs started with the [StartDominantLanguageDetectionJob \(p. 411\)](#) operation have the following limitations:

- They don't support phonetic language detection. For example, they will not detect "arigato" as Japanese nor "nihao" as Chinese.
- They may have trouble distinguishing close language pairs, such as Indonesian and Malay; or Bosnian, Croatian, and Serbian.
- For best results the input text should be at least 20 characters long.

## Events

Events detection jobs created with the [StartEventsDetectionJob \(p. 421\)](#) operation have the following limits:

Description	Quotas
Character encoding	UTF-8
Total size of all files in a job	50 MB
Maximum size of each document in a job	10 KB
Maximum number of files, one document per file	5,000
Maximum number of lines, one document per line (for all files in request)	5,000

## Topic modeling

Topic detection jobs created with the [StartTopicsDetectionJob \(p. 444\)](#) operation have the following limits:

Description	Quota/Guideline
Character encoding	UTF-8
Maximum number of topics to return	100
Maximum total size of all files in request	5 GB
Minimum total size of all files in request	500 bytes
Maximum file size for one file, one document per file	100 MB
Maximum number of files, one document per file	1,000,000
Maximum number of lines, one document per line (for all files in request)	1,000,000

For best results, you should include at least 1,000 input documents.

## Entity recognition

Entity recognizer training jobs started with the [CreateEntityRecognizer \(p. 287\)](#) operation, asynchronous entity recognition jobs started with the [StartEntitiesDetectionJob \(p. 416\)](#) operation, and synchronous entity recognition requests started with the [DetectEntities \(p. 341\)](#) operation have the following limits:

### Plain text entity recognition - training ([CreateEntityRecognizer](#))

Description	Quota/Guideline
Number of entities per model/custom entity recognizer	1–25
Document size (UTF-8)	1–5,000 byte
Number of documents	250–120,000

Description	Quota/Guideline
Document corpus size (all docs in plaintext combined)	5 KB - 100 MB
Minimum number of annotations per entity	100
Number of items in entity list	1–1 million
Length of individual entry (post-strip) in entry list	1–5,000
Entity list corpus size (all docs in plaintext combined)	5 KB –100 MB

#### PDF or Word text entity recognition - training (CreateEntityRecognizer)

Description	Quota/Guideline
Number of entities per model/custom entity recognizer	1–25
Maximum annotation file size (UTF-8 JSON)	5 MB
Number of documents	250–10,000
Document corpus size (all docs in plaintext combined)	5 KB–1 GB
Minimum number of annotations per entity	100

#### Augmented manifest files

Description	Quota/Guideline
Maximum number of augmented manifest files for training a custom entity recognizer	5
Maximum number of attribute names for each augmented manifest file	5
Maximum length of attribute name	63 characters

#### Entity recognition for plaintext files - inference (StartEntitiesDetectionJob)

Description	Quota/Guideline
Document size (UTF-8)	1 byte–1 MB
Maximum number of files, one document per file	1,000,000
Maximum number of lines, one document per line (for all files in request)	1,000,000
Document corpus size (all docs in plaintext combined)	1 byte–5 GB

#### Entity recognition for image, PDF, or Word files - inference (StartEntitiesDetectionJob)

Description	Quota/Guideline
Image size (JPG or PNG)	1 byte–10 MB

Description	Quota/Guideline
Image size (TIFF)	1 byte–10 MB. Maximum one page.
Document size (PDF)	1 byte–50 MB
Document size (Docx)	1 byte–5 MB
Document size (UTF-8)	1 byte–1 MB
Maximum number of files, one document per file (one document per line not allowed for image files or PDF/Word documents)	500
Maximum number of pages for a PDF or Docx file	100
Document corpus size after text extraction (plaintext, all files combined)	1 byte–5 GB

For more information about limits for images, see [Hard Limits in Amazon Textract](#)

### Real-time analysis

Description	Quota/Guideline
Maximum number of inference units per account	100
Maximum number of inference units per endpoint	10
Maximum throughput per inference unit (characters)	100/second
Maximum throughput per inference unit (documents)	2/second
Maximum number of documents per synchronous request	1

# Tutorials and other resources

Tutorials and other resources for Amazon Comprehend.

## Topics

- [Tutorial: Analyzing insights from customer reviews with Amazon Comprehend \(p. 226\)](#)
- [Using Amazon S3 object Lambda access points for personally identifiable information \(PII\) \(p. 249\)](#)
- [Solution: Analyzing text with Amazon Comprehend and OpenSearch \(p. 253\)](#)

## Tutorial: Analyzing insights from customer reviews with Amazon Comprehend

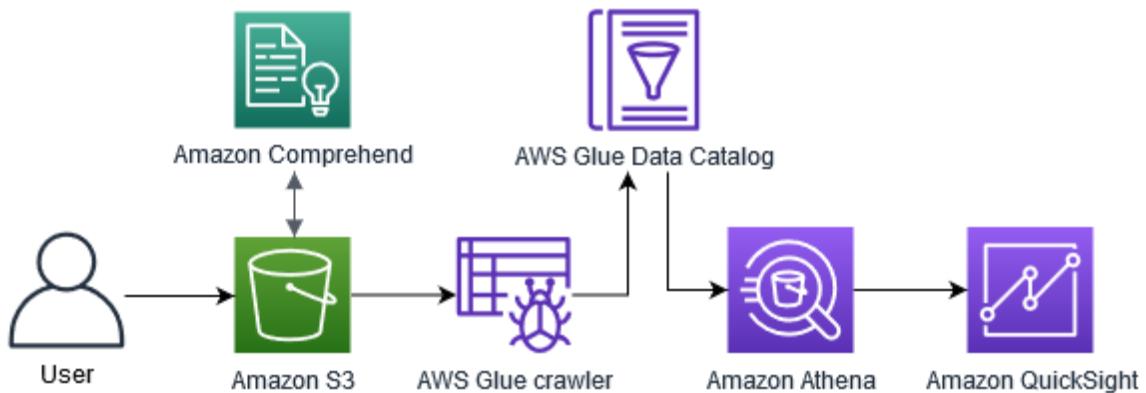
This tutorial explains how to use Amazon Comprehend with [Amazon Simple Storage Service](#), [AWS Glue](#), [Amazon Athena](#), and [Amazon QuickSight](#) to gain valuable insights into your documents. Amazon Comprehend can extract sentiment (the mood of a document) and entities (names of people, organizations, events, dates, products, places, quantities, and titles) from unstructured text.

For example, you can get actionable insights from customer reviews. In this tutorial, you analyze a sample dataset of customer reviews about a novel. You use Amazon Comprehend sentiment analysis to determine whether customers feel positive or negative about the novel. You also use Amazon Comprehend entities analysis to discover mentions of important entities, such as related novels or authors. After following this tutorial, you might discover that over 50% of the reviews are positive. You might also discover that customers are comparing authors and expressing interest in other classic novels.

In this tutorial, you accomplish the following:

- Store a sample dataset of reviews in [Amazon Simple Storage Service](#) (Amazon S3). Amazon Simple Storage Service is an object storage service.
- Use [Amazon Comprehend](#) to analyze the sentiment and entities in the review documents.
- Use an [AWS Glue](#) crawler to store the results of the analysis in a database. AWS Glue is an extract, transform, and load (ETL) service that lets you catalog and clean your data for analytics.
- Run [Amazon Athena](#) queries to clean your data. Amazon Athena is a serverless interactive query service.
- Create visualizations with your data in [Amazon QuickSight](#). Amazon QuickSight is a serverless business intelligence tool for extracting insights from your data.

The following diagram shows the workflow.



**Estimated time to complete this tutorial:** 1 hour

**Estimated cost:** Some of the actions in this tutorial incur charges on your AWS account. For information about the charges for each of these services, see the following pricing pages.

- [Amazon S3 pricing](#)
- [Amazon Comprehend pricing](#)
- [AWS Glue pricing](#)
- [Amazon Athena pricing](#)
- [Amazon QuickSight pricing](#)

### Topics

- [Prerequisites \(p. 227\)](#)
- [Step 1: Adding documents to Amazon S3 \(p. 229\)](#)
- [Step 2: \(CLI only\) creating an IAM role for Amazon Comprehend \(p. 232\)](#)
- [Step 3: Running analysis jobs on documents in Amazon S3 \(p. 234\)](#)
- [Step 4: Preparing the Amazon Comprehend output for data visualization \(p. 237\)](#)
- [Step 5: Visualizing Amazon Comprehend output in Amazon QuickSight \(p. 245\)](#)

## Prerequisites

To complete this tutorial, you need the following:

- An AWS account. If you don't have an AWS account, see the topic [Step 1: Set up an AWS account and create an administrator user](#) in the *Amazon Comprehend User Guide* to set up a new account.
- An [AWS Identity and Access Management \(IAM\)](#) user. We highly recommend that you use an IAM user to protect your root account. The root account has unrestricted access to AWS resources and billing information. Using an IAM user with restricted permissions limits how much access you have within your account. To learn how to set up an IAM user and group for your account, see the [Getting started](#) tutorial in the *IAM User Guide*.
- The following permissions policy attached to your IAM group or user. The policy grants your IAM user some of the permissions required to complete this tutorial. The next prerequisite describes the additional permissions you need.

```
{  
    "Version": "2012-10-17",
```

```

"Statement":
[
  {
    "Sid": "VisualEditor0",
    "Effect": "Allow",
    "Action":
    [
      "comprehend:*",
      "ds:AuthorizeApplication",
      "ds:CheckAlias",
      "ds>CreateAlias",
      "ds>CreateIdentityPoolDirectory",
      "ds>DeleteDirectory",
      "ds:DescribeDirectories",
      "ds:DescribeTrusts",
      "ds:UnauthorizeApplication",
      "iam:AttachRolePolicy",
      "iam:CreatePolicy",
      "iam:CreatePolicyVersion",
      "iam:CreateRole",
      "iam:DeletePolicyVersion",
      "iam:DeleteRole",
      "iam:DetachRolePolicy",
      "iam:GetPolicy",
      "iam:GetPolicyVersion",
      "iam:GetRole",
      "iam>ListAccountAliases",
      "iam>ListAttachedRolePolicies",
      "iam>ListEntitiesForPolicy",
      "iam>ListPolicies",
      "iam>ListPolicyVersions",
      "iam>ListRoles",
      "quicksight:*",
      "s3:*",
      "tag:GetResources"
    ],
    "Resource": "*"
  },
  {
    "Action":
    [
      "iam:PassRole"
    ],
    "Effect": "Allow",
    "Resource":
    [
      "arn:aws:iam::*:role/*Comprehend*"
    ]
  }
]
}

```

Use the previous policy to create an IAM policy and attach it to your group or user. For information about creating an IAM policy, see [Creating IAM policies](#) in the *IAM User Guide*. For information about attaching an IAM policy, see [Adding and removing IAM identity permissions](#) in the *IAM User Guide*.

- Managed policies attached to your IAM group or user. In addition to the previous policy, you must also attach the following AWS managed policies to your group or user:
  - [AWSGlueConsoleFullAccess](#)
  - [AWSQuicksightAthenaAccess](#)

These managed policies give you permission to use AWS Glue, Amazon Athena, and Amazon QuickSight. For information about attaching an IAM policy, see [Adding and removing IAM identity permissions](#) in the *IAM User Guide*.

## Step 1: Adding documents to Amazon S3

Before starting the Amazon Comprehend analysis jobs, you need to store a sample dataset of customer reviews in Amazon Simple Storage Service (Amazon S3). Amazon S3 hosts your data in containers called buckets. Amazon Comprehend can analyze documents stored in a bucket and it sends results of the analysis to a bucket. In this step, you create an S3 bucket, create input and output folders in the bucket, and upload a sample dataset to the bucket.

### Topics

- [Prerequisites \(p. 229\)](#)
- [Download sample data \(p. 229\)](#)
- [Create an Amazon S3 bucket \(p. 229\)](#)
- [\(Console only\) create folders \(p. 230\)](#)
- [Upload the input data \(p. 231\)](#)

## Prerequisites

Before you begin, review [Tutorial: Analyzing insights from customer reviews with Amazon Comprehend \(p. 226\)](#) and complete the prerequisites.

## Download sample data

The following sample dataset contains Amazon reviews taken from the larger dataset "Amazon reviews - Full", which was published with the article "Character-level Convolutional Networks for Text Classification" (Xiang Zhang et al., 2015). Download the dataset to your computer.

### To get the sample data

1. Download the zip file [tutorial-reviews-data.zip](#) to your computer.
2. Extract the zip file on your computer. There are two files. The file `THIRD_PARTY_LICENSES.txt` is the open source license for the dataset published by Xiang Zhang et al. The file `amazon-reviews.csv` is the dataset you analyze in the tutorial.

## Create an Amazon S3 bucket

After downloading the sample dataset, create an Amazon S3 bucket to store your input and output data. You can create an S3 bucket using the Amazon S3 console or the AWS Command Line Interface (AWS CLI).

### Create an Amazon S3 bucket (console)

In the Amazon S3 console, you create a bucket with a name that is unique in all of AWS.

### To create an S3 bucket (console)

1. Sign in to the AWS Management Console and open the Amazon S3 console at <https://console.aws.amazon.com/s3/>.
2. In **Buckets**, choose **Create bucket**.
3. For **Bucket name**, enter a globally unique name that describes the bucket's purpose.
4. For **Region**, choose the AWS Region where you want to create the bucket. The Region you choose must support Amazon Comprehend. To reduce latency, choose the AWS Region closest to your geographic location that is supported by Amazon Comprehend. For a list of Regions that support Amazon Comprehend, see the [Region table](#) in the *Global Infrastructure Guide*.

5. Leave the default settings for **Object Ownership**, **Bucket settings for Block Public Access**, **Bucket Versioning**, and **Tags**.
6. For **Default encryption**, choose **Disable**.

**Tip**

While this tutorial does not use encryption, you might want to use encryption when analyzing important data. For end-to-end encryption, you can encrypt your data at rest in the bucket and also when you run analysis jobs. For more information about encryption with AWS, see [What is AWS Key Management Service?](#) in the *AWS Key Management Service Developer Guide*.

7. Review your bucket configurations and then choose **Create bucket**.

## Create an Amazon S3 bucket (AWS CLI)

After opening the AWS CLI, you run the `create-bucket` command to create a bucket that will store the input and output data.

### To create an Amazon S3 bucket (AWS CLI)

1. To create your bucket, run the following command in the AWS CLI. Replace `DOC-EXAMPLE-BUCKET` with a name for the bucket that is unique in all of AWS.

```
aws s3api create-bucket --bucket DOC-EXAMPLE-BUCKET
```

By default, the `create-bucket` command creates a bucket in the `us-east-1` AWS Region. To create a bucket in an AWS Region other than `us-east-1`, add the `LocationConstraint` parameter to specify your Region. For example, the following command creates a bucket in the `us-west-2` Region.

```
aws s3api create-bucket --bucket DOC-EXAMPLE-BUCKET  
--region us-west-2 --create-bucket-configuration LocationConstraint=us-west-2
```

Note that only certain Regions support Amazon Comprehend. For a list of Regions that support Amazon Comprehend, see the [Region table](#) in the *Global Infrastructure Guide*.

2. To ensure that your bucket was created successfully, run the following command. The command lists all of the S3 buckets associated with your account.

```
aws s3 ls
```

## (Console only) create folders

Next, create two folders in your S3 bucket. The first folder is for your input data. The second folder is where Amazon Comprehend sends the analysis results. If you use the Amazon S3 console, you have to manually create the folders. If you use the AWS CLI, you can create folders when you upload the sample dataset or run an analysis job. For that reason, we provide a procedure for creating folders only for console users. If you are using the AWS CLI, you will create folders in [Upload the input data \(p. 231\)](#) and in [Step 3: Running analysis jobs on documents in Amazon S3 \(p. 234\)](#).

### To create folders in your S3 bucket (console)

1. Open the Amazon S3 console at <https://console.aws.amazon.com/s3/>.
2. In **Buckets**, choose your bucket from the list of buckets.
3. In the **Overview** tab, choose **Create folder**.

4. For the new folder name, enter `input`.
5. For the encryption settings, choose **None (Use bucket settings)**.
6. Choose **Save**.
7. Repeat steps 3 through 6 to create another folder for the output of the analysis jobs, but in step 4, enter the new folder name `output`.

## Upload the input data

Now that you have a bucket, upload the sample dataset `amazon-reviews.csv`. You can upload data to S3 buckets with the Amazon S3 console or the AWS CLI.

### Upload sample documents to a bucket (console)

In the Amazon S3 console, upload the sample dataset file to the input folder.

#### To upload the sample documents (console)

1. Open the Amazon S3 console at <https://console.aws.amazon.com/s3/>.
2. In **Buckets**, choose your bucket from the list of buckets.
3. Choose the `input` folder and then choose **Upload**.
4. Choose **Add files** and then choose the `amazon-reviews.csv` file on your computer.
5. Choose **Next**.
6. Leave the default settings for **Manage users**, **Access for other AWS accounts**, and **Manage public permissions**. Choose **Next**.
7. For **Storage class**, choose **Standard**.
8. For **Encryption**, choose **None**.
9. Leave **Metadata** and **Tag** blank.
10. Choose **Next** and review the configurations, and then choose **Upload**.

### Upload sample documents to a bucket (AWS CLI)

Create an input folder in your S3 bucket and upload the dataset file to the new folder with the `cp` command.

#### To upload the sample documents (AWS CLI)

1. To upload the `amazon-reviews.csv` file to a new folder in your bucket, run the following AWS CLI command. Replace **DOC-EXAMPLE-BUCKET** with the name of your bucket. By adding the path `/input/` at the end, Amazon S3 automatically creates a new folder called `input` in your bucket and uploads the dataset file to that folder.

```
aws s3 cp amazon-reviews.csv s3://DOC-EXAMPLE-BUCKET/input/
```

2. To ensure that your file was uploaded successfully, run the following command. The command lists the contents of your bucket's `input` folder.

```
aws s3 ls s3://DOC-EXAMPLE-BUCKET/input/
```

Now, you have an S3 bucket with the `amazon-reviews.csv` file in a folder called `input`. If you used the console, you also have an `output` folder in the bucket. If you used the AWS CLI, you will create the `output` folder when running the Amazon Comprehend analysis jobs.

## Step 2: (CLI only) creating an IAM role for Amazon Comprehend

This step is necessary only if you are using the AWS Command Line Interface (AWS CLI) to complete this tutorial. If you are using the Amazon Comprehend console to run the analysis jobs, skip to [Step 3: Running analysis jobs on documents in Amazon S3 \(p. 234\)](#).

To run analysis jobs, Amazon Comprehend requires access to the Amazon S3 bucket that contains the sample dataset and will contain the jobs' output. IAM roles allow you to control the permissions of AWS services or users. In this step, you create an IAM role for Amazon Comprehend. Then, you create and attach to this role a resource-based policy that grants Amazon Comprehend access to your S3 bucket. By the end of this step, Amazon Comprehend will have the necessary permissions to access your input data, store your output, and run sentiment and entities analysis jobs.

For more information about using IAM with Amazon Comprehend, see [Overview of managing access permissions to Amazon Comprehend resources \(p. 197\)](#) and [Using identity-based policies \(IAM policies\) for Amazon Comprehend \(p. 199\)](#) in the *Amazon Comprehend User Guide*.

### Topics

- [Prerequisites \(p. 232\)](#)
- [Create an IAM role \(p. 232\)](#)
- [Attach an IAM policy to the IAM role \(p. 233\)](#)

## Prerequisites

Before you begin, do the following:

- Complete [Step 1: Adding documents to Amazon S3 \(p. 229\)](#).
- Have a code or text editor to save JSON policies and keep track of your Amazon Resource Names (ARNs).

## Create an IAM role

To access your Amazon Simple Storage Service (Amazon S3) bucket, Amazon Comprehend needs to assume an AWS Identity and Access Management (IAM) role. The IAM role declares Amazon Comprehend as a trusted entity. After Amazon Comprehend assumes the role and becomes a trusted entity, you can grant bucket access permissions to Amazon Comprehend. In this step, you create a role that labels Amazon Comprehend as a trusted entity. You can create a role with the AWS CLI or the Amazon Comprehend console. To use the console, skip to [Step 3: Running analysis jobs on documents in Amazon S3 \(p. 234\)](#).

The Amazon Comprehend console lets you select roles where the role name contains 'Comprehend' and the trust policy includes **comprehend.amazonaws.com**. Configure your CLI-created roles to meet these criteria if you want the console to display them.

### To create an IAM role for Amazon Comprehend (AWS CLI)

1. Save the following trust policy as a JSON document called `comprehend-trust-policy.json` in a code or text editor on your computer. This trust policy declares Amazon Comprehend as a trusted entity and allows it to assume an IAM role.

```
{
```

```

    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Principal": {
                "Service": "comprehend.amazonaws.com"
            },
            "Action": "sts:AssumeRole"
        }
    ]
}

```

2. To create the IAM role, run the following AWS CLI command. The command creates an IAM role called `AmazonComprehendServiceRole-access-role` and attaches the trust policy to the role. Replace `path/` with your local computer's path to the JSON document.

```
aws iam create-role --role-name AmazonComprehendServiceRole-access-role
--assume-role-policy-document file:///path//comprehend-trust-policy.json
```

#### Tip

If you get an Error parsing parameter message, the path to your JSON trust policy file is probably incorrect. Provide the relative path to the file based on your home directory.

3. Copy the Amazon Resource Name (ARN) and save it in a text editor. The ARN has a format similar to `arn:aws:iam::123456789012:role/AmazonComprehendServiceRole-access-role`. You need this ARN to run Amazon Comprehend analysis jobs.

## Attach an IAM policy to the IAM role

To access your Amazon S3 bucket, Amazon Comprehend needs permissions to list, read, and write. To give Amazon Comprehend the required permissions, create and attach an IAM policy to your IAM role. The IAM policy allows Amazon Comprehend to retrieve the input data from your bucket and write analysis results to the bucket. After creating the policy, you attach it to your IAM role.

### To create an IAM policy (AWS CLI)

1. Save the following policy locally as a JSON document called `comprehend-access-policy.json`. It grants Amazon Comprehend access to the specified S3 bucket.

```

{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Action": [
                "s3:GetObject"
            ],
            "Resource": [
                "arn:aws:s3:::DOC-EXAMPLE-BUCKET/*"
            ],
            "Effect": "Allow"
        },
        {
            "Action": [
                "s3>ListBucket"
            ],
            "Resource": [
                "arn:aws:s3:::DOC-EXAMPLE-BUCKET"
            ],
            "Effect": "Allow"
        }
    ]
}

```

```
        "Action": [
            "s3:PutObject"
        ],
        "Resource": [
            "arn:aws:s3:::DOC-EXAMPLE-BUCKET/*"
        ],
        "Effect": "Allow"
    }
]
```

2. To create the S3 bucket access policy, run the following AWS CLI command. Replace *path/* with your local computer's path to the JSON document.

```
aws iam create-policy --policy-name comprehend-access-policy
--policy-document file://path/comprehend-access-policy.json
```

3. Copy the access policy ARN and save it in a text editor. The ARN has a format similar to *arn:aws:iam::123456789012:policy/comprehend-access-policy*. You need this ARN to attach your access policy to your IAM role.

#### To attach the IAM policy to your IAM role (AWS CLI)

- Run the following command. Replace *policy-arn* with the access policy ARN that you copied in the previous step.

```
aws iam attach-role-policy --policy-arn policy-arn
--role-name AmazonComprehendServiceRole-access-role
```

You now have an IAM role called `AmazonComprehendServiceRole-access-role` that has a trust policy for Amazon Comprehend and an access policy that grants Amazon Comprehend access to your S3 bucket. You also have the ARN for the IAM role copied to a text editor.

## Step 3: Running analysis jobs on documents in Amazon S3

After storing the data in Amazon S3, you can begin running Amazon Comprehend analysis jobs. A *sentiment* analysis job determines the overall mood of a document (positive, negative, neutral, or mixed). An *entities* analysis job extracts the names of real-world objects from a document. These objects include people, places, titles, events, dates, quantities, products, and organizations. In this step, you run two Amazon Comprehend analysis jobs to extract the sentiment and entities from the sample dataset.

### Topics

- [Prerequisites \(p. 234\)](#)
- [Analyze sentiment and entities \(p. 235\)](#)

## Prerequisites

Before you begin, do the following:

- [Complete Step 1: Adding documents to Amazon S3 \(p. 229\).](#)
- (Optional) If you are using the AWS CLI, complete [Step 2: \(CLI only\) creating an IAM role for Amazon Comprehend \(p. 232\)](#) and have your IAM role ARN ready.

## Analyze sentiment and entities

The first job you run analyzes the sentiment of each customer review in the sample dataset. The second job extracts the entities in each customer review. You can perform Amazon Comprehend analysis jobs either using the Amazon Comprehend console or the AWS CLI.

### Tip

Make sure that you are in an AWS Region that supports Amazon Comprehend. For more information, see the [Region table](#) in the *Global Infrastructure Guide*.

### Analyze sentiments and entities (console)

When using the Amazon Comprehend console, you create one job at a time. You need to repeat the following steps in order to run both a sentiment and an entities analysis job. Note that for the first job, you create an IAM role, but for the second job, you can reuse the first job's IAM role. You can reuse the IAM role as long as you use the same S3 bucket and folders.

#### To run sentiment and entities analysis jobs (console)

1. Ensure that you're in the same Region in which you created your Amazon Simple Storage Service (Amazon S3) bucket. If you're in another Region, in the navigation bar, choose the AWS Region where you created your S3 bucket from the **Region selector**.
2. Open the Amazon Comprehend console at <https://console.aws.amazon.com/comprehend/>
3. Choose **Launch Amazon Comprehend**.
4. In the navigation pane, choose **Analysis jobs**.
5. Choose **Create job**.
6. In the **Job settings** section, do the following:
  - a. For **Name**, enter `reviews-sentiment-analysis`.
  - b. For **Analysis type**, choose **Sentiment**.
  - c. For **Language**, choose **English**.
  - d. Leave the **Job encryption** setting as disabled.
7. In the **Input data** section, do the following:
  - a. For **Data source**, choose **My documents**.
  - b. For **S3 location**, choose **Browse S3** and then choose your bucket from the list of buckets.
  - c. In your S3 bucket, for **Objects**, choose your input folder.
  - d. In the input folder, choose the sample dataset `amazon-reviews.csv` and then choose **Choose**.
  - e. For **Input format**, choose **One document per line**.
8. In the **Output data** section, do the following:
  - a. For **S3 location**, choose **Browse S3** and then choose your bucket from the list of buckets.
  - b. In your S3 bucket, for **Objects**, choose the output folder and then choose **Choose**.
  - c. Leave **Encryption** turned off.
9. In the **Access permissions** section, do the following:
  - a. For **IAM role**, choose **Create an IAM role**.
  - b. For **Permissions to access**, choose **Input and Output S3 buckets**.
  - c. For **Name suffix**, enter `comprehend-access-role`. This role provides access to your Amazon S3 bucket.
10. Choose **Create job**.
11. Repeat steps 1-10 to create an entities analysis job. Make the following changes:

- a. In **Job settings**, for **Name**, enter reviews-entities-analysis.
- b. In **Job settings**, for **Analysis type**, choose **Entities**.
- c. In **Access permissions**, choose **Use an existing IAM role**. For **Role name**, choose `AmazonComprehendServiceRole-comprehend-access-role` (this is the same role you created for the sentiment job).

### Analyze sentiments and entities (AWS CLI)

You use the `start-sentiment-detection-job` and the `start-entities-detection-job` commands to run sentiment and entities analysis jobs. After you run each command, the AWS CLI shows a JSON object with a `JobId` value that allows you to access details about the job, including the output S3 location.

### To run sentiment and entities analysis jobs (AWS CLI)

1. Start a sentiment analysis job by running the following command in the AWS CLI. Replace `arn:aws:iam::123456789012:role/comprehend-access-role` with the IAM role ARN that you previously copied to a text editor. If your default AWS CLI Region differs from the Region in which you created your Amazon S3 bucket, include the `--region` parameter and replace `us-east-1` with the Region where your bucket resides.

```
aws comprehend start-sentiment-detection-job
--input-data-config S3Uri=s3://DOC-EXAMPLE-BUCKET/input/
--output-data-config S3Uri=s3://DOC-EXAMPLE-BUCKET/output/
--data-access-role-arn arn:aws:iam::123456789012:role/comprehend-access-role
--job-name reviews-sentiment-analysis
--language-code en
[--region us-east-1]
```

2. After you submit the job, copy the `JobId` and save it to a text editor. You will need the `JobId` to find the output files from the analysis job.
3. Start an entities analysis job by running the following command.

```
aws comprehend start-entities-detection-job
--input-data-config S3Uri=s3://DOC-EXAMPLE-BUCKET/input/
--output-data-config S3Uri=s3://DOC-EXAMPLE-BUCKET/output/
--data-access-role-arn arn:aws:iam::123456789012:role/comprehend-access-role
--job-name reviews-entities-analysis
--language-code en
[--region us-east-1]
```

4. After you submit the job, copy the `JobId` and save it to a text editor.
5. Check the status of your jobs. You can view the progress of a job by tracking its `JobId`.

To track the progress of your sentiment analysis job, run the following command. Replace `sentiment-job-id` with the `JobId` that you copied after running your sentiment analysis.

```
aws comprehend describe-sentiment-detection-job
--job-id sentiment-job-id
```

To track your entities analysis job, run the following command. Replace `entities-job-id` with the `JobId` that you copied after running your entities analysis.

```
aws comprehend describe-entities-detection-job
--job-id entities-job-id
```

It takes several minutes for the JobStatus to show as COMPLETED.

You have completed sentiment and entities analysis jobs. Both of the jobs should be completed before you move on to the next step. It can take several minutes for the jobs to finish.

## Step 4: Preparing the Amazon Comprehend output for data visualization

To prepare the results of the sentiment and entities analysis jobs for creating data visualizations, you use AWS Glue and Amazon Athena. In this step, you extract the Amazon Comprehend results files. Then, you create an AWS Glue *crawler* that explores your data and automatically catalogs it in tables in the AWS Glue Data Catalog. After that, you access and transform these tables using Amazon Athena, a serverless and interactive query service. When you have finished this step, your Amazon Comprehend results are clean and ready for visualization.

For a PII entity detection job, the output file is plain text, not a compressed archive. The output file name is the same as the input file, with .out appended at the end. You don't need the step of extracting the output file. Skip to [Load the Data into an AWS Glue Data Catalog](#).

### Topics

- [Prerequisites \(p. 237\)](#)
- [Download the Output \(p. 237\)](#)
- [Extract the output files \(p. 239\)](#)
- [Upload the extracted files \(p. 239\)](#)
- [Load the data into an AWS Glue Data Catalog \(p. 240\)](#)
- [Prepare the data for analysis \(p. 243\)](#)

## Prerequisites

Before you begin, complete [Step 3: Running analysis jobs on documents in Amazon S3 \(p. 234\)](#).

## Download the Output

The Amazon Comprehend uses Gzip compression to compress output files and save them as a tar archive. The simplest way to extract the output files is to download the output.tar.gz archives locally.

In this step, you download the sentiment and entities output archives.

### Download the Output Files (Console)

To find the output files for each job, return to the analysis job in the Amazon Comprehend console. The analysis job provides the S3 location for the output, where you can download the output file.

#### To download the output files (console)

1. In the [Amazon Comprehend console](#), in the navigation pane, return to **Analysis jobs**.
2. Choose your sentiment analysis job `reviews-sentiment-analysis`.
3. Under **Output**, choose the link displayed next to **Output data location**. This redirects you to the output.tar.gz archive in your S3 bucket.

4. In the **Overview** tab, choose **Download**.
5. On your computer, rename the archive as `sentiment-output.tar.gz`. Since all of the output files have the same name, this helps you keep track of the sentiment and entities files.
6. Repeat steps 1-4 to find and download the output from your `reviews-entities-analysis` job. On your computer, rename the archive as `entities-output.tar.gz`.

### Download the output files (AWS CLI)

To find the output files for each job, use the `JobId` from the analysis job to find the output's S3 location. Then, use the `cp` command to download the output file to your computer.

#### To download the output files (AWS CLI)

1. To list details about your sentiment analysis job, run the following command. Replace `sentiment-job-id` with the sentiment `JobId` that you saved.

```
aws comprehend describe-sentiment-detection-job --job-id sentiment-job-id
```

If you lost track of your `JobId`, you can run the following command to list all of your sentiment jobs and filter for your job by name.

```
aws comprehend list-sentiment-detection-jobs  
--filter JobName="reviews-sentiment-analysis"
```

2. In the `OutputDataConfig` object, find the `S3Uri` value. The `S3Uri` value should be similar to the following format: `s3://DOC-EXAMPLE-BUCKET/.../output/output.tar.gz`. Copy this value to a text editor.
3. To download the sentiment output archive to your local directory, run the following command. Replace the S3 bucket path with the `S3Uri` you copied in the previous step. Replace `path/` with the folder path to your local directory. The name `sentiment-output.tar.gz` replaces the original archive name to help you keep track of the sentiment and entities files.

```
aws s3 cp s3://DOC-EXAMPLE-BUCKET/.../output/output.tar.gz  
path/sentiment-output.tar.gz
```

4. To list details about your entities analysis job, run the following command.

```
aws comprehend describe-entities-detection-job  
--job-id entities-job-id
```

If you don't know your `JobId`, run the following command to list all of your entities jobs and filter for your job by name.

```
aws comprehend list-entities-detection-jobs  
--filter JobName="reviews-entities-analysis"
```

5. From the `OutputDataConfig` object in your entities job description, copy the `S3Uri` value.
6. To download the entities output archive to your local directory, run the following command. Replace the S3 bucket path with the `S3Uri` you copied in the previous step. Replace `path/` with the folder path to your local directory. The name `entities-output.tar.gz` replaces the original archive name.

```
aws s3 cp s3://DOC-EXAMPLE-BUCKET/.../output/output.tar.gz  
path/entities-output.tar.gz
```

## Extract the output files

Before you can access the Amazon Comprehend results, unpack the sentiment and entities archives. You can use either your local file system or a terminal to unpack the archives.

### Extract the output files (GUI file system)

If you use macOS, double-click the archive in your GUI file system to extract the output file from the archive.

If you use Windows, you can use a third-party tool such as 7-Zip to extract the output files in your GUI file system. In Windows, you must perform two steps to access the output file in the archive. First decompress the archive, and then extract the archive.

Rename the sentiment file as `sentiment-output` and the entities file as `entities-output` to distinguish between the output files.

### Extract the output files (terminal)

If you use Linux or macOS, you can use your standard terminal. If you use Windows, you must have access to a Unix-style environment, such as Cygwin, to run tar commands.

To extract the sentiment output file from the sentiment archive, run the following command in your local terminal.

```
tar -xvf sentiment-output.tar.gz --transform 's,^,sentiment-,'
```

Note that the `--transform` parameter adds the prefix `sentiment-` to the output file inside of the archive, renaming the file as `sentiment-output`. This allows you to distinguish between the sentiment and entities output files and prevent overwriting.

To extract the entities output file from the entities archive, run the following command in your local terminal.

```
tar -xvf entities-output.tar.gz --transform 's,^,entities-,'
```

The `--transform` parameter adds the prefix `entities-` to the output file name.

#### Tip

To save storage costs in Amazon S3, you can compress the files again with Gzip before uploading them. It's important to decompress and unpack the original archives because AWS Glue can't automatically read data from a tar archive. However, AWS Glue can read from files in Gzip format.

## Upload the extracted files

After extracting the files, upload them to your bucket. You must store the sentiment and entities output files in separate folders in order for AWS Glue to read the data properly. In your bucket, create a folder for the extracted sentiment results and a second folder for the extracted entities results. You can create folders either with the Amazon S3 console or the AWS CLI.

### Upload the extracted files to Amazon S3 (console)

In your S3 bucket, create one folder for the extracted sentiment results file and one folder for the entities results file. Then, upload the extracted results files to their respective folders.

### To upload the extracted files to Amazon S3 (console)

1. Open the Amazon S3 console at <https://console.aws.amazon.com/s3/>.
2. In **Buckets**, choose your bucket and then choose **Create folder**.
3. For the new folder name, enter **sentiment-results** and choose **Save**. This folder will contain the extracted sentiment output file.
4. In your bucket's **Overview** tab, from the list of bucket contents, choose the new folder **sentiment-results**. Choose **Upload**.
5. Choose **Add files**, choose the **sentiment-output** file from your local computer, and then choose **Next**.
6. Leave the options for **Manage users**, **Access for other AWS account**, and **Manage public permissions** as the defaults. Choose **Next**.
7. For **Storage class**, choose **Standard**. Leave the options for **Encryption**, **Metadata**, and **Tag** as the defaults. Choose **Next**.
8. Review the upload options and then choose **Upload**.
9. Repeat steps 1-8 to create a folder called **entities-results**, and upload the **entities-output** file to it.

### Upload the extracted files to Amazon S3 (AWS CLI)

You can create a folder in your S3 bucket while uploading a file with the `cp` command.

### To upload the extracted files to Amazon S3 (AWS CLI)

1. Create a sentiment folder and upload your sentiment file to it by running the following command. Replace `path/` with the local path to your extracted sentiment output file.

```
aws s3 cp path/sentiment-output s3://DOC-EXAMPLE-BUCKET/sentiment-results/
```

2. Create an entities output folder and upload your entities file to it by running the following command. Replace `path/` with the local path to your extracted entities output file.

```
aws s3 cp path/entities-output s3://DOC-EXAMPLE-BUCKET/entities-results/
```

## Load the data into an AWS Glue Data Catalog

To get the results into a database, you can use an AWS Glue *crawler*. An AWS Glue *crawler* scans files and discovers the schema of the data. It then arranges the data in tables in an AWS Glue Data Catalog (a serverless database). You can create a crawler with the AWS Glue console or the AWS CLI.

### Load the data into an AWS Glue Data Catalog (console)

Create an AWS Glue crawler that scans your **sentiment-results** and **entities-results** folders separately. A new IAM role for AWS Glue gives the crawler permission to access your S3 bucket. You create this IAM role while setting up the crawler.

### To load the data into an AWS Glue Data Catalog (console)

1. Ensure that you're in a Region which supports AWS Glue. If you're in another Region, in the navigation bar, choose a supported Region from the **Region selector**. For a list of Regions that support AWS Glue, see the [Region Table](#) in the *Global Infrastructure Guide*.
2. Open the AWS Glue console at <https://console.aws.amazon.com/glue/>.

3. In the navigation pane, choose **Crawlers** and then choose **Add crawler**.
4. For **Crawler name**, enter comprehend-analysis-crawler and then choose **Next**.
5. For **Crawler source type**, choose **Data stores** and then choose **Next**.
6. For **Add a data store**, do the following:
  - a. For **Choose a data store**, choose **S3**.
  - b. Leave **Connection** blank.
  - c. For **Crawl data in**, choose **Specified path in my account**.
  - d. For **Include path**, enter the full S3 path of the sentiment output folder: s3://*DOC-EXAMPLE-  
BUCKET*/sentiment-results.
  - e. Choose **Next**.
7. For **Add another data store**, choose **Yes** and then choose **Next**. Repeat Step 6, but enter the full S3 path of the entities output folder: s3://*DOC-EXAMPLE-  
BUCKET*/entities-results.
8. For **Add another data store**, choose **No** and then choose **Next**.
9. For **Choose an IAM role**, do the following:
  - a. Choose **Create an IAM role**.
  - b. For **IAM role**, enter **glue-access-role** and then choose **Next**.
10. For **Create a schedule for this crawler**, choose **Run on demand** and choose **Next**.
11. For **Configure the crawler's output**, do the following:
  - a. For **Database**, choose **Add database**.
  - b. For **Database name**, enter **comprehend-results**. This database will store your Amazon Comprehend output tables.
  - c. Leave the other options on their default settings and choose **Next**.
12. Review the crawler information and then choose **Finish**.
13. In the Glue console, in **Crawlers**, choose **comprehend-analysis-crawler** and choose **Run crawler**. It can take a few minutes for the crawler to finish.

### Load the data into an AWS Glue Data Catalog (AWS CLI)

Create an IAM role for AWS Glue that provides permission to access your S3 bucket. Then, create a database in the AWS Glue Data Catalog. Finally, create and run a crawler that loads your data into tables in the database.

### To load the data into an AWS Glue Data Catalog (AWS CLI)

1. To create an IAM role for AWS Glue, do the following:
  - a. Save the following trust policy as a JSON document called **glue-trust-policy.json** on your computer.

```
{  
    "Version": "2012-10-17",  
    "Statement": [  
        {  
            "Effect": "Allow",  
            "Principal": {  
                "Service": "glue.amazonaws.com"  
            },  
            "Action": "sts:AssumeRole"  
        }  
    ]  
}
```

- b. To create an IAM role, run the following command. Replace `path/` with your local computer's path to the JSON document.

```
aws iam create-role --role-name glue-access-role  
--assume-role-policy-document file://path/glue-trust-policy.json
```

- c. When the AWS CLI lists the Amazon Resource Number (ARN) for the new role, copy and save it to a text editor.
- d. Save the following IAM policy as a JSON document called `glue-access-policy.json` on your computer. The policy grants AWS Glue permission to crawl your results folders.

```
{  
    "Version": "2012-10-17",  
    "Statement": [  
        {  
            "Effect": "Allow",  
            "Action": [  
                "s3:GetObject",  
                "s3:PutObject"  
            ],  
            "Resource": [  
                "arn:aws:s3:::DOC-EXAMPLE-BUCKET/sentiment-results*",  
                "arn:aws:s3:::DOC-EXAMPLE-BUCKET/entities-results*"  
            ]  
        }  
    ]  
}
```

- e. To create the IAM policy, run the following command. Replace `path/` with your local computer's path to the JSON document.

```
aws iam create-policy --policy-name glue-access-policy  
--policy-document file://path/glue-access-policy.json
```

- f. When the AWS CLI lists the access policy's ARN, copy and save it to a text editor.
- g. Attach the new policy to the IAM role by running the following command. Replace `policy-arn` with the IAM policy ARN you copied in the previous step.

```
aws iam attach-role-policy --policy-arn policy-arn  
--role-name glue-access-role
```

- h. Attach the AWS managed policy `AWSGlueServiceRole` to your IAM role by running the following command.

```
aws iam attach-role-policy --policy-arn  
arn:aws:iam::aws:policy/service-role/AWSGlueServiceRole  
--role-name glue-access-role
```

2. Create an AWS Glue database by running the following command.

```
aws glue create-database  
--database-input Name="comprehend-results"
```

3. Create a new AWS Glue crawler by running the following command. Replace `glue-iam-role-arn` with the ARN of your AWS Glue IAM role.

```
aws glue create-crawler  
--name comprehend-analysis-crawler  
--role glue-iam-role-arn
```

```
--targets S3Targets=[  
{Path="s3://DOC-EXAMPLE-BUCKET/sentiment-results"},  
{Path="s3://DOC-EXAMPLE-BUCKET/entities-results"}]  
--database-name comprehend-results
```

4. Start the crawler by running the following command.

```
aws glue start-crawler --name comprehend-analysis-crawler
```

It can take a few minutes for the crawler to finish.

## Prepare the data for analysis

Now you have a database populated with the Amazon Comprehend results. However, the results are nested. To unnest them, you run a few SQL statements in Amazon Athena. Amazon Athena is an interactive query service that makes it easy to analyze data in Amazon S3 using standard SQL. Athena is serverless, so there is no infrastructure to manage and it has a pay-per-query pricing model. In this step, you create new tables of cleaned data that you can use for analysis and visualization. You use the Athena console to prepare the data.

### To prepare the data

1. Open the Athena console at <https://console.aws.amazon.com/athena/>.
2. In the query editor, choose **Settings**, then choose **Manage**.
3. For **Location of query results**, enter `s3://DOC-EXAMPLE-BUCKET/query-results/`. This creates a new folder called `query-results` in your bucket that stores the output of the Amazon Athena queries you run. Choose **Save**.
4. In the query editor, choose **Editor**.
5. For **Database**, choose the AWS Glue database `comprehend-results` that you created.
6. In the **Tables** section, you should have two tables called `sentiment_results` and `entities_results`. Preview the tables to make sure that the crawler loaded the data. In each table's options (the three dots next to the table name), choose **Preview table**. A short query runs automatically. Check the **Results** pane to ensure that the tables contain data.

#### Tip

If the tables don't have any data, try checking the folders in your S3 bucket. Make sure that there is one folder for entities results and one folder for sentiment results. Then, try running a new AWS Glue crawler.

7. To unnest the `sentiment_results` table, enter the following query in the **Query editor** and choose **Run**.

```
CREATE TABLE sentiment_results_final AS  
SELECT file, line, sentiment,  
sentimentscore.mixed AS mixed,  
sentimentscore.negative AS negative,  
sentimentscore.neutral AS neutral,  
sentimentscore.positive AS positive  
FROM sentiment_results
```

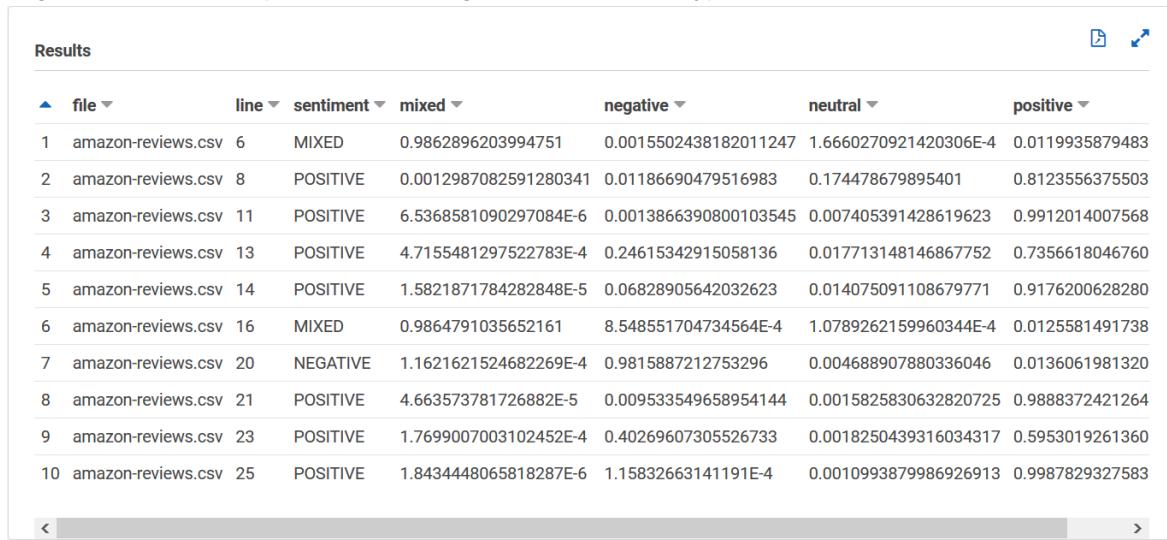
8. To begin unnesting the `entities` table, enter the following query in the **Query editor** and choose **Run**.

```
CREATE TABLE entities_results_1 AS  
SELECT file, line, nested FROM entities_results  
CROSS JOIN UNNEST(entities) as t(nested)
```

9. To finish unnesting the entities table, enter the following query in the **Query editor** and choose **Run query**.

```
CREATE TABLE entities_results_final AS
SELECT file, line,
nested.beginoffset AS beginoffset,
nested.endoffset AS endoffset,
nested.score AS score,
nested.text AS entity,
nested.type AS category
FROM entities_results_1
```

Your **sentiment\_results\_final** table should look like the following, with columns named **file**, **line**, **sentiment**, **mixed**, **negative**, **neutral**, and **positive**. The table should have one value per cell. The **sentiment** column describes the most likely overall sentiment of a particular review. The **mixed**, **negative**, **neutral**, and **positive** columns give scores for each type of sentiment.



The screenshot shows the AWS Lambda function configuration interface. The 'Code' tab is selected, displaying the Lambda function code editor. The code editor contains the SQL query provided in the previous step.

Results							
	file	line	sentiment	mixed	negative	neutral	positive
1	amazon-reviews.csv	6	MIXED	0.9862896203994751	0.0015502438182011247	1.6660270921420306E-4	0.0119935879483
2	amazon-reviews.csv	8	POSITIVE	0.0012987082591280341	0.01186690479516983	0.174478679895401	0.8123556375503
3	amazon-reviews.csv	11	POSITIVE	6.5368581090297084E-6	0.0013866390800103545	0.007405391428619623	0.9912014007568
4	amazon-reviews.csv	13	POSITIVE	4.7155481297522783E-4	0.24615342915058136	0.017713148146867752	0.7356618046760
5	amazon-reviews.csv	14	POSITIVE	1.5821871784282848E-5	0.06828905642032623	0.014075091108679771	0.9176200628280
6	amazon-reviews.csv	16	MIXED	0.9864791035652161	8.548551704734564E-4	1.0789262159960344E-4	0.0125581491738
7	amazon-reviews.csv	20	NEGATIVE	1.1621621524682269E-4	0.9815887212753296	0.004688907880336046	0.0136061981320
8	amazon-reviews.csv	21	POSITIVE	4.663573781726882E-5	0.009533549658954144	0.0015825830632820725	0.9888372421264
9	amazon-reviews.csv	23	POSITIVE	1.7699007003102452E-4	0.40269607305526733	0.0018250439316034317	0.5953019261360
10	amazon-reviews.csv	25	POSITIVE	1.8434448065818287E-6	1.15832663141191E-4	0.0010993879986926913	0.9987829327583

Your **entities\_results\_final** table should look like the following, with columns named **file**, **line**, **beginoffset**, **endoffset**, **score**, **entity**, and **category**. The table should have one value per cell. The **score** column indicates Amazon Comprehend's confidence in the **entity** it detected. The **category** indicates what kind of entity Comprehend detected.

Results							
file	line	beginoffset	endoffset	score	entity	category	
1	amazon-reviews.csv	0	15	22	0.9885989378545348	English	OTHER
2	amazon-reviews.csv	2	24	28	0.9699371997593782	2 me	QUANTITY
3	amazon-reviews.csv	2	94	95	0.6523066984191679	2	QUANTITY
4	amazon-reviews.csv	2	125	126	0.713791396412543	2	QUANTITY
5	amazon-reviews.csv	4	30	36	0.9957169942979278	kindle	COMMERCIAL_ITEM
6	amazon-reviews.csv	5	1	10	0.9979111763962706	Hawthorne	PERSON
7	amazon-reviews.csv	5	135	142	0.5065408081314243	Puritan	OTHER
8	amazon-reviews.csv	5	143	148	0.7702269458801602	Salem	LOCATION
9	amazon-reviews.csv	5	211	229	0.999675563687763	The Scarlet Letter	TITLE
10	amazon-reviews.csv	5	233	236	0.8944631322676461	one	QUANTITY

Now that you have the Amazon Comprehend results loaded into tables, you can visualize and extract meaningful insights from the data.

## Step 5: Visualizing Amazon Comprehend output in Amazon QuickSight

After storing the Amazon Comprehend results in tables, you can connect to and visualize the data with Amazon QuickSight. Amazon QuickSight is an AWS managed business intelligence (BI) tool for visualizing data. Amazon QuickSight makes it easy to connect to your data source and create powerful visuals. In this step, you connect Amazon QuickSight to your data, create visualizations that extract insights from the data, and publish a dashboard of visualizations.

### Topics

- [Prerequisites \(p. 245\)](#)
- [Give Amazon QuickSight access \(p. 245\)](#)
- [Import the datasets \(p. 246\)](#)
- [Create a sentiment visualization \(p. 246\)](#)
- [Create an entities visualization \(p. 247\)](#)
- [Publish a dashboard \(p. 248\)](#)
- [Clean up \(p. 249\)](#)

## Prerequisites

Before you begin, complete [Step 4: Preparing the Amazon Comprehend output for data visualization \(p. 237\)](#).

## Give Amazon QuickSight access

To import the data, Amazon QuickSight requires access to your Amazon Simple Storage Service (Amazon S3) bucket and Amazon Athena tables. To give Amazon QuickSight access to your data, you must be signed in as a QuickSight administrator and have access to edit the resource permissions. If you are unable to complete the following steps, review the IAM prerequisites from the overview page [Tutorial: Analyzing insights from customer reviews with Amazon Comprehend \(p. 226\)](#).

## To give Amazon QuickSight access to your data

1. Open the [Amazon QuickSight console](#).
2. If this is the first time you have used Amazon QuickSight, the console prompts you to create a new administrator user by providing an email address. For **Email address**, enter the same email address as your AWS account. Choose **Continue**.
3. After signing in, choose your profile name in the navigation bar and choose **Manage QuickSight**. You must be signed in as an administrator to view the **Manage QuickSight** option.
4. Choose **Security and permissions**.
5. For **QuickSight access to AWS services**, choose **Add or remove**.
6. Choose **Amazon S3**.
7. From **Select Amazon S3 buckets**, choose your S3 bucket for both **S3 Bucket** and **Write permissions for Athena Workgroup**.
8. Choose **Finish**.
9. Choose **Update**.

## Import the datasets

Before creating visualizations, you must add the sentiment and entities datasets to Amazon QuickSight. You do this with the Amazon QuickSight console. You import your unnested sentiment and unnested entities tables from Amazon Athena.

### To import your datasets

1. Open the [Amazon QuickSight console](#).
2. In the navigation bar, in **Datasets**, choose **New dataset**.
3. For **Create a Data Set**, choose **Athena**.
4. For **Data source name**, enter `reviews-sentiment-analysis` and choose **Create data source**.
5. For **Database**, choose the database `comprehend-results`.
6. For **Tables**, choose the sentiment table `sentiment_results_final` and then choose **Select**.
7. Choose **Import to SPICE for quicker analytics** and choose **Visualize**. SPICE is QuickSight's in-memory calculation engine that provides faster analyses than direct querying when creating visualizations.
8. Return to the Amazon QuickSight console and choose **Datasets**. Repeat steps 1-7 to create an entities dataset, but make the following changes:
  - a. For **Data source name**, enter `reviews-entities-analysis`.
  - b. For **Tables**, choose the entities table `entities_results_final`.

## Create a sentiment visualization

Now that you can access your data in Amazon QuickSight, you can begin creating visualizations. You create a pie chart with the Amazon Comprehend sentiment data. The pie chart shows what proportion of the reviews are positive, neutral, mixed, and negative.

### To visualize sentiment data

1. In the Amazon QuickSight console, choose **Analyses** and then choose **New analysis**.
2. From **Your Data Sets**, choose the sentiment dataset `sentiment_results_final` and then choose **Create analysis**.

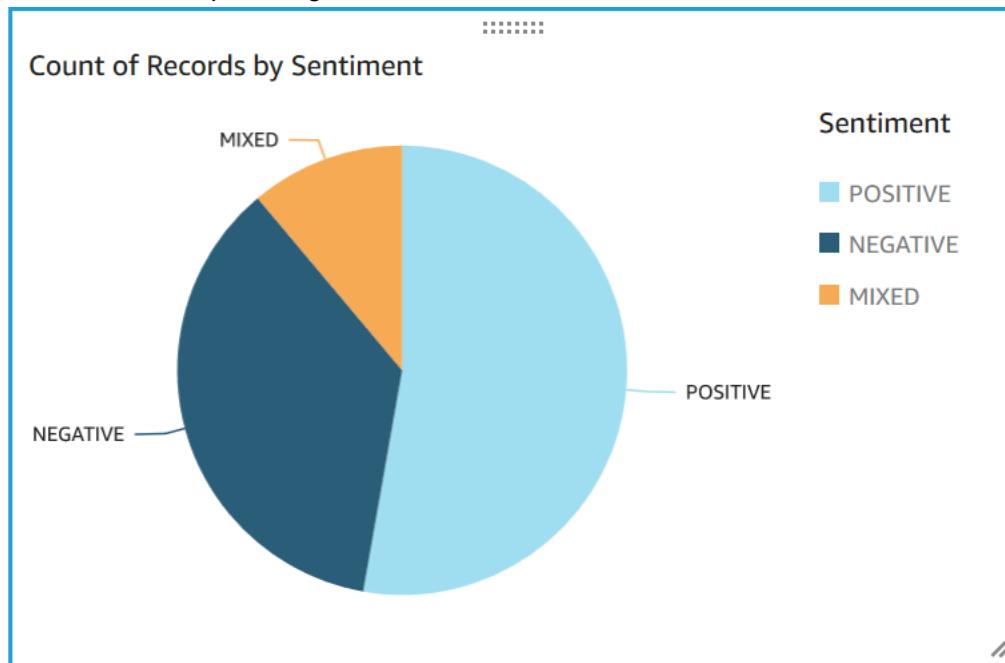
3. In the visual editor, in **Fields list**, choose **sentiment**.

**Note**

The values in the **Fields list** depend on the column names you used to create the tables in Amazon Athena. If you changed the provided column names in the SQL queries, the **Fields list** names will be different than the names used in these visualization examples.

4. For **Visual types**, choose **Pie chart**.

A pie chart similar to the following with positive, neutral, mixed, and negative sections is displayed. To see the count and percentage of a section, hover over it.



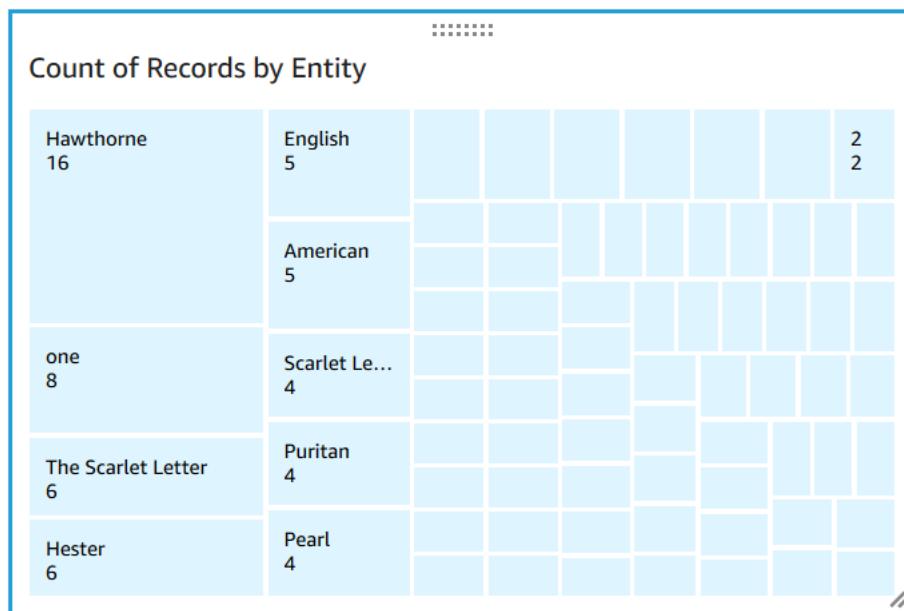
## Create an entities visualization

Now create a second visualization with the entities dataset. You create a tree map of the distinct entities in the data. Each block in the tree map represents an entity, and the size of the block correlates to the number of times that the entity appears in the dataset.

### To visualize entities data

1. In the **Visualize** control pane, next to **Data set**, choose the **Add, edit, replace, and remove data sets** icon.
2. Choose **Add data set**.
3. For **Choose data set to add**, choose your entities dataset `entities_results_final` from the list of datasets and choose **Select**.
4. In the **Visualize** control pane, choose the **Data set** drop down menu and choose the entities dataset `entities_results_final`.
5. In **Fields list**, choose **entity**.
6. For **Visual types**, choose **Tree map**.

A tree map similar to the following is displayed next to your pie chart. To see the count of a specific entity, hover over a block.



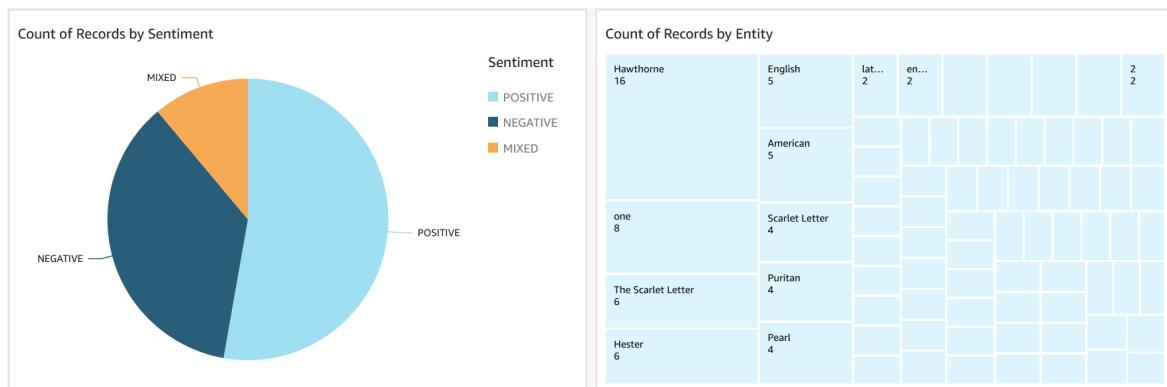
## Publish a dashboard

After creating the visualizations, you can publish them as a dashboard. You can perform various tasks with a dashboard, such as sharing it with users in your AWS account, saving it as a PDF, or emailing it as a report (limited to the Enterprise edition of Amazon QuickSight). In this step, you publish the visualizations as a dashboard in your account.

### To publish your dashboard

1. In the navigation bar, choose **Share**.
2. Choose **Publish dashboard**.
3. Choose **Publish new dashboard as** and enter the name `comprehend-analysis-reviews` for the dashboard.
4. Choose **Publish dashboard**.
5. Close the **Share dashboard with users** pane by choosing the close button in the upper-right corner.
6. In the Amazon QuickSight console, in the navigation pane, choose **Dashboards**. A thumbnail of your new dashboard `comprehend-analysis-reviews` should appear under **Dashboards**. Choose the dashboard to view it.

You now have a dashboard with sentiment and entities visualizations that looks similar to the following example.



### Tip

If you want to edit the visualizations in your dashboard, return to [Analyses](#) and edit the visualization that you want to update. Then, publish the dashboard again either as a new dashboard or as a replacement of the existing dashboard.

## Clean up

After completing this tutorial, you might want to clean up any AWS resources you no longer want to use. Active AWS resources can continue to incur charges in your account.

The following actions can help prevent incurring ongoing charges:

- Cancel your Amazon QuickSight subscription. Amazon QuickSight is a monthly subscription service. To cancel your subscription, see [Canceling your subscription](#) in the *Amazon QuickSight User Guide*.
- Delete your Amazon S3 bucket. Amazon S3 charges you for storage. To clean up your Amazon S3 resources, delete your bucket. For information about deleting a bucket, see [How do I delete an S3 Bucket?](#) in the *Amazon Simple Storage Service User Guide*. Make sure that you save all of your important files before deleting your bucket.
- Clear your AWS Glue Data Catalog. The AWS Glue Data Catalog charges you monthly for storage. You can delete your databases to prevent incurring ongoing charges. For information about managing your AWS Glue Data Catalog databases, see [Working with databases on the AWS Glue console](#) in the *AWS Glue Developer Guide*. Make sure that you export your data before clearing any databases or tables.

## Using Amazon S3 object Lambda access points for personally identifiable information (PII)

Use Amazon S3 Object Lambda Access Points for personally identifiable information (PII) to configure how documents are retrieved from your Amazon S3 bucket. You can control access to documents that contain PII and redact PII from documents. For more information on how Amazon Comprehend can detect PII in your documents, see [Detecting PII entities \(p. 83\)](#). Amazon S3 Object Lambda Access Points use AWS Lambda functions to automatically transform the output of a standard Amazon S3 GET request. For more information see, [Transforming objects with S3 object Lambda](#) in the *Amazon Simple Storage Service User Guide*.

When you create an Amazon S3 Object Lambda Access Point for PII, documents are processed using Amazon Comprehend Lambda functions to control access of documents that contain PII and redact PII from documents.

When you create an Amazon S3 Object Lambda Access Point for PII, documents are processed using the following Amazon Comprehend Lambda functions:

- [ComprehendPiiAccessControlS3ObjectLambda](#) - Controls access to documents with PII stored in your S3 bucket. For more information about this Lambda function, sign in to the AWS Management Console to view the [ComprehendPiiAccessControlS3ObjectLambda](#) function in the AWS Serverless Application Repository.
- [ComprehendPiiRedactionS3ObjectLambda](#) - Redacts PII from documents in your Amazon S3 bucket. For more information about this Lambda function, sign in to the AWS Management Console to view the [ComprehendPiiRedactionS3ObjectLambda](#) function in the AWS Serverless Application Repository.

For information about how to deploy serverless applications from the AWS Serverless Application Repository, see [Deploying applications](#) in the *AWS Serverless Application Repository Developer Guide*.

#### Topics

- [Controlling access to documents with personally identifiable information \(PII\) \(p. 250\)](#)
- [Redacting personally identifiable information \(PII\) from documents \(p. 251\)](#)

## Controlling access to documents with personally identifiable information (PII)

You can use an Amazon S3 Object Lambda Access Point to control access to documents with personally identifiable information (PII).

To ensure that only authorized users have access to documents that contain PII stored in your Amazon S3 bucket, you use the [ComprehendPiiAccessControlS3ObjectLambda](#) function. This Lambda function uses the [ContainsPiiEntities \(p. 275\)](#) operation when processing a standard Amazon S3 GET request on document objects.

For example, if you have documents in your S3 bucket that include PII such as credit card numbers or bank account information, you can configure the [ComprehendPiiAccessControlS3ObjectLambda](#) function to detect these PII entity types and restrict access to unauthorized users. For more information about supported PII entity types, see [PII universal entity types \(p. 84\)](#).

For more information about this Lambda function, sign in to the AWS Management Console to view the [ComprehendPiiAccessControlS3ObjectLambda](#) function in the AWS Serverless Application Repository.

## Creating an Amazon S3 object Lambda access point to control access to documents

The following example creates an Amazon S3 Object Lambda Access Point to control access to documents that contain social security numbers.

### Creating an Amazon S3 object Lambda access point using the AWS Command Line Interface

Create an Amazon S3 Object Lambda Access Point configuration and save the configuration in a file called **config.json**.

```
{  
    "SupportingAccessPoint": "s3-default-access-point-name-arn",  
    "TransformationConfigurations": [  
        {  
            "Actions": [
```

```
        "s3:GetObject"
    ],
    "ContentTransformation": {
        "AwsLambda": {
            "FunctionArn": "comprehend-pii-access-control-s3-object-lambda-arn",
            "FunctionPayload": "{\"pii_entities_types\": \"SSN\"}"
        }
    }
}
```

The following example creates an Amazon S3 Object Lambda Access Point based on the configuration defined in the `config.json` file.

The example is formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

```
aws s3control create-banner-access-point \
--region region \
--account-id account-id \
--name s3-object-lambda-access-point \
--configuration file://config.json
```

## Invoking an Amazon S3 object Lambda access point to control access to documents

The following example invokes an Amazon S3 Object Lambda Access Point to control access to documents.

### Invoking an Amazon S3 object Lambda access point using the AWS Command Line Interface

The following example invokes an Amazon S3 Object Lambda Access Point using the AWS CLI.

The example is formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

```
aws s3api get-object \
--region region \
--bucket s3-object-lambda-access-point-name-arn \
--key object-prefix-key output-file-name
```

## Redacting personally identifiable information (PII) from documents

You can use an Amazon S3 Object Lambda Access Point to redact personally identifiable information (PII) from documents.

To redact PII entity types from documents stored in an S3 bucket, you use the `ComprehendPiiRedactionS3ObjectLambda` function. This Lambda function uses the [ContainsPiiEntities \(p. 275\)](#) and [DetectPiiEntities \(p. 348\)](#) operations when processing a standard Amazon S3 GET request on document objects.

For example, if documents in your S3 bucket include PII such as credit card numbers or bank account information, you can configure the `ComprehendPiiRedactionS3ObjectLambda` function to detect PII

and then return a copy of these documents in which PII entity types are redacted. For more information about supported PII entity types, see [PII universal entity types \(p. 84\)](#).

For more information about this Lambda function, sign in to the AWS Management Console to view the [ComprehendPiiRedactionS3ObjectLambda](#) function in the AWS Serverless Application Repository.

## Creating an Amazon S3 object Lambda access point to redact PII from documents

The following example creates an Amazon S3 Object Lambda Access Point to redact credit card numbers from documents.

### Creating an Amazon S3 object Lambda access point using the AWS Command Line Interface

Create an Amazon S3 Object Lambda Access Point configuration and save the configuration in a file called `config.json`.

```
{  
    "SupportingAccessPoint": "s3-default-access-point-name-arn",  
    "TransformationConfigurations": [  
        {  
            "Actions": [  
                "s3:GetObject"  
            ],  
            "ContentTransformation": {  
                "AwsLambda": {  
                    "FunctionArn": "comprehend-pii-redaction-s3-object-lambda-arn",  
                    "FunctionPayload": "{\"pii_entities_types\": \"CREDIT_DEBIT_NUMBER\"}"  
                }  
            }  
        }  
    ]  
}
```

The following example demonstrates creating an Amazon S3 Object Lambda Access Point based on the configuration defined in the `config.json`

The example is formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

```
aws s3control create-access-point-for-object-lambda \  
    --region region \  
    --account-id account-id \  
    --name s3-object-lambda-access-point \  
    --configuration file://config.json
```

## Invoking an Amazon S3 object Lambda access point to redact PII from documents

The following examples invoke an Amazon S3 Object Lambda Access Point to redact PII from documents.

### Invoking an Amazon S3 object Lambda access point using the AWS Command Line Interface

The following example invokes an Amazon S3 Object Lambda Access Point using the AWS CLI.

The example is formatted for Unix, Linux, and macOS. For Windows, replace the backslash (\) Unix continuation character at the end of each line with a caret (^).

```
aws s3api get-object \
--region region \
--bucket s3-object-lambda-access-point-name-arn \
--key object-prefix-key output-file-name
```

## Solution: Analyzing text with Amazon Comprehend and OpenSearch

AWS provides a reference implementation of text analysis using Amazon Comprehend and the OpenSearch service. Amazon Comprehend provides text analysis and OpenSearch provides document indexing, searching, and visualization.

For more information, see [Analyzing text with OpenSearch and Amazon Comprehend](#).

# API reference

This section provides detailed information about the Amazon Comprehend API actions and their parameters.

For information about the IAM access control permissions you need to use this API, see [Using identity-based policies \(IAM policies\) for Amazon Comprehend \(p. 199\)](#).

You can use [AWS SDKs](#) to access Amazon Comprehend APIs using your favorite programming language. The SDKs automatically perform useful tasks for you, such as:

- Cryptographically sign your service requests
- Retry requests
- Handle error responses

The following resources provide additional information about the Amazon Comprehend API.

- [Amazon Web Services General Reference](#)
  - [Amazon Comprehend Endpoints for each region](#).
- [AWS Command Line Interface](#)
  - [Amazon Comprehend CLI commands](#).

## Topics

- [Actions \(p. 254\)](#)
- [Data Types \(p. 473\)](#)
- [Common Parameters \(p. 571\)](#)
- [Common Errors \(p. 573\)](#)

## Actions

The following actions are supported:

- [BatchDetectDominantLanguage \(p. 257\)](#)
- [BatchDetectEntities \(p. 260\)](#)
- [BatchDetectKeyPhrases \(p. 263\)](#)
- [BatchDetectSentiment \(p. 266\)](#)
- [BatchDetectSyntax \(p. 269\)](#)
- [ClassifyDocument \(p. 272\)](#)
- [ContainsPiiEntities \(p. 275\)](#)
- [CreateDocumentClassifier \(p. 277\)](#)
- [CreateEndpoint \(p. 283\)](#)
- [CreateEntityRecognizer \(p. 287\)](#)
- [DeleteDocumentClassifier \(p. 293\)](#)
- [DeleteEndpoint \(p. 295\)](#)
- [DeleteEntityRecognizer \(p. 297\)](#)

- [DeleteResourcePolicy \(p. 299\)](#)
- [DescribeDocumentClassificationJob \(p. 301\)](#)
- [DescribeDocumentClassifier \(p. 304\)](#)
- [DescribeDominantLanguageDetectionJob \(p. 307\)](#)
- [DescribeEndpoint \(p. 310\)](#)
- [DescribeEntitiesDetectionJob \(p. 312\)](#)
- [DescribeEntityRecognizer \(p. 315\)](#)
- [DescribeEventsDetectionJob \(p. 318\)](#)
- [DescribeKeyPhrasesDetectionJob \(p. 320\)](#)
- [DescribePiiEntitiesDetectionJob \(p. 323\)](#)
- [DescribeResourcePolicy \(p. 326\)](#)
- [DescribeSentimentDetectionJob \(p. 329\)](#)
- [DescribeTargetedSentimentDetectionJob \(p. 332\)](#)
- [DescribeTopicsDetectionJob \(p. 335\)](#)
- [DetectDominantLanguage \(p. 338\)](#)
- [DetectEntities \(p. 341\)](#)
- [DetectKeyPhrases \(p. 345\)](#)
- [DetectPiiEntities \(p. 348\)](#)
- [DetectSentiment \(p. 350\)](#)
- [DetectSyntax \(p. 353\)](#)
- [ImportModel \(p. 356\)](#)
- [ListDocumentClassificationJobs \(p. 360\)](#)
- [ListDocumentClassifiers \(p. 363\)](#)
- [ListDocumentClassifierSummaries \(p. 366\)](#)
- [ListDominantLanguageDetectionJobs \(p. 368\)](#)
- [ListEndpoints \(p. 371\)](#)
- [ListEntitiesDetectionJobs \(p. 374\)](#)
- [ListEntityRecognizers \(p. 377\)](#)
- [ListEntityRecognizerSummaries \(p. 381\)](#)
- [ListEventsDetectionJobs \(p. 383\)](#)
- [ListKeyPhrasesDetectionJobs \(p. 386\)](#)
- [ListPiiEntitiesDetectionJobs \(p. 389\)](#)
- [ListSentimentDetectionJobs \(p. 392\)](#)
- [ListTagsForResource \(p. 395\)](#)
- [ListTargetedSentimentDetectionJobs \(p. 397\)](#)
- [ListTopicsDetectionJobs \(p. 400\)](#)
- [PutResourcePolicy \(p. 403\)](#)
- [StartDocumentClassificationJob \(p. 406\)](#)
- [StartDominantLanguageDetectionJob \(p. 411\)](#)
- [StartEntitiesDetectionJob \(p. 416\)](#)
- [StartEventsDetectionJob \(p. 421\)](#)
- [StartKeyPhrasesDetectionJob \(p. 425\)](#)
- [StartPiiEntitiesDetectionJob \(p. 430\)](#)
- [StartSentimentDetectionJob \(p. 434\)](#)
- [StartTargetedSentimentDetectionJob \(p. 439\)](#)
- [StartTopicsDetectionJob \(p. 444\)](#)

- [StopDominantLanguageDetectionJob \(p. 449\)](#)
- [StopEntitiesDetectionJob \(p. 451\)](#)
- [StopEventsDetectionJob \(p. 453\)](#)
- [StopKeyPhrasesDetectionJob \(p. 455\)](#)
- [StopPiiEntitiesDetectionJob \(p. 457\)](#)
- [StopSentimentDetectionJob \(p. 459\)](#)
- [StopTargetedSentimentDetectionJob \(p. 461\)](#)
- [StopTrainingDocumentClassifier \(p. 463\)](#)
- [StopTrainingEntityRecognizer \(p. 465\)](#)
- [TagResource \(p. 467\)](#)
- [UntagResource \(p. 469\)](#)
- [UpdateEndpoint \(p. 471\)](#)

## BatchDetectDominantLanguage

Determines the dominant language of the input text for a batch of documents. For a list of languages that Amazon Comprehend can detect, see [Amazon Comprehend Supported Languages](#).

### Request Syntax

```
{  
    "TextList": [ "string" ]  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### TextList (p. 257)

A list containing the text of the input documents. The list can contain a maximum of 25 documents. Each document should contain at least 20 characters and must contain fewer than 5,000 bytes of UTF-8 encoded characters.

Type: Array of strings

Length Constraints: Minimum length of 1.

Required: Yes

### Response Syntax

```
{  
    "ErrorList": [  
        {  
            "ErrorCode": "string",  
            "ErrorMessage": "string",  
            "Index": number  
        }  
    ],  
    "ResultList": [  
        {  
            "Index": number,  
            "Languages": [  
                {  
                    "LanguageCode": "string",  
                    "Score": number  
                }  
            ]  
        }  
    ]  
}
```

### Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

#### **ErrorList (p. 257)**

A list containing one [BatchItemError \(p. 482\)](#) object for each document that contained an error. The results are sorted in ascending order by the `Index` field and match the order of the documents in the input list. If there are no errors in the batch, the `ErrorList` is empty.

Type: Array of [BatchItemError \(p. 482\)](#) objects

#### **ResultList (p. 257)**

A list of [BatchDetectDominantLanguageItemResult \(p. 477\)](#) objects containing the results of the operation. The results are sorted in ascending order by the `Index` field and match the order of the documents in the input list. If all of the documents contain an error, the `ResultList` is empty.

Type: Array of [BatchDetectDominantLanguageItemResult \(p. 477\)](#) objects

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **BatchSizeLimitExceededException**

The number of documents in the request exceeds the limit of 25. Try your request again with fewer documents.

HTTP Status Code: 400

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **TextSizeLimitExceededException**

The size of the input text exceeds the limit. Use a smaller document.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)

- [AWS SDK for Ruby V3](#)

## BatchDetectEntities

Inspects the text of a batch of documents for named entities and returns information about them. For more information about named entities, see [Entities \(p. 5\)](#)

### Request Syntax

```
{  
    "LanguageCode": "string",  
    "TextList": [ "string" ]  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [LanguageCode \(p. 260\)](#)

The language of the input documents. You can specify any of the primary languages supported by Amazon Comprehend. All documents must be in the same language.

Type: String

Valid Values: en | es | fr | de | it | pt | ar | hi | ja | ko | zh | zh-TW

Required: Yes

#### [TextList \(p. 260\)](#)

A list containing the text of the input documents. The list can contain a maximum of 25 documents. Each document must contain fewer than 5,000 bytes of UTF-8 encoded characters.

Type: Array of strings

Length Constraints: Minimum length of 1.

Required: Yes

### Response Syntax

```
{  
    "ErrorList": [  
        {  
            "ErrorCode": "string",  
            "ErrorMessage": "string",  
            "Index": number  
        }  
    ],  
    "ResultList": [  
        {  
            "Entities": [  
                {  
                    "BeginOffset": number,  
                    "EndOffset": number,  
                    "Score": number,  
                    "Text": "string",  
                    "Type": "string"  
                }  
            ]  
        }  
    ]  
}
```

```
        "Type": "string"
    }
],
"Index": number
}
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### ErrorList (p. 260)

A list containing one [BatchItemError \(p. 482\)](#) object for each document that contained an error. The results are sorted in ascending order by the `Index` field and match the order of the documents in the input list. If there are no errors in the batch, the `ErrorList` is empty.

Type: Array of [BatchItemError \(p. 482\)](#) objects

### ResultList (p. 260)

A list of [BatchDetectEntitiesItemResult \(p. 478\)](#) objects containing the results of the operation. The results are sorted in ascending order by the `Index` field and match the order of the documents in the input list. If all of the documents contain an error, the `ResultList` is empty.

Type: Array of [BatchDetectEntitiesItemResult \(p. 478\)](#) objects

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### BatchSizeLimitExceededException

The number of documents in the request exceeds the limit of 25. Try your request again with fewer documents.

HTTP Status Code: 400

### InternalServerError

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### InvalidRequestException

The request is invalid.

HTTP Status Code: 400

### TextSizeLimitExceededException

The size of the input text exceeds the limit. Use a smaller document.

HTTP Status Code: 400

### UnsupportedLanguageException

Amazon Comprehend can't process the language of the input text. For custom entity recognition APIs, only English, Spanish, French, Italian, German, or Portuguese are accepted. For a list of supported languages, see [Languages supported in Amazon Comprehend \(p. 35\)](#).

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## BatchDetectKeyPhrases

Detects the key noun phrases found in a batch of documents.

### Request Syntax

```
{  
    "LanguageCode": "string",  
    "TextList": [ "string" ]  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [LanguageCode \(p. 263\)](#)

The language of the input documents. You can specify any of the primary languages supported by Amazon Comprehend. All documents must be in the same language.

Type: String

Valid Values: en | es | fr | de | it | pt | ar | hi | ja | ko | zh | zh-TW

Required: Yes

#### [TextList \(p. 263\)](#)

A list containing the text of the input documents. The list can contain a maximum of 25 documents. Each document must contain fewer than 5,000 bytes of UTF-8 encoded characters.

Type: Array of strings

Length Constraints: Minimum length of 1.

Required: Yes

### Response Syntax

```
{  
    "ErrorList": [  
        {  
            "ErrorCode": "string",  
            "ErrorMessage": "string",  
            "Index": number  
        }  
    ],  
    "ResultList": [  
        {  
            "Index": number,  
            "KeyPhrases": [  
                {  
                    "BeginOffset": number,  
                    "EndOffset": number,  
                    "Score": number,  
                    "Text": "string"  
                }  
            ]  
        }  
    ]  
}
```

```
        "Text": "string"
    }
]
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [ErrorList \(p. 263\)](#)

A list containing one [BatchItemError \(p. 482\)](#) object for each document that contained an error. The results are sorted in ascending order by the `Index` field and match the order of the documents in the input list. If there are no errors in the batch, the `ErrorList` is empty.

Type: Array of [BatchItemError \(p. 482\)](#) objects

### [ResultList \(p. 263\)](#)

A list of [BatchDetectKeyPhrasesItemResult \(p. 479\)](#) objects containing the results of the operation. The results are sorted in ascending order by the `Index` field and match the order of the documents in the input list. If all of the documents contain an error, the `ResultList` is empty.

Type: Array of [BatchDetectKeyPhrasesItemResult \(p. 479\)](#) objects

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **BatchSizeLimitExceededException**

The number of documents in the request exceeds the limit of 25. Try your request again with fewer documents.

HTTP Status Code: 400

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **TextSizeLimitExceededException**

The size of the input text exceeds the limit. Use a smaller document.

HTTP Status Code: 400

### **UnsupportedLanguageException**

Amazon Comprehend can't process the language of the input text. For custom entity recognition APIs, only English, Spanish, French, Italian, German, or Portuguese are accepted. For a list of supported languages, see [Languages supported in Amazon Comprehend \(p. 35\)](#).

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## BatchDetectSentiment

Inspects a batch of documents and returns an inference of the prevailing sentiment, POSITIVE, NEUTRAL, MIXED, or NEGATIVE, in each one.

### Request Syntax

```
{  
    "LanguageCode": "string",  
    "TextList": [ "string" ]  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [LanguageCode \(p. 266\)](#)

The language of the input documents. You can specify any of the primary languages supported by Amazon Comprehend. All documents must be in the same language.

Type: String

Valid Values: en | es | fr | de | it | pt | ar | hi | ja | ko | zh | zh-TW

Required: Yes

#### [TextList \(p. 266\)](#)

A list containing the text of the input documents. The list can contain a maximum of 25 documents. Each document must contain fewer than 5,000 bytes of UTF-8 encoded characters.

Type: Array of strings

Length Constraints: Minimum length of 1.

Required: Yes

### Response Syntax

```
{  
    "ErrorList": [  
        {  
            "ErrorCode": "string",  
            "ErrorMessage": "string",  
            "Index": number  
        }  
    ],  
    "ResultList": [  
        {  
            "Index": number,  
            "Sentiment": "string",  
            "SentimentScore": {  
                "Mixed": number,  
                "Negative": number,  
                "Positive": number,  
                "Neutral": number  
            }  
        }  
    ]  
}
```

```
        "Neutral": number,
        "Positive": number
    }
]
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [ErrorList \(p. 266\)](#)

A list containing one [BatchItemError \(p. 482\)](#) object for each document that contained an error. The results are sorted in ascending order by the `Index` field and match the order of the documents in the input list. If there are no errors in the batch, the `ErrorList` is empty.

Type: Array of [BatchItemError \(p. 482\)](#) objects

### [ResultList \(p. 266\)](#)

A list of [BatchDetectSentimentItemResult \(p. 480\)](#) objects containing the results of the operation. The results are sorted in ascending order by the `Index` field and match the order of the documents in the input list. If all of the documents contain an error, the `ResultList` is empty.

Type: Array of [BatchDetectSentimentItemResult \(p. 480\)](#) objects

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **BatchSizeLimitExceededException**

The number of documents in the request exceeds the limit of 25. Try your request again with fewer documents.

HTTP Status Code: 400

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **TextSizeLimitExceededException**

The size of the input text exceeds the limit. Use a smaller document.

HTTP Status Code: 400

### **UnsupportedLanguageException**

Amazon Comprehend can't process the language of the input text. For custom entity recognition APIs, only English, Spanish, French, Italian, German, or Portuguese are accepted. For a list of supported languages, see [Languages supported in Amazon Comprehend \(p. 35\)](#).

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## BatchDetectSyntax

Inspects the text of a batch of documents for the syntax and part of speech of the words in the document and returns information about them. For more information, see [Syntax analysis \(p. 26\)](#).

### Request Syntax

```
{  
    "LanguageCode": "string",  
    "TextList": [ "string" ]  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [LanguageCode \(p. 269\)](#)

The language of the input documents. You can specify any of the following languages supported by Amazon Comprehend: German ("de"), English ("en"), Spanish ("es"), French ("fr"), Italian ("it"), or Portuguese ("pt"). All documents must be in the same language.

Type: String

Valid Values: en | es | fr | de | it | pt

Required: Yes

#### [TextList \(p. 269\)](#)

A list containing the text of the input documents. The list can contain a maximum of 25 documents. Each document must contain fewer than 5,000 bytes of UTF-8 encoded characters.

Type: Array of strings

Length Constraints: Minimum length of 1.

Required: Yes

### Response Syntax

```
{  
    "ErrorList": [  
        {  
            "ErrorCode": "string",  
            "ErrorMessage": "string",  
            "Index": number  
        }  
    ],  
    "ResultList": [  
        {  
            "Index": number,  
            "SyntaxTokens": [  
                {  
                    "BeginOffset": number,  
                    "EndOffset": number,  
                    "Text": "string"  
                }  
            ]  
        }  
    ]  
}
```

```
        "EndOffset": number,
        "PartOfSpeech": {
            "Score": number,
            "Tag": "string"
        },
        "Text": "string",
        "TokenId": number
    }
}
]
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [ErrorList \(p. 269\)](#)

A list containing one [BatchItemError \(p. 482\)](#) object for each document that contained an error. The results are sorted in ascending order by the `Index` field and match the order of the documents in the input list. If there are no errors in the batch, the `ErrorList` is empty.

Type: Array of [BatchItemError \(p. 482\)](#) objects

### [ResultList \(p. 269\)](#)

A list of [BatchDetectSyntaxItemResult \(p. 481\)](#) objects containing the results of the operation. The results are sorted in ascending order by the `Index` field and match the order of the documents in the input list. If all of the documents contain an error, the `ResultList` is empty.

Type: Array of [BatchDetectSyntaxItemResult \(p. 481\)](#) objects

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **BatchSizeLimitExceededException**

The number of documents in the request exceeds the limit of 25. Try your request again with fewer documents.

HTTP Status Code: 400

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **TextSizeLimitExceededException**

The size of the input text exceeds the limit. Use a smaller document.

HTTP Status Code: 400

### **UnsupportedLanguageException**

Amazon Comprehend can't process the language of the input text. For custom entity recognition APIs, only English, Spanish, French, Italian, German, or Portuguese are accepted. For a list of supported languages, see [Languages supported in Amazon Comprehend \(p. 35\)](#).

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## ClassifyDocument

Creates a new document classification request to analyze a single document in real-time, using a previously created and trained custom model and an endpoint.

### Request Syntax

```
{  
    "EndpointArn": "string",  
    "Text": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### EndpointArn (p. 272)

The Amazon Resource Number (ARN) of the endpoint. For information about endpoints, see [Managing endpoints](#).

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:document-classifier-endpoint/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*

Required: Yes

#### Text (p. 272)

The document text to be analyzed.

Type: String

Length Constraints: Minimum length of 1.

Required: Yes

### Response Syntax

```
{  
    "Classes": [  
        {  
            "Name": "string",  
            "Score": number  
        }  
    ],  
    "Labels": [  
        {  
            "Name": "string",  
            "Score": number  
        }  
    ]  
}
```

}

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### **Classes (p. 272)**

The classes used by the document being analyzed. These are used for multi-class trained models. Individual classes are mutually exclusive and each document is expected to have only a single class assigned to it. For example, an animal can be a dog or a cat, but not both at the same time.

Type: Array of [DocumentClass \(p. 486\)](#) objects

### **Labels (p. 272)**

The labels used by the document being analyzed. These are used for multi-label trained models. Individual labels represent different categories that are related in some manner and are not mutually exclusive. For example, a movie can be just an action movie, or it can be an action movie, a science fiction movie, and a comedy, all at the same time.

Type: Array of [DocumentLabel \(p. 501\)](#) objects

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **ResourceUnavailableException**

The specified resource is not available. Check the resource and try your request again.

HTTP Status Code: 400

### **TextSizeLimitExceededException**

The size of the input text exceeds the limit. Use a smaller document.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)

- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## ContainsPiiEntities

Analyzes input text for the presence of personally identifiable information (PII) and returns the labels of identified PII entity types such as name, address, bank account number, or phone number.

### Request Syntax

```
{  
    "LanguageCode": "string",  
    "Text": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [LanguageCode \(p. 275\)](#)

The language of the input documents. Currently, English is the only valid language.

Type: String

Valid Values: en

Required: Yes

#### [Text \(p. 275\)](#)

Creates a new document classification request to analyze a single document in real-time, returning personally identifiable information (PII) entity labels.

Type: String

Length Constraints: Minimum length of 1.

Required: Yes

### Response Syntax

```
{  
    "Labels": [  
        {  
            "Name": "string",  
            "Score": number  
        }  
    ]  
}
```

### Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

## Labels (p. 275)

The labels used in the document being analyzed. Individual labels represent personally identifiable information (PII) entity types.

Type: Array of [EntityLabel \(p. 518\)](#) objects

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### InternalServerError

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### InvalidRequestException

The request is invalid.

HTTP Status Code: 400

### TextSizeLimitExceededException

The size of the input text exceeds the limit. Use a smaller document.

HTTP Status Code: 400

### UnsupportedLanguageException

Amazon Comprehend can't process the language of the input text. For custom entity recognition APIs, only English, Spanish, French, Italian, German, or Portuguese are accepted. For a list of supported languages, see [Languages supported in Amazon Comprehend \(p. 35\)](#).

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## CreateDocumentClassifier

Creates a new document classifier that you can use to categorize documents. To create a classifier, you provide a set of training documents that labeled with the categories that you want to use. After the classifier is trained you can use it to categorize a set of labeled documents into the categories. For more information, see [Custom classification \(p. 100\)](#).

### Request Syntax

```
{  
    "ClientRequestToken": "string",  
    "DataAccessRoleArn": "string",  
    "DocumentClassifierName": "string",  
    "InputDataConfig": {  
        "AugmentedManifests": [  
            {  
                "AnnotationDataS3Uri": "string",  
                "AttributeNames": [ "string" ],  
                "DocumentType": "string",  
                "S3Uri": "string",  
                "SourceDocumentsS3Uri": "string",  
                "Split": "string"  
            }  
        ],  
        "DataFormat": "string",  
        "LabelDelimiter": "string",  
        "S3Uri": "string",  
        "TestS3Uri": "string"  
    },  
    "LanguageCode": "string",  
    "Mode": "string",  
    "ModelKmsKeyId": "string",  
    "ModelPolicy": "string",  
    "OutputDataConfig": {  
        "KmsKeyId": "string",  
        "S3Uri": "string"  
    },  
    "Tags": [  
        {  
            "Key": "string",  
            "Value": "string"  
        }  
    ],  
    "VersionName": "string",  
    "VolumeKmsKeyId": "string",  
    "VpcConfig": {  
        "SecurityGroupIds": [ "string" ],  
        "Subnets": [ "string" ]  
    }  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

### [ClientRequestToken \(p. 277\)](#)

A unique identifier for the request. If you don't set the client request token, Amazon Comprehend generates one.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 64.

Pattern: ^[a-zA-Z0-9-]+\$

Required: No

### [DataAccessRoleArn \(p. 277\)](#)

The Amazon Resource Name (ARN) of the AWS Identity and Management (IAM) role that grants Amazon Comprehend read access to your input data.

Type: String

Length Constraints: Minimum length of 20. Maximum length of 2048.

Pattern: arn:aws(-[^:]+)?:iam::[0-9]{12}:role/.+

Required: Yes

### [DocumentClassifierName \(p. 277\)](#)

The name of the document classifier.

Type: String

Length Constraints: Maximum length of 63.

Pattern: ^[a-zA-Z0-9](-\*[a-zA-Z0-9])\*\$

Required: Yes

### [InputDataConfig \(p. 277\)](#)

Specifies the format and location of the input data for the job.

Type: [DocumentClassifierInputDataConfig \(p. 492\)](#) object

Required: Yes

### [LanguageCode \(p. 277\)](#)

The language of the input documents. You can specify any of the following languages supported by Amazon Comprehend: German ("de"), English ("en"), Spanish ("es"), French ("fr"), Italian ("it"), or Portuguese ("pt"). All documents must be in the same language.

Type: String

Valid Values: en | es | fr | de | it | pt

Required: Yes

### [Mode \(p. 277\)](#)

Indicates the mode in which the classifier will be trained. The classifier can be trained in multi-class mode, which identifies one and only one class for each document, or multi-label mode, which identifies one or more labels for each document. In multi-label mode, multiple labels for an individual document are separated by a delimiter. The default delimiter between labels is a pipe (|).

Type: String

Valid Values: MULTI\_CLASS | MULTI\_LABEL

Required: No

#### [ModelKmsKeyId \(p. 277\)](#)

ID for the AWS Key Management Service (KMS) key that Amazon Comprehend uses to encrypt trained custom models. The ModelKmsKeyId can be either of the following formats:

- KMS Key ID: "1234abcd-12ab-34cd-56ef-1234567890ab"
- Amazon Resource Name (ARN) of a KMS Key: "arn:aws:kms:us-west-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab"

Type: String

Length Constraints: Maximum length of 2048.

Pattern: ^\p{ASCII}+\$

Required: No

#### [ModelPolicy \(p. 277\)](#)

The resource-based policy to attach to your custom document classifier model. You can use this policy to allow another AWS account to import your custom model.

Provide your policy as a JSON body that you enter as a UTF-8 encoded string without line breaks. To provide valid JSON, enclose the attribute names and values in double quotes. If the JSON body is also enclosed in double quotes, then you must escape the double quotes that are inside the policy:

```
"{\\"attribute\\": \\"value\\", \\"attribute\\": [\"value\"]}"
```

To avoid escaping quotes, you can use single quotes to enclose the policy and double quotes to enclose the JSON names and values:

```
'{"attribute": "value", "attribute": ["value"]}'
```

Type: String

Length Constraints: Minimum length of 1. Maximum length of 20000.

Pattern: [\u0009\u000A\u000D\u0020-\u00FF]+

Required: No

#### [OutputDataConfig \(p. 277\)](#)

Enables the addition of output results configuration parameters for custom classifier jobs.

Type: [DocumentClassifierOutputDataConfig \(p. 494\)](#) object

Required: No

#### [Tags \(p. 277\)](#)

Tags to be associated with the document classifier being created. A tag is a key-value pair that adds as a metadata to a resource used by Amazon Comprehend. For example, a tag with "Sales" as the key might be added to a resource to indicate its use by the sales department.

Type: Array of [Tag \(p. 562\)](#) objects

Required: No

### [VersionName \(p. 277\)](#)

The version name given to the newly created classifier. Version names can have a maximum of 256 characters. Alphanumeric characters, hyphens (-) and underscores (\_) are allowed. The version name must be unique among all models with the same classifier name in the account/AWS Region.

Type: String

Length Constraints: Maximum length of 63.

Pattern: ^[a-zA-Z0-9](-\*[a-zA-Z0-9])\*\$

Required: No

### [VolumeKmsKeyId \(p. 277\)](#)

ID for the AWS Key Management Service (KMS) key that Amazon Comprehend uses to encrypt data on the storage volume attached to the ML compute instance(s) that process the analysis job. The VolumeKmsKeyId can be either of the following formats:

- KMS Key ID: "1234abcd-12ab-34cd-56ef-1234567890ab"
- Amazon Resource Name (ARN) of a KMS Key: "arn:aws:kms:us-west-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab"

Type: String

Length Constraints: Maximum length of 2048.

Pattern: ^\p{ASCII}+\$

Required: No

### [VpcConfig \(p. 277\)](#)

Configuration parameters for an optional private Virtual Private Cloud (VPC) containing the resources you are using for your custom classifier. For more information, see [Amazon VPC](#).

Type: [VpcConfig \(p. 571\)](#) object

Required: No

## Response Syntax

```
{  
    "DocumentClassifierArn": "string"  
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [DocumentClassifierArn \(p. 280\)](#)

The Amazon Resource Name (ARN) that identifies the document classifier.

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:document-classifier/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*?)?

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **KmsKeyValidationException**

The KMS customer managed key (CMK) entered cannot be validated. Verify the key and re-enter it.

HTTP Status Code: 400

### **ResourceInUseException**

The specified resource name is already in use. Use a different name and try your request again.

HTTP Status Code: 400

### **ResourceLimitExceededException**

The maximum number of resources per account has been exceeded. Review the resources, and then try your request again.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

### **TooManyTagsException**

The request contains more tags than can be associated with a resource (50 tags per resource). The maximum number of tags includes both existing tags and those included in your current request.

HTTP Status Code: 400

### **UnsupportedLanguageException**

Amazon Comprehend can't process the language of the input text. For custom entity recognition APIs, only English, Spanish, French, Italian, German, or Portuguese are accepted. For a list of supported languages, see [Languages supported in Amazon Comprehend \(p. 35\)](#).

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## CreateEndpoint

Creates a model-specific endpoint for synchronous inference for a previously trained custom model. For information about endpoints, see [Managing endpoints](#).

### Request Syntax

```
{  
    "ClientRequestToken": "string",  
    "DataAccessRoleArn": "string",  
    "DesiredInferenceUnits": number,  
    "EndpointName": "string",  
    "ModelArn": "string",  
    "Tags": [  
        {  
            "Key": "string",  
            "Value": "string"  
        }  
    ]  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [ClientRequestToken \(p. 283\)](#)

An idempotency token provided by the customer. If this token matches a previous endpoint creation request, Amazon Comprehend will not return a `ResourceInUseException`.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 64.

Pattern: `^[a-zA-Z0-9-]+$`

Required: No

#### [DataAccessRoleArn \(p. 283\)](#)

The Amazon Resource Name (ARN) of the AWS Identity and Access Management (IAM) role that grants Amazon Comprehend read access to trained custom models encrypted with a customer managed key (`ModelKmsKeyId`).

Type: String

Length Constraints: Minimum length of 20. Maximum length of 2048.

Pattern: `arn:aws(-[^:]+)?:iam::[0-9]{12}:role/.+`

Required: No

#### [DesiredInferenceUnits \(p. 283\)](#)

The desired number of inference units to be used by the model using this endpoint. Each inference unit represents of a throughput of 100 characters per second.

Type: Integer

Valid Range: Minimum value of 1.

Required: Yes

#### [EndpointName \(p. 283\)](#)

This is the descriptive suffix that becomes part of the `EndpointArn` used for all subsequent requests to this resource.

Type: String

Length Constraints: Maximum length of 40.

Pattern: `^[a-zA-Z0-9](-*[a-zA-Z0-9])*$`

Required: Yes

#### [ModelArn \(p. 283\)](#)

The Amazon Resource Number (ARN) of the model to which the endpoint will be attached.

Type: String

Length Constraints: Maximum length of 256.

Pattern: `arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]*:[0-9]{12}:(document-classifier|entity-recognizer)/[a-zA-Z0-9](-*[a-zA-Z0-9])*(/version/[a-zA-Z0-9](-*[a-zA-Z0-9])*)?`

Required: Yes

#### [Tags \(p. 283\)](#)

Tags associated with the endpoint being created. A tag is a key-value pair that adds metadata to the endpoint. For example, a tag with "Sales" as the key might be added to an endpoint to indicate its use by the sales department.

Type: Array of [Tag \(p. 562\)](#) objects

Required: No

## Response Syntax

```
{  
    "EndpointArn": "string"  
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

#### [EndpointArn \(p. 284\)](#)

The Amazon Resource Number (ARN) of the endpoint being created.

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:(document-classifier-endpoint|entity-recognizer-endpoint)/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **ResourceInUseException**

The specified resource name is already in use. Use a different name and try your request again.

HTTP Status Code: 400

### **ResourceLimitExceededException**

The maximum number of resources per account has been exceeded. Review the resources, and then try your request again.

HTTP Status Code: 400

### **ResourceNotFoundException**

The specified resource ARN was not found. Check the ARN and try your request again.

HTTP Status Code: 400

### **ResourceUnavailableException**

The specified resource is not available. Check the resource and try your request again.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

### **TooManyTagsException**

The request contains more tags than can be associated with a resource (50 tags per resource). The maximum number of tags includes both existing tags and those included in your current request.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## CreateEntityRecognizer

Creates an entity recognizer using submitted files. After your `CreateEntityRecognizer` request is submitted, you can check job status using the [DescribeEntityRecognizer \(p. 315\)](#) API.

### Request Syntax

```
{  
    "ClientRequestToken": "string",  
    "DataAccessRoleArn": "string",  
    "InputDataConfig": {  
        "Annotations": {  
            "S3Uri": "string",  
            "TestS3Uri": "string"  
        },  
        "AugmentedManifests": [  
            {  
                "AnnotationDataS3Uri": "string",  
                "AttributeNames": [ "string" ],  
                "DocumentType": "string",  
                "S3Uri": "string",  
                "SourceDocumentsS3Uri": "string",  
                "Split": "string"  
            }  
        ],  
        "DataFormat": "string",  
        "Documents": {  
            "InputFormat": "string",  
            "S3Uri": "string",  
            "TestS3Uri": "string"  
        },  
        "EntityList": {  
            "S3Uri": "string"  
        },  
        "EntityType": [  
            {  
                "Type": "string"  
            }  
        ]  
    },  
    "LanguageCode": "string",  
    "ModelKmsKeyId": "string",  
    "ModelPolicy": "string",  
    "RecognizerName": "string",  
    "Tags": [  
        {  
            "Key": "string",  
            "Value": "string"  
        }  
    ],  
    "VersionName": "string",  
    "VolumeKmsKeyId": "string",  
    "VpcConfig": {  
        "SecurityGroupIds": [ "string" ],  
        "Subnets": [ "string" ]  
    }  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [ClientRequestToken \(p. 287\)](#)

A unique identifier for the request. If you don't set the client request token, Amazon Comprehend generates one.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 64.

Pattern: ^[a-zA-Z0-9-]+\$

Required: No

#### [DataAccessRoleArn \(p. 287\)](#)

The Amazon Resource Name (ARN) of the AWS Identity and Management (IAM) role that grants Amazon Comprehend read access to your input data.

Type: String

Length Constraints: Minimum length of 20. Maximum length of 2048.

Pattern: arn:aws(-[^:]+)?:iam::[0-9]{12}:role/.+

Required: Yes

#### [InputDataConfig \(p. 287\)](#)

Specifies the format and location of the input data. The S3 bucket containing the input data must be located in the same region as the entity recognizer being created.

Type: [EntityRecognizerInputDataConfig \(p. 524\)](#) object

Required: Yes

#### [LanguageCode \(p. 287\)](#)

You can specify any of the following languages supported by Amazon Comprehend: English ("en"), Spanish ("es"), French ("fr"), Italian ("it"), German ("de"), or Portuguese ("pt"). All documents must be in the same language.

Type: String

Valid Values: en | es | fr | it | de | pt

Required: Yes

#### [ModelKmsKeyId \(p. 287\)](#)

ID for the AWS Key Management Service (KMS) key that Amazon Comprehend uses to encrypt trained custom models. The ModelKmsKeyId can be either of the following formats

- KMS Key ID: "1234abcd-12ab-34cd-56ef-1234567890ab"
- Amazon Resource Name (ARN) of a KMS Key: "arn:aws:kms:us-west-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab"

Type: String

Length Constraints: Maximum length of 2048.

Pattern: ^\p{ASCII}+\$

Required: No

#### [ModelPolicy \(p. 287\)](#)

The JSON resource-based policy to attach to your custom entity recognizer model. You can use this policy to allow another AWS account to import your custom model.

Provide your JSON as a UTF-8 encoded string without line breaks. To provide valid JSON for your policy, enclose the attribute names and values in double quotes. If the JSON body is also enclosed in double quotes, then you must escape the double quotes that are inside the policy:

```
"{\"attribute\": \"value\", \"attribute\": [\"value\"]}"
```

To avoid escaping quotes, you can use single quotes to enclose the policy and double quotes to enclose the JSON names and values:

```
'{"attribute": "value", "attribute": ["value"]}'
```

Type: String

Length Constraints: Minimum length of 1. Maximum length of 20000.

Pattern: [\u0009\u000A\u000D\u0020-\u00FF]+

Required: No

#### [RecognizerName \(p. 287\)](#)

The name given to the newly created recognizer. Recognizer names can be a maximum of 256 characters. Alphanumeric characters, hyphens (-) and underscores (\_) are allowed. The name must be unique in the account/region.

Type: String

Length Constraints: Maximum length of 63.

Pattern: ^[a-zA-Z0-9](-\*[a-zA-Z0-9])\*\$

Required: Yes

#### [Tags \(p. 287\)](#)

Tags to be associated with the entity recognizer being created. A tag is a key-value pair that adds as a metadata to a resource used by Amazon Comprehend. For example, a tag with "Sales" as the key might be added to a resource to indicate its use by the sales department.

Type: Array of [Tag \(p. 562\)](#) objects

Required: No

#### [VersionName \(p. 287\)](#)

The version name given to the newly created recognizer. Version names can be a maximum of 256 characters. Alphanumeric characters, hyphens (-) and underscores (\_) are allowed. The version name must be unique among all models with the same recognizer name in the account/ AWS Region.

Type: String

Length Constraints: Maximum length of 63.

Pattern: ^[a-zA-Z0-9](-\*[a-zA-Z0-9])\*\$

Required: No

### [VolumeKmsKeyId \(p. 287\)](#)

ID for the AWS Key Management Service (KMS) key that Amazon Comprehend uses to encrypt data on the storage volume attached to the ML compute instance(s) that process the analysis job. The VolumeKmsKeyId can be either of the following formats:

- KMS Key ID: "1234abcd-12ab-34cd-56ef-1234567890ab"
- Amazon Resource Name (ARN) of a KMS Key: "arn:aws:kms:us-west-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab"

Type: String

Length Constraints: Maximum length of 2048.

Pattern: ^\p{ASCII}+\$

Required: No

### [VpcConfig \(p. 287\)](#)

Configuration parameters for an optional private Virtual Private Cloud (VPC) containing the resources you are using for your custom entity recognizer. For more information, see [Amazon VPC](#).

Type: [VpcConfig \(p. 571\)](#) object

Required: No

## Response Syntax

```
{  
    "EntityRecognizerArn": "string"  
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [EntityRecognizerArn \(p. 290\)](#)

The Amazon Resource Name (ARN) that identifies the entity recognizer.

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:entity-recognizer/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*)?

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

**InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

**KmsKeyValidationException**

The KMS customer managed key (CMK) entered cannot be validated. Verify the key and re-enter it.

HTTP Status Code: 400

**ResourceInUseException**

The specified resource name is already in use. Use a different name and try your request again.

HTTP Status Code: 400

**ResourceLimitExceededException**

The maximum number of resources per account has been exceeded. Review the resources, and then try your request again.

HTTP Status Code: 400

**TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

**TooManyTagsException**

The request contains more tags than can be associated with a resource (50 tags per resource). The maximum number of tags includes both existing tags and those included in your current request.

HTTP Status Code: 400

**UnsupportedLanguageException**

Amazon Comprehend can't process the language of the input text. For custom entity recognition APIs, only English, Spanish, French, Italian, German, or Portuguese are accepted. For a list of supported languages, see [Languages supported in Amazon Comprehend \(p. 35\)](#).

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)



## DeleteDocumentClassifier

Deletes a previously created document classifier

Only those classifiers that are in terminated states (IN\_ERROR, TRAINED) will be deleted. If an active inference job is using the model, a `ResourceInUseException` will be returned.

This is an asynchronous action that puts the classifier into a DELETING state, and it is then removed by a background job. Once removed, the classifier disappears from your account and is no longer available for use.

### Request Syntax

```
{  
    "DocumentClassifierArn": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### **DocumentClassifierArn (p. 293)**

The Amazon Resource Name (ARN) that identifies the document classifier.

Type: String

Length Constraints: Maximum length of 256.

Pattern: `arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]*:[0-9]{12}:document-classifier/[a-zA-Z0-9](-*[a-zA-Z0-9])*(/version/[a-zA-Z0-9](-*[a-zA-Z0-9])*?)?`

Required: Yes

### Response Elements

If the action is successful, the service sends back an HTTP 200 response with an empty HTTP body.

### Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

#### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

#### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **ResourceInUseException**

The specified resource name is already in use. Use a different name and try your request again.

HTTP Status Code: 400

### **ResourceNotFoundException**

The specified resource ARN was not found. Check the ARN and try your request again.

HTTP Status Code: 400

### **ResourceUnavailableException**

The specified resource is not available. Check the resource and try your request again.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## DeleteEndpoint

Deletes a model-specific endpoint for a previously-trained custom model. All endpoints must be deleted in order for the model to be deleted. For information about endpoints, see [Managing endpoints](#).

### Request Syntax

```
{  
    "EndpointArn": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### EndpointArn (p. 295)

The Amazon Resource Number (ARN) of the endpoint being deleted.

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]\*)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:(document-classifier-endpoint|entity-recognizer-endpoint)/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*

Required: Yes

### Response Elements

If the action is successful, the service sends back an HTTP 200 response with an empty HTTP body.

### Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

#### InternalServerError

An internal server error occurred. Retry your request.

HTTP Status Code: 500

#### InvalidRequestException

The request is invalid.

HTTP Status Code: 400

#### ResourceInUseException

The specified resource name is already in use. Use a different name and try your request again.

HTTP Status Code: 400

#### ResourceNotFoundException

The specified resource ARN was not found. Check the ARN and try your request again.

HTTP Status Code: 400

**TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## DeleteEntityRecognizer

Deletes an entity recognizer.

Only those recognizers that are in terminated states (IN\_ERROR, TRAINED) will be deleted. If an active inference job is using the model, a `ResourceInUseException` will be returned.

This is an asynchronous action that puts the recognizer into a DELETING state, and it is then removed by a background job. Once removed, the recognizer disappears from your account and is no longer available for use.

### Request Syntax

```
{  
    "EntityRecognizerArn": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### **EntityRecognizerArn (p. 297)**

The Amazon Resource Name (ARN) that identifies the entity recognizer.

Type: String

Length Constraints: Maximum length of 256.

Pattern: `arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]*:[0-9]{12}:entity-recognizer/[a-zA-Z0-9](-*[a-zA-Z0-9])*(/version/[a-zA-Z0-9](-*[a-zA-Z0-9])*?)?`

Required: Yes

### Response Elements

If the action is successful, the service sends back an HTTP 200 response with an empty HTTP body.

### Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

#### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

#### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **ResourceInUseException**

The specified resource name is already in use. Use a different name and try your request again.

HTTP Status Code: 400

### **ResourceNotFoundException**

The specified resource ARN was not found. Check the ARN and try your request again.

HTTP Status Code: 400

### **ResourceUnavailableException**

The specified resource is not available. Check the resource and try your request again.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## DeleteResourcePolicy

Deletes a resource-based policy that is attached to a custom model.

### Request Syntax

```
{  
    "PolicyRevisionId": "string",  
    "ResourceArn": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [PolicyRevisionId \(p. 299\)](#)

The revision ID of the policy to delete.

Type: String

Length Constraints: Maximum length of 64.

Pattern: [0-9A-Fa-f]+

Required: No

#### [ResourceArn \(p. 299\)](#)

The Amazon Resource Name (ARN) of the custom model version that has the policy to delete.

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:(document-classifier|entity-recognizer)/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*)?

Required: Yes

### Response Elements

If the action is successful, the service sends back an HTTP 200 response with an empty HTTP body.

### Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

#### [InternalServerError](#)

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **ResourceNotFoundException**

The specified resource ARN was not found. Check the ARN and try your request again.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## DescribeDocumentClassificationJob

Gets the properties associated with a document classification job. Use this operation to get the status of a classification job.

### Request Syntax

```
{  
    "JobId": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### JobId (p. 301)

The identifier that Amazon Comprehend generated for the job. The [StartDocumentClassificationJob \(p. 406\)](#) operation returns this identifier in its response.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/+=\-%@]\*\$

Required: Yes

### Response Syntax

```
{  
    "DocumentClassificationJobProperties": {  
        "DataAccessRoleArn": "string",  
        "DocumentClassifierArn": "string",  
        "EndTime": number,  
        "InputDataConfig": {  
            "DocumentReaderConfig": {  
                "DocumentReadAction": "string",  
                "DocumentReadMode": "string",  
                "FeatureTypes": [ "string" ]  
            },  
            "InputFormat": "string",  
            "S3Uri": "string"  
        },  
        "JobArn": "string",  
        "JobId": "string",  
        "JobName": "string",  
        "JobStatus": "string",  
        "Message": "string",  
        "OutputDataConfig": {  
            "KmsKeyId": "string",  
            "S3Uri": "string"  
        },  
        "SubmitTime": number,  
        "VolumeKmsKeyId": "string",  
    }  
}
```

```
    "VpcConfig": {  
        "SecurityGroupIds": [ "string" ],  
        "Subnets": [ "string" ]  
    }  
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [DocumentClassificationJobProperties \(p. 301\)](#)

An object that describes the properties associated with the document classification job.

Type: [DocumentClassificationJobProperties \(p. 488\)](#) object

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **JobNotFoundException**

The specified job was not found. Check the job ID and try again.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)

- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## DescribeDocumentClassifier

Gets the properties associated with a document classifier.

### Request Syntax

```
{  
    "DocumentClassifierArn": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### **DocumentClassifierArn (p. 304)**

The Amazon Resource Name (ARN) that identifies the document classifier. The [CreateDocumentClassifier \(p. 277\)](#) operation returns this identifier in its response.

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^\:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:document-classifier/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*)?

Required: Yes

### Response Syntax

```
{  
    "DocumentClassifierProperties": {  
        "ClassifierMetadata": {  
            "EvaluationMetrics": {  
                "Accuracy": number,  
                "F1Score": number,  
                "HammingLoss": number,  
                "MicroF1Score": number,  
                "MicroPrecision": number,  
                "MicroRecall": number,  
                "Precision": number,  
                "Recall": number  
            },  
            "NumberOfLabels": number,  
            "NumberOfTestDocuments": number,  
            "NumberOfTrainedDocuments": number  
        },  
        "DataAccessRoleArn": "string",  
        "DocumentClassifierArn": "string",  
        "EndTime": number,  
        "InputDataConfig": {  
            "AugmentedManifests": [  
                {  
                    "ManifestType": "string",  
                    "S3Uri": "string"  
                }  
            ]  
        },  
        "LabelingJobArn": "string",  
        "LastModified": number,  
        "LabelerArn": "string",  
        "LabelType": "string",  
        "ModelSize": number,  
        "Status": "string",  
        "TrainingJobArn": "string",  
        "Version": number  
    }  
}
```

```
        "AnnotationDataS3Uri": "string",
        "AttributeNames": [ "string" ],
        "DocumentType": "string",
        "S3Uri": "string",
        "SourceDocumentsS3Uri": "string",
        "Split": "string"
    }
],
"DataFormat": "string",
"LabelDelimiter": "string",
"S3Uri": "string",
"TestS3Uri": "string"
},
"LanguageCode": "string",
"Message": "string",
"Mode": "string",
"ModelKmsKeyId": "string",
"OutputDataConfig": {
    "KmsKeyId": "string",
    "S3Uri": "string"
},
"SourceModelArn": "string",
"Status": "string",
"SubmitTime": number,
"TrainingEndTime": number,
"TrainingStartTime": number,
"VersionName": "string",
"VolumeKmsKeyId": "string",
"VpcConfig": {
    "SecurityGroupIds": [ "string" ],
    "Subnets": [ "string" ]
}
}
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [DocumentClassifierProperties \(p. 304\)](#)

An object that contains the properties associated with a document classifier.

Type: [DocumentClassifierProperties \(p. 495\)](#) object

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **ResourceNotFoundException**

The specified resource ARN was not found. Check the ARN and try your request again.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## DescribeDominantLanguageDetectionJob

Gets the properties associated with a dominant language detection job. Use this operation to get the status of a detection job.

### Request Syntax

```
{  
    "JobId": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### JobId (p. 307)

The identifier that Amazon Comprehend generated for the job. The [StartDominantLanguageDetectionJob \(p. 411\)](#) operation returns this identifier in its response.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/+=\-%@]\*\$

Required: Yes

### Response Syntax

```
{  
    "DominantLanguageDetectionJobProperties": {  
        "DataAccessRoleArn": "string",  
        "EndTime": number,  
        "InputDataConfig": {  
            "DocumentReaderConfig": {  
                "DocumentReadAction": "string",  
                "DocumentReadMode": "string",  
                "FeatureTypes": [ "string" ]  
            },  
            "InputFormat": "string",  
            "S3Uri": "string"  
        },  
        "JobArn": "string",  
        "JobId": "string",  
        "JobName": "string",  
        "JobStatus": "string",  
        "Message": "string",  
        "OutputDataConfig": {  
            "KmsKeyId": "string",  
            "S3Uri": "string"  
        },  
        "SubmitTime": number,  
        "VolumeKmsKeyId": "string",  
        "VpcConfig": {  
    }
```

```
        "SecurityGroupIds": [ "string" ],
        "Subnets": [ "string" ]
    }
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [DominantLanguageDetectionJobProperties \(p. 307\)](#)

An object that contains the properties associated with a dominant language detection job.

Type: [DominantLanguageDetectionJobProperties \(p. 505\)](#) object

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **JobNotFoundException**

The specified job was not found. Check the job ID and try again.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)

- [AWS SDK for Ruby V3](#)

## DescribeEndpoint

Gets the properties associated with a specific endpoint. Use this operation to get the status of an endpoint. For information about endpoints, see [Managing endpoints](#).

### Request Syntax

```
{  
    "EndpointArn": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### EndpointArn (p. 310)

The Amazon Resource Number (ARN) of the endpoint being described.

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:(document-classifier-endpoint|entity-recognizer-endpoint)/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*

Required: Yes

### Response Syntax

```
{  
    "EndpointProperties": {  
        "CreationTime": number,  
        "CurrentInferenceUnits": number,  
        "DataAccessRoleArn": "string",  
        "DesiredDataAccessRoleArn": "string",  
        "DesiredInferenceUnits": number,  
        "DesiredModelArn": "string",  
        "EndpointArn": "string",  
        "LastModifiedTime": number,  
        "Message": "string",  
        "ModelArn": "string",  
        "Status": "string"  
    }  
}
```

### Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

#### EndpointProperties (p. 310)

Describes information associated with the specific endpoint.

Type: [EndpointProperties \(p. 509\)](#) object

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **ResourceNotFoundException**

The specified resource ARN was not found. Check the ARN and try your request again.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## DescribeEntitiesDetectionJob

Gets the properties associated with an entities detection job. Use this operation to get the status of a detection job.

### Request Syntax

```
{  
    "JobId": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### JobId (p. 312)

The identifier that Amazon Comprehend generated for the job. The [StartEntitiesDetectionJob \(p. 416\)](#) operation returns this identifier in its response.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/+=\-%@]\*\$

Required: Yes

### Response Syntax

```
{  
    "EntitiesDetectionJobProperties": {  
        "DataAccessRoleArn": "string",  
        "EndTime": number,  
        "EntityRecognizerArn": "string",  
        "InputDataConfig": {  
            "DocumentReaderConfig": {  
                "DocumentReadAction": "string",  
                "DocumentReadMode": "string",  
                "FeatureTypes": [ "string" ]  
            },  
            "InputFormat": "string",  
            "S3Uri": "string"  
        },  
        "JobArn": "string",  
        "JobId": "string",  
        "JobName": "string",  
        "JobStatus": "string",  
        "LanguageCode": "string",  
        "Message": "string",  
        "OutputDataConfig": {  
            "KmsKeyId": "string",  
            "S3Uri": "string"  
        },  
        "SubmitTime": number,  
        "StartTime": number  
    }  
}
```

```
    "VolumeKmsKeyId": "string",
    "VpcConfig": {
        "SecurityGroupIds": [ "string" ],
        "Subnets": [ "string" ]
    }
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [EntitiesDetectionJobProperties \(p. 312\)](#)

An object that contains the properties associated with an entities detection job.

Type: [EntitiesDetectionJobProperties \(p. 513\)](#) object

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **JobNotFoundException**

The specified job was not found. Check the job ID and try again.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)

- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## DescribeEntityRecognizer

Provides details about an entity recognizer including status, S3 buckets containing training data, recognizer metadata, metrics, and so on.

### Request Syntax

```
{  
    "EntityRecognizerArn": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### EntityRecognizerArn (p. 315)

The Amazon Resource Name (ARN) that identifies the entity recognizer.

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:entity-recognizer/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*)?

Required: Yes

### Response Syntax

```
{  
    "EntityRecognizerProperties": {  
        "DataAccessRoleArn": "string",  
        "EndTime": number,  
        "EntityRecognizerArn": "string",  
        "InputDataConfig": {  
            "Annotations": {  
                "S3Uri": "string",  
                "TestS3Uri": "string"  
            },  
            "AugmentedManifests": [  
                {  
                    "AnnotationDataS3Uri": "string",  
                    "AttributeNames": [ "string" ],  
                    "DocumentType": "string",  
                    "S3Uri": "string",  
                    "SourceDocumentsS3Uri": "string",  
                    "Split": "string"  
                }  
            ]  
        },  
        "DataFormat": "string",  
        "Documents": {  
            "InputFormat": "string",  
            "S3Uri": "string",  
            "TestS3Uri": "string"  
        }  
    }  
}
```

```
        },
        "EntityList": {
            "S3Uri": "string"
        },
        "EntityTypes": [
            {
                "Type": "string"
            }
        ]
    },
    "LanguageCode": "string",
    "Message": "string",
    "ModelKmsKeyId": "string",
    "RecognizerMetadata": {
        "EntityTypes": [
            {
                "EvaluationMetrics": {
                    "F1Score": number,
                    "Precision": number,
                    "Recall": number
                },
                "NumberOfTrainMentions": number,
                "Type": "string"
            }
        ],
        "EvaluationMetrics": {
            "F1Score": number,
            "Precision": number,
            "Recall": number
        },
        "NumberOfTestDocuments": number,
        "NumberOfTrainedDocuments": number
    },
    "SourceModelArn": "string",
    "Status": "string",
    "SubmitTime": number,
    "TrainingEndTime": number,
    "TrainingStartTime": number,
    "VersionName": "string",
    "VolumeKmsKeyId": "string",
    "VpcConfig": {
        "SecurityGroupIds": [ "string" ],
        "Subnets": [ "string" ]
    }
}
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [EntityRecognizerProperties \(p. 315\)](#)

Describes information associated with an entity recognizer.

Type: [EntityRecognizerProperties \(p. 528\)](#) object

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **ResourceNotFoundException**

The specified resource ARN was not found. Check the ARN and try your request again.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## DescribeEventsDetectionJob

Gets the status and details of an events detection job.

### Request Syntax

```
{  
    "JobId": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### JobId (p. 318)

The identifier of the events detection job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}]\p{N}\_.:/:=+\-%@]\*\$

Required: Yes

### Response Syntax

```
{  
    "EventsDetectionJobProperties": {  
        "DataAccessRoleArn": "string",  
        "EndTime": number,  
        "InputDataConfig": {  
            "DocumentReaderConfig": {  
                "DocumentReadAction": "string",  
                "DocumentReadMode": "string",  
                "FeatureTypes": [ "string" ]  
            },  
            "InputFormat": "string",  
            "S3Uri": "string"  
        },  
        "JobArn": "string",  
        "JobId": "string",  
        "JobName": "string",  
        "JobStatus": "string",  
        "LanguageCode": "string",  
        "Message": "string",  
        "OutputDataConfig": {  
            "KmsKeyId": "string",  
            "S3Uri": "string"  
        },  
        "SubmitTime": number,  
        "TargetEventTypes": [ "string" ]  
    }  
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [EventsDetectionJobProperties \(p. 318\)](#)

An object that contains the properties associated with an event detection job.

Type: [EventsDetectionJobProperties \(p. 536\)](#) object

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **JobNotFoundException**

The specified job was not found. Check the job ID and try again.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## DescribeKeyPhrasesDetectionJob

Gets the properties associated with a key phrases detection job. Use this operation to get the status of a detection job.

### Request Syntax

```
{  
    "JobId": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### JobId (p. 320)

The identifier that Amazon Comprehend generated for the job. The [StartKeyPhrasesDetectionJob \(p. 425\)](#) operation returns this identifier in its response.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:/:=+\-%@]\*\$

Required: Yes

### Response Syntax

```
{  
    "KeyPhrasesDetectionJobProperties": {  
        "DataAccessRoleArn": "string",  
        "EndTime": number,  
        "InputDataConfig": {  
            "DocumentReaderConfig": {  
                "DocumentReadAction": "string",  
                "DocumentReadMode": "string",  
                "FeatureTypes": [ "string" ]  
            },  
            "InputFormat": "string",  
            "S3Uri": "string"  
        },  
        "JobArn": "string",  
        "JobId": "string",  
        "JobName": "string",  
        "JobStatus": "string",  
        "LanguageCode": "string",  
        "Message": "string",  
        "OutputDataConfig": {  
            "KmsKeyId": "string",  
            "S3Uri": "string"  
        },  
        "SubmitTime": number,  
        "VolumeKmsKeyId": "string",  
    }  
}
```

```
    "VpcConfig": {  
        "SecurityGroupIds": [ "string" ],  
        "Subnets": [ "string" ]  
    }  
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [KeyPhrasesDetectionJobProperties \(p. 320\)](#)

An object that contains the properties associated with a key phrases detection job.

Type: [KeyPhrasesDetectionJobProperties \(p. 543\)](#) object

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **JobNotFoundException**

The specified job was not found. Check the job ID and try again.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)

- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## DescribePiiEntitiesDetectionJob

Gets the properties associated with a PII entities detection job. For example, you can use this operation to get the job status.

### Request Syntax

```
{  
    "JobId": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### JobId (p. 323)

The identifier that Amazon Comprehend generated for the job. The [StartPiiEntitiesDetectionJob \(p. 430\)](#) operation returns this identifier in its response.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/+=\-%@]\*\$

Required: Yes

### Response Syntax

```
{  
    "PiiEntitiesDetectionJobProperties": {  
        "DataAccessRoleArn": "string",  
        "EndTime": number,  
        "InputDataConfig": {  
            "DocumentReaderConfig": {  
                "DocumentReadAction": "string",  
                "DocumentReadMode": "string",  
                "FeatureTypes": [ "string" ]  
            },  
            "InputFormat": "string",  
            "S3Uri": "string"  
        },  
        "JobArn": "string",  
        "JobId": "string",  
        "JobName": "string",  
        "JobStatus": "string",  
        "LanguageCode": "string",  
        "Message": "string",  
        "Mode": "string",  
        "OutputDataConfig": {  
            "KmsKeyId": "string",  
            "S3Uri": "string"  
        },  
        "RedactionConfig": {  
    }
```

```
        "MaskCharacter": "string",
        "MaskMode": "string",
        "PiiEntityTypes": [ "string" ]
    },
    "SubmitTime": number
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [PiiEntitiesDetectionJobProperties \(p. 323\)](#)

Provides information about a PII entities detection job.

Type: [PiiEntitiesDetectionJobProperties \(p. 549\)](#) object

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **JobNotFoundException**

The specified job was not found. Check the job ID and try again.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)

- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## DescribeResourcePolicy

Gets the details of a resource-based policy that is attached to a custom model, including the JSON body of the policy.

### Request Syntax

```
{  
    "ResourceArn": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### **ResourceArn (p. 326)**

The Amazon Resource Name (ARN) of the policy to describe.

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:(document-classifier|entity-recognizer)/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*)?

Required: Yes

### Response Syntax

```
{  
    "CreationTime": number,  
    "LastModifiedTime": number,  
    "PolicyRevisionId": "string",  
    "ResourcePolicy": "string"  
}
```

### Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

#### **CreationTime (p. 326)**

The time at which the policy was created.

Type: Timestamp

#### **LastModifiedTime (p. 326)**

The time at which the policy was last modified.

Type: Timestamp

#### **PolicyRevisionId (p. 326)**

The revision ID of the policy. Each time you modify a policy, Amazon Comprehend assigns a new revision ID, and it deletes the prior version of the policy.

Type: String

Length Constraints: Maximum length of 64.

Pattern: [ 0-9A-Fa-f ]+

#### **ResourcePolicy (p. 326)**

The JSON body of the resource-based policy.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 20000.

Pattern: [\u0009\u000A\u000D\u0020-\u00FF]+

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **ResourceNotFoundException**

The specified resource ARN was not found. Check the ARN and try your request again.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)



## DescribeSentimentDetectionJob

Gets the properties associated with a sentiment detection job. Use this operation to get the status of a detection job.

### Request Syntax

```
{  
    "JobId": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### JobId (p. 329)

The identifier that Amazon Comprehend generated for the job. The [StartSentimentDetectionJob \(p. 434\)](#) operation returns this identifier in its response.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/+=\-%@]\*\$

Required: Yes

### Response Syntax

```
{  
    "SentimentDetectionJobProperties": {  
        "DataAccessRoleArn": "string",  
        "EndTime": number,  
        "InputDataConfig": {  
            "DocumentReaderConfig": {  
                "DocumentReadAction": "string",  
                "DocumentReadMode": "string",  
                "FeatureTypes": [ "string" ]  
            },  
            "InputFormat": "string",  
            "S3Uri": "string"  
        },  
        "JobArn": "string",  
        "JobId": "string",  
        "JobName": "string",  
        "JobStatus": "string",  
        "LanguageCode": "string",  
        "Message": "string",  
        "OutputDataConfig": {  
            "KmsKeyId": "string",  
            "S3Uri": "string"  
        },  
        "SubmitTime": number,  
        "VolumeKmsKeyId": "string",  
    }  
}
```

```
    "VpcConfig": {  
        "SecurityGroupIds": [ "string" ],  
        "Subnets": [ "string" ]  
    }  
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [SentimentDetectionJobProperties \(p. 329\)](#)

An object that contains the properties associated with a sentiment detection job.

Type: [SentimentDetectionJobProperties \(p. 557\)](#) object

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **JobNotFoundException**

The specified job was not found. Check the job ID and try again.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)

- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## DescribeTargetedSentimentDetectionJob

Gets the properties associated with a targeted sentiment detection job. Use this operation to get the status of the job.

### Request Syntax

```
{  
    "JobId": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### JobId (p. 332)

The identifier that Amazon Comprehend generated for the job. The [StartTargetedSentimentDetectionJob \(p. 439\)](#) operation returns this identifier in its response.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}]\p{N}\_.:/:+\\-%@]\*\$

Required: Yes

### Response Syntax

```
{  
    "TargetedSentimentDetectionJobProperties": {  
        "DataAccessRoleArn": "string",  
        "EndTime": number,  
        "InputDataConfig": {  
            "DocumentReaderConfig": {  
                "DocumentReadAction": "string",  
                "DocumentReadMode": "string",  
                "FeatureTypes": [ "string" ]  
            },  
            "InputFormat": "string",  
            "S3Uri": "string"  
        },  
        "JobArn": "string",  
        "JobId": "string",  
        "JobName": "string",  
        "JobStatus": "string",  
        "LanguageCode": "string",  
        "Message": "string",  
        "OutputDataConfig": {  
            "KmsKeyId": "string",  
            "S3Uri": "string"  
        },  
        "SubmitTime": number,  
        "VolumeKmsKeyId": "string"  
    }  
}
```

```
    "VpcConfig": {  
        "SecurityGroupIds": [ "string" ],  
        "Subnets": [ "string" ]  
    }  
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [TargetedSentimentDetectionJobProperties \(p. 332\)](#)

An object that contains the properties associated with a targeted sentiment detection job.

Type: [TargetedSentimentDetectionJobProperties \(p. 564\)](#) object

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **JobNotFoundException**

The specified job was not found. Check the job ID and try again.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)

- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## DescribeTopicsDetectionJob

Gets the properties associated with a topic detection job. Use this operation to get the status of a detection job.

### Request Syntax

```
{  
    "JobId": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### JobId (p. 335)

The identifier assigned by the user to the detection job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/=+\-%@]\*\$

Required: Yes

### Response Syntax

```
{  
    "TopicsDetectionJobProperties": {  
        "DataAccessRoleArn": "string",  
        "EndTime": number,  
        "InputDataConfig": {  
            "DocumentReaderConfig": {  
                "DocumentReadAction": "string",  
                "DocumentReadMode": "string",  
                "FeatureTypes": [ "string" ]  
            },  
            "InputFormat": "string",  
            "S3Uri": "string"  
        },  
        "JobArn": "string",  
        "JobId": "string",  
        "JobName": "string",  
        "JobStatus": "string",  
        "Message": "string",  
        "NumberOfTopics": number,  
        "OutputDataConfig": {  
            "KmsKeyId": "string",  
            "S3Uri": "string"  
        },  
        "SubmitTime": number,  
        "VolumeKmsKeyId": "string",  
        "VpcConfig": {  
    }
```

```
        "SecurityGroupIds": [ "string" ],
        "Subnets": [ "string" ]
    }
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [TopicsDetectionJobProperties \(p. 335\)](#)

The list of properties for the requested job.

Type: [TopicsDetectionJobProperties \(p. 568\)](#) object

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **JobNotFoundException**

The specified job was not found. Check the job ID and try again.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)

- [AWS SDK for Ruby V3](#)

## DetectDominantLanguage

Determines the dominant language of the input text. For a list of languages that Amazon Comprehend can detect, see [Amazon Comprehend Supported Languages](#).

### Request Syntax

```
{  
    "Text": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [Text \(p. 338\)](#)

A UTF-8 text string. Each string should contain at least 20 characters and must contain fewer than 5,000 bytes of UTF-8 encoded characters.

Type: String

Length Constraints: Minimum length of 1.

Required: Yes

### Response Syntax

```
{  
    "Languages": [  
        {  
            "LanguageCode": "string",  
            "Score": number  
        }  
    ]  
}
```

### Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

#### [Languages \(p. 338\)](#)

The languages that Amazon Comprehend detected in the input text. For each language, the response returns the RFC 5646 language code and the level of confidence that Amazon Comprehend has in the accuracy of its inference. For more information about RFC 5646, see [Tags for Identifying Languages](#) on the [IETF Tools](#) web site.

Type: Array of [DominantLanguage \(p. 503\)](#) objects

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **TextSizeLimitExceededException**

The size of the input text exceeds the limit. Use a smaller document.

HTTP Status Code: 400

## Examples

### Detect dominant language

If the input text is "Bob lives in Seattle. He is a software engineer at Amazon.", the operation returns the following:

```
{  
    "Languages": [  
        {  
            "LanguageCode": "en",  
            "Score": 0.9774383902549744  
        },  
        {  
            "LanguageCode": "de",  
            "Score": 0.010717987082898617  
        }  
    ]  
}
```

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)



## DetectEntities

Inspects text for named entities, and returns information about them. For more information, about named entities, see [Entities \(p. 5\)](#).

### Request Syntax

```
{  
    "EndpointArn": "string",  
    "LanguageCode": "string",  
    "Text": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [EndpointArn \(p. 341\)](#)

The Amazon Resource Name of an endpoint that is associated with a custom entity recognition model. Provide an endpoint if you want to detect entities by using your own custom model instead of the default model that is used by Amazon Comprehend.

If you specify an endpoint, Amazon Comprehend uses the language of your custom model, and it ignores any language code that you provide in your request.

For information about endpoints, see [Managing endpoints](#).

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:entity-recognizer-endpoint/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*

Required: No

#### [LanguageCode \(p. 341\)](#)

The language of the input documents. You can specify any of the primary languages supported by Amazon Comprehend. All documents must be in the same language.

If your request includes the endpoint for a custom entity recognition model, Amazon Comprehend uses the language of your custom model, and it ignores any language code that you specify here.

Type: String

Valid Values: en | es | fr | de | it | pt | ar | hi | ja | ko | zh | zh-TW

Required: No

#### [Text \(p. 341\)](#)

A UTF-8 text string. Each string must contain fewer than 5,000 bytes of UTF-8 encoded characters.

Type: String

Length Constraints: Minimum length of 1.

Required: Yes

## Response Syntax

```
{  
    "Entities": [  
        {  
            "BeginOffset": number,  
            "EndOffset": number,  
            "Score": number,  
            "Text": "string",  
            "Type": "string"  
        }  
    ]  
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### **Entities (p. 342)**

A collection of entities identified in the input text. For each entity, the response provides the entity text, entity type, where the entity text begins and ends, and the level of confidence that Amazon Comprehend has in the detection.

If your request uses a custom entity recognition model, Amazon Comprehend detects the entities that the model is trained to recognize. Otherwise, it detects the default entity types. For a list of default entity types, see [Entities \(p. 5\)](#).

Type: Array of [Entity \(p. 516\)](#) objects

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **ResourceUnavailableException**

The specified resource is not available. Check the resource and try your request again.

HTTP Status Code: 400

### **TextSizeLimitExceededException**

The size of the input text exceeds the limit. Use a smaller document.

HTTP Status Code: 400

### UnsupportedLanguageException

Amazon Comprehend can't process the language of the input text. For custom entity recognition APIs, only English, Spanish, French, Italian, German, or Portuguese are accepted. For a list of supported languages, see [Languages supported in Amazon Comprehend \(p. 35\)](#).

HTTP Status Code: 400

## Examples

### Detect entities

If the input text is "Bob ordered two sandwiches and three ice cream cones today from a store in Seattle.", the operation returns the following:

```
{
  "Entities": [
    {
      "Text": "Bob",
      "Score": 1.0,
      "Type": "PERSON",
      "BeginOffset": 0,
      "EndOffset": 3
    },
    {
      "Text": "two",
      "Score": 1.0,
      "Type": "QUANTITY",
      "BeginOffset": 12,
      "EndOffset": 15
    },
    {
      "Text": "three",
      "Score": 1.0,
      "Type": "QUANTITY",
      "BeginOffset": 32,
      "EndOffset": 37
    },
    {
      "Text": "Today",
      "Score": 1.0,
      "Type": "DATE",
      "BeginOffset": 54,
      "EndOffset": 59
    },
    {
      "Text": "Seattle",
      "Score": 1.0,
      "Type": "LOCATION",
      "BeginOffset": 76,
      "EndOffset": 83
    }
  ]
}
```

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## DetectKeyPhrases

Detects the key noun phrases found in the text.

### Request Syntax

```
{  
    "LanguageCode": "string",  
    "Text": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [LanguageCode \(p. 345\)](#)

The language of the input documents. You can specify any of the primary languages supported by Amazon Comprehend. All documents must be in the same language.

Type: String

Valid Values: en | es | fr | de | it | pt | ar | hi | ja | ko | zh | zh-TW

Required: Yes

#### [Text \(p. 345\)](#)

A UTF-8 text string. Each string must contain fewer than 5,000 bytes of UTF-8 encoded characters.

Type: String

Length Constraints: Minimum length of 1.

Required: Yes

### Response Syntax

```
{  
    "KeyPhrases": [  
        {  
            "BeginOffset": number,  
            "EndOffset": number,  
            "Score": number,  
            "Text": "string"  
        }  
    ]  
}
```

### Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

## KeyPhrases (p. 345)

A collection of key phrases that Amazon Comprehend identified in the input text. For each key phrase, the response provides the text of the key phrase, where the key phrase begins and ends, and the level of confidence that Amazon Comprehend has in the accuracy of the detection.

Type: Array of [KeyPhrase \(p. 541\)](#) objects

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### InternalServerError

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### InvalidRequestException

The request is invalid.

HTTP Status Code: 400

### TextSizeLimitExceededException

The size of the input text exceeds the limit. Use a smaller document.

HTTP Status Code: 400

### UnsupportedLanguageException

Amazon Comprehend can't process the language of the input text. For custom entity recognition APIs, only English, Spanish, French, Italian, German, or Portuguese are accepted. For a list of supported languages, see [Languages supported in Amazon Comprehend \(p. 35\)](#).

HTTP Status Code: 400

## Examples

### Detect phrases

If the input text is "Bob lives in Seattle. He is a software engineer at Amazon.", the API returns the following:

```
{
  "KeyPhrases": [
    {
      "Text": "Bob",
      "Score": 1.0,
      "BeginOffset": 0,
      "EndOffset": 3
    },
    {
      "Text": "Seattle",
      "Score": 1.0,
      "BeginOffset": 13,
      "EndOffset": 20
    }
  ]
}
```

```
        "Text": "a software engineer",
        "Score": 1.0,
        "BeginOffset": 28,
        "EndOffset": 39
    },
    {
        "Text": "Amazon",
        "Score": 1.0,
        "BeginOffset": 43,
        "EndOffset": 49
    }
}]
```

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## DetectPiiEntities

Inspects the input text for entities that contain personally identifiable information (PII) and returns information about them.

### Request Syntax

```
{  
    "LanguageCode": "string",  
    "Text": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [LanguageCode \(p. 348\)](#)

The language of the input documents. Currently, English is the only valid language.

Type: String

Valid Values: en

Required: Yes

#### [Text \(p. 348\)](#)

A UTF-8 text string. Each string must contain fewer than 5,000 bytes of UTF-8 encoded characters.

Type: String

Length Constraints: Minimum length of 1.

Required: Yes

### Response Syntax

```
{  
    "Entities": [  
        {  
            "BeginOffset": number,  
            "EndOffset": number,  
            "Score": number,  
            "Type": "string"  
        }  
    ]  
}
```

### Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### **Entities (p. 348)**

A collection of PII entities identified in the input text. For each entity, the response provides the entity type, where the entity text begins and ends, and the level of confidence that Amazon Comprehend has in the detection.

Type: Array of [PiiEntity \(p. 552\)](#) objects

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **TextSizeLimitExceededException**

The size of the input text exceeds the limit. Use a smaller document.

HTTP Status Code: 400

### **UnsupportedLanguageException**

Amazon Comprehend can't process the language of the input text. For custom entity recognition APIs, only English, Spanish, French, Italian, German, or Portuguese are accepted. For a list of supported languages, see [Languages supported in Amazon Comprehend \(p. 35\)](#).

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## DetectSentiment

Inspects text and returns an inference of the prevailing sentiment (POSITIVE, NEUTRAL, MIXED, or NEGATIVE).

### Request Syntax

```
{  
    "LanguageCode": "string",  
    "Text": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [LanguageCode \(p. 350\)](#)

The language of the input documents. You can specify any of the primary languages supported by Amazon Comprehend. All documents must be in the same language.

Type: String

Valid Values: en | es | fr | de | it | pt | ar | hi | ja | ko | zh | zh-TW

Required: Yes

#### [Text \(p. 350\)](#)

A UTF-8 text string. Each string must contain fewer than 5,000 bytes of UTF-8 encoded characters.

Type: String

Length Constraints: Minimum length of 1.

Required: Yes

### Response Syntax

```
{  
    "Sentiment": "string",  
    "SentimentScore": {  
        "Mixed": number,  
        "Negative": number,  
        "Neutral": number,  
        "Positive": number  
    }  
}
```

### Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

## [Sentiment \(p. 350\)](#)

The inferred sentiment that Amazon Comprehend has the highest level of confidence in.

Type: String

Valid Values: POSITIVE | NEGATIVE | NEUTRAL | MIXED

## [SentimentScore \(p. 350\)](#)

An object that lists the sentiments, and their corresponding confidence levels.

Type: [SentimentScore \(p. 560\)](#) object

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **TextSizeLimitExceededException**

The size of the input text exceeds the limit. Use a smaller document.

HTTP Status Code: 400

### **UnsupportedLanguageException**

Amazon Comprehend can't process the language of the input text. For custom entity recognition APIs, only English, Spanish, French, Italian, German, or Portuguese are accepted. For a list of supported languages, see [Languages supported in Amazon Comprehend \(p. 35\)](#).

HTTP Status Code: 400

## Examples

### Detect sentiment

If the input text is "Today is my birthday, I am so happy.", the operation returns the following response:

```
{  
    "SentimentScore": {  
        "Mixed": 0.0033542951568961143,  
        "Positive": 0.9869875907897949,  
        "Neutral": 0.008563132025301456,  
        "Negative": 0.0010949420975521207  
    },  
    "Sentiment": "POSITIVE",  
}
```

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## DetectSyntax

Inspects text for syntax and the part of speech of words in the document. For more information, [Syntax analysis \(p. 26\)](#).

### Request Syntax

```
{  
    "LanguageCode": "string",  
    "Text": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [LanguageCode \(p. 353\)](#)

The language code of the input documents. You can specify any of the following languages supported by Amazon Comprehend: German ("de"), English ("en"), Spanish ("es"), French ("fr"), Italian ("it"), or Portuguese ("pt").

Type: String

Valid Values: en | es | fr | de | it | pt

Required: Yes

#### [Text \(p. 353\)](#)

A UTF-8 string. Each string must contain fewer than 5,000 bytes of UTF encoded characters.

Type: String

Length Constraints: Minimum length of 1.

Required: Yes

### Response Syntax

```
{  
    "SyntaxTokens": [  
        {  
            "BeginOffset": number,  
            "EndOffset": number,  
            "PartOfSpeech": {  
                "Score": number,  
                "Tag": "string"  
            },  
            "Text": "string",  
            "TokenId": number  
        }  
    ]  
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### **SyntaxTokens (p. 353)**

A collection of syntax tokens describing the text. For each token, the response provides the text, the token type, where the text begins and ends, and the level of confidence that Amazon Comprehend has that the token is correct. For a list of token types, see [Syntax analysis \(p. 26\)](#).

Type: Array of [SyntaxToken \(p. 561\)](#) objects

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **TextSizeLimitExceededException**

The size of the input text exceeds the limit. Use a smaller document.

HTTP Status Code: 400

### **UnsupportedLanguageException**

Amazon Comprehend can't process the language of the input text. For custom entity recognition APIs, only English, Spanish, French, Italian, German, or Portuguese are accepted. For a list of supported languages, see [Languages supported in Amazon Comprehend \(p. 35\)](#).

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)



## ImportModel

Creates a new custom model that replicates a source custom model that you import. The source model can be in your AWS account or another one.

If the source model is in another AWS account, then it must have a resource-based policy that authorizes you to import it.

The source model must be in the same AWS region that you're using when you import. You can't import a model that's in a different region.

## Request Syntax

```
{  
    "DataAccessRoleArn": "string",  
    "ModelKmsKeyId": "string",  
    "modelName": "string",  
    "SourceModelArn": "string",  
    "Tags": [  
        {  
            "Key": "string",  
            "Value": "string"  
        }  
    ],  
    "VersionName": "string"  
}
```

## Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

### DataAccessRoleArn (p. 356)

The Amazon Resource Name (ARN) of the AWS Identity and Management (IAM) role that allows Amazon Comprehend to use Amazon Key Management Service (KMS) to encrypt or decrypt the custom model.

Type: String

Length Constraints: Minimum length of 20. Maximum length of 2048.

Pattern: arn:aws(-[^:]\*)?:iam::[0-9]{12}:role/.+

Required: No

### ModelKmsKeyId (p. 356)

ID for the AWS Key Management Service (KMS) key that Amazon Comprehend uses to encrypt trained custom models. The ModelKmsKeyId can be either of the following formats:

- KMS Key ID: "1234abcd-12ab-34cd-56ef-1234567890ab"
- Amazon Resource Name (ARN) of a KMS Key: "arn:aws:kms:us-west-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab"

Type: String

Length Constraints: Maximum length of 2048.

Pattern: ^\p{ASCII}+\$

Required: No

#### [ModelName \(p. 356\)](#)

The name to assign to the custom model that is created in Amazon Comprehend by this import.

Type: String

Length Constraints: Maximum length of 63.

Pattern: ^[a-zA-Z0-9](-\*[a-zA-Z0-9])\*\$

Required: No

#### [SourceModelArn \(p. 356\)](#)

The Amazon Resource Name (ARN) of the custom model to import.

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:(document-classifier|entity-recognizer)/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*?)?

Required: Yes

#### [Tags \(p. 356\)](#)

Tags to be associated with the custom model that is created by this import. A tag is a key-value pair that adds as a metadata to a resource used by Amazon Comprehend. For example, a tag with "Sales" as the key might be added to a resource to indicate its use by the sales department.

Type: Array of [Tag \(p. 562\)](#) objects

Required: No

#### [VersionName \(p. 356\)](#)

The version name given to the custom model that is created by this import. Version names can have a maximum of 256 characters. Alphanumeric characters, hyphens (-) and underscores (\_) are allowed. The version name must be unique among all models with the same classifier name in the account/AWS Region.

Type: String

Length Constraints: Maximum length of 63.

Pattern: ^[a-zA-Z0-9](-\*[a-zA-Z0-9])\*\$

Required: No

## Response Syntax

```
{  
    "ModelArn": "string"  
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### **ModelArn (p. 357)**

The Amazon Resource Name (ARN) of the custom model being imported.

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:(document-classifier|entity-recognizer)/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*)?

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **KmsKeyValidationException**

The KMS customer managed key (CMK) entered cannot be validated. Verify the key and re-enter it.

HTTP Status Code: 400

### **ResourceInUseException**

The specified resource name is already in use. Use a different name and try your request again.

HTTP Status Code: 400

### **ResourceLimitExceededException**

The maximum number of resources per account has been exceeded. Review the resources, and then try your request again.

HTTP Status Code: 400

### **ResourceNotFoundException**

The specified resource ARN was not found. Check the ARN and try your request again.

HTTP Status Code: 400

### **ResourceUnavailableException**

The specified resource is not available. Check the resource and try your request again.

HTTP Status Code: 400

### TooManyRequestsException

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

### TooManyTagsException

The request contains more tags than can be associated with a resource (50 tags per resource). The maximum number of tags includes both existing tags and those included in your current request.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## ListDocumentClassificationJobs

Gets a list of the documentation classification jobs that you have submitted.

### Request Syntax

```
{  
    "Filter": {  
        "JobName": "string",  
        "JobStatus": "string",  
        "SubmitTimeAfter": number,  
        "SubmitTimeBefore": number  
    },  
    "MaxResults": number,  
    "NextToken": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [Filter \(p. 360\)](#)

Filters the jobs that are returned. You can filter jobs on their names, status, or the date and time that they were submitted. You can only set one filter at a time.

Type: [DocumentClassificationJobFilter \(p. 487\)](#) object

Required: No

#### [MaxResults \(p. 360\)](#)

The maximum number of results to return in each page. The default is 100.

Type: Integer

Valid Range: Minimum value of 1. Maximum value of 500.

Required: No

#### [NextToken \(p. 360\)](#)

Identifies the next page of results to return.

Type: String

Length Constraints: Minimum length of 1.

Required: No

### Response Syntax

```
{  
    "DocumentClassificationJobPropertiesList": [  
        {  
            "DataAccessRoleArn": "string",  
            "DocumentClassifierArn": "string",  
            "DocumentType": "string",  
            "FailureReason": "string",  
            "JobId": "string",  
            "JobName": "string",  
            "JobStatus": "string",  
            "LastModified": "string",  
            "SubmitTime": "string",  
            "StatusDetails": "string"  
        }  
    ]  
}
```

```
    "EndTime": number,
    "InputDataConfig": {
        "DocumentReaderConfig": {
            "DocumentReadAction": "string",
            "DocumentReadMode": "string",
            "FeatureTypes": [ "string" ]
        },
        "InputFormat": "string",
        "S3Uri": "string"
    },
    "JobArn": "string",
    "JobId": "string",
    "JobName": "string",
    "JobStatus": "string",
    "Message": "string",
    "OutputDataConfig": {
        "KmsKeyId": "string",
        "S3Uri": "string"
    },
    "SubmitTime": number,
    "VolumeKmsKeyId": "string",
    "VpcConfig": {
        "SecurityGroupIds": [ "string" ],
        "Subnets": [ "string" ]
    }
},
],
"NextToken": "string
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [DocumentClassificationJobPropertiesList \(p. 360\)](#)

A list containing the properties of each job returned.

Type: Array of [DocumentClassificationJobProperties \(p. 488\)](#) objects

### [NextToken \(p. 360\)](#)

Identifies the next page of results to return.

Type: String

Length Constraints: Minimum length of 1.

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidFilterException**

The filter specified for the operation is invalid. Specify a different filter.

HTTP Status Code: 400

**InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

**TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## ListDocumentClassifiers

Gets a list of the document classifiers that you have created.

### Request Syntax

```
{  
    "Filter": {  
        "DocumentClassifierName": "string",  
        "Status": "string",  
        "SubmitTimeAfter": number,  
        "SubmitTimeBefore": number  
    },  
    "MaxResults": number,  
    "NextToken": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [Filter \(p. 363\)](#)

Filters the jobs that are returned. You can filter jobs on their name, status, or the date and time that they were submitted. You can only set one filter at a time.

Type: [DocumentClassifierFilter \(p. 491\)](#) object

Required: No

#### [MaxResults \(p. 363\)](#)

The maximum number of results to return in each page. The default is 100.

Type: Integer

Valid Range: Minimum value of 1. Maximum value of 500.

Required: No

#### [NextToken \(p. 363\)](#)

Identifies the next page of results to return.

Type: String

Length Constraints: Minimum length of 1.

Required: No

### Response Syntax

```
{  
    "DocumentClassifierPropertiesList": [  
        {  
            "DocumentClassifierName": "string",  
            "Status": "string",  
            "SubmitTime": number,  
            "LastModifiedTime": number  
        }  
    ]  
}
```

```
{
    "ClassifierMetadata": {
        "EvaluationMetrics": {
            "Accuracy": number,
            "F1Score": number,
            "HammingLoss": number,
            "MicroF1Score": number,
            "MicroPrecision": number,
            "MicroRecall": number,
            "Precision": number,
            "Recall": number
        },
        "NumberOfLabels": number,
        "NumberOfTestDocuments": number,
        "NumberOfTrainedDocuments": number
    },
    "DataAccessRoleArn": "string",
    "DocumentClassifierArn": "string",
    "EndTime": number,
    "InputDataConfig": {
        "AugmentedManifests": [
            {
                "AnnotationDataS3Uri": "string",
                "AttributeNames": [ "string" ],
                "DocumentType": "string",
                "S3Uri": "string",
                "SourceDocumentsS3Uri": "string",
                "Split": "string"
            }
        ],
        "DataFormat": "string",
        "LabelDelimiter": "string",
        "S3Uri": "string",
        "TestS3Uri": "string"
    },
    "LanguageCode": "string",
    "Message": "string",
    "Mode": "string",
    "ModelKmsKeyId": "string",
    "OutputDataConfig": {
        "KmsKeyId": "string",
        "S3Uri": "string"
    },
    "SourceModelArn": "string",
    "Status": "string",
    "SubmitTime": number,
    "TrainingEndTime": number,
    "TrainingStartTime": number,
    "VersionName": "string",
    "VolumeKmsKeyId": "string",
    "VpcConfig": {
        "SecurityGroupIds": [ "string" ],
        "Subnets": [ "string" ]
    }
},
    "NextToken": "string

```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [DocumentClassifierPropertiesList \(p. 363\)](#)

A list containing the properties of each job returned.

Type: Array of [DocumentClassifierProperties \(p. 495\)](#) objects

### [NextToken \(p. 363\)](#)

Identifies the next page of results to return.

Type: String

Length Constraints: Minimum length of 1.

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidFilterException**

The filter specified for the operation is invalid. Specify a different filter.

HTTP Status Code: 400

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## ListDocumentClassifierSummaries

Gets a list of summaries of the document classifiers that you have created

### Request Syntax

```
{  
    "MaxResults": number,  
    "NextToken": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [MaxResults \(p. 366\)](#)

The maximum number of results to return on each page. The default is 100.

Type: Integer

Valid Range: Minimum value of 1. Maximum value of 500.

Required: No

#### [NextToken \(p. 366\)](#)

Identifies the next page of results to return.

Type: String

Length Constraints: Minimum length of 1.

Required: No

### Response Syntax

```
{  
    "DocumentClassifierSummariesList": [  
        {  
            "DocumentClassifierName": "string",  
            "LatestVersionCreatedAt": number,  
            "LatestVersionName": "string",  
            "LatestVersionStatus": "string",  
            "NumberOfVersions": number  
        }  
    ],  
    "NextToken": "string"  
}
```

### Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [DocumentClassifierSummariesList \(p. 366\)](#)

The list of summaries of document classifiers.

Type: Array of [DocumentClassifierSummary \(p. 499\)](#) objects

### [NextToken \(p. 366\)](#)

Identifies the next page of results to return.

Type: String

Length Constraints: Minimum length of 1.

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## ListDominantLanguageDetectionJobs

Gets a list of the dominant language detection jobs that you have submitted.

### Request Syntax

```
{  
    "Filter": {  
        "JobName": "string",  
        "JobStatus": "string",  
        "SubmitTimeAfter": number,  
        "SubmitTimeBefore": number  
    },  
    "MaxResults": number,  
    "NextToken": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### **Filter (p. 368)**

Filters that jobs that are returned. You can filter jobs on their name, status, or the date and time that they were submitted. You can only set one filter at a time.

Type: [DominantLanguageDetectionJobFilter \(p. 504\)](#) object

Required: No

#### **MaxResults (p. 368)**

The maximum number of results to return in each page. The default is 100.

Type: Integer

Valid Range: Minimum value of 1. Maximum value of 500.

Required: No

#### **NextToken (p. 368)**

Identifies the next page of results to return.

Type: String

Length Constraints: Minimum length of 1.

Required: No

### Response Syntax

```
{  
    "DominantLanguageDetectionJobPropertiesList": [  
        {  
            "DataAccessRoleArn": "string",  
            "JobId": "string",  
            "JobName": "string",  
            "JobStatus": "string",  
            "LanguageCode": "string",  
            "SubmitTime": number  
        }  
    ]  
}
```

```

    "EndTime": number,
    "InputDataConfig": {
        "DocumentReaderConfig": {
            "DocumentReadAction": "string",
            "DocumentReadMode": "string",
            "FeatureTypes": [ "string" ]
        },
        "InputFormat": "string",
        "S3Uri": "string"
    },
    "JobArn": "string",
    "JobId": "string",
    "JobName": "string",
    "JobStatus": "string",
    "Message": "string",
    "OutputDataConfig": {
        "KmsKeyId": "string",
        "S3Uri": "string"
    },
    "SubmitTime": number,
    "VolumeKmsKeyId": "string",
    "VpcConfig": {
        "SecurityGroupIds": [ "string" ],
        "Subnets": [ "string" ]
    }
},
],
"NextToken": "string"
}

```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [DominantLanguageDetectionJobPropertiesList \(p. 368\)](#)

A list containing the properties of each job that is returned.

Type: Array of [DominantLanguageDetectionJobProperties \(p. 505\)](#) objects

### [NextToken \(p. 368\)](#)

Identifies the next page of results to return.

Type: String

Length Constraints: Minimum length of 1.

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidFilterException**

The filter specified for the operation is invalid. Specify a different filter.

HTTP Status Code: 400

**InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

**TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## ListEndpoints

Gets a list of all existing endpoints that you've created. For information about endpoints, see [Managing endpoints](#).

### Request Syntax

```
{  
    "Filter": {  
        "CreationTimeAfter": number,  
        "CreationTimeBefore": number,  
        "ModelArn": "string",  
        "Status": "string"  
    },  
    "MaxResults": number,  
    "NextToken": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [Filter \(p. 371\)](#)

Filters the endpoints that are returned. You can filter endpoints on their name, model, status, or the date and time that they were created. You can only set one filter at a time.

Type: [EndpointFilter \(p. 508\)](#) object

Required: No

#### [MaxResults \(p. 371\)](#)

The maximum number of results to return in each page. The default is 100.

Type: Integer

Valid Range: Minimum value of 1. Maximum value of 500.

Required: No

#### [NextToken \(p. 371\)](#)

Identifies the next page of results to return.

Type: String

Length Constraints: Minimum length of 1.

Required: No

### Response Syntax

```
{  
    "EndpointPropertiesList": [  
        {  
            "Name": "string",  
            "ModelArn": "string",  
            "Status": "string",  
            "CreationTime": number,  
            "LastModifiedTime": number  
        }  
    ]  
}
```

```
        "CreationTime": number,
        "CurrentInferenceUnits": number,
        "DataAccessRoleArn": string,
        "DesiredDataAccessRoleArn": string,
        "DesiredInferenceUnits": number,
        "DesiredModelArn": string,
        "EndpointArn": string,
        "LastModifiedTime": number,
        "Message": string,
        "ModelArn": string,
        "Status": string
    }
],
"NextToken": string
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [EndpointPropertiesList \(p. 371\)](#)

Displays a list of endpoint properties being retrieved by the service in response to the request.

Type: Array of [EndpointProperties \(p. 509\)](#) objects

### [NextToken \(p. 371\)](#)

Identifies the next page of results to return.

Type: String

Length Constraints: Minimum length of 1.

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## ListEntitiesDetectionJobs

Gets a list of the entity detection jobs that you have submitted.

### Request Syntax

```
{  
    "Filter": {  
        "JobName": "string",  
        "JobStatus": "string",  
        "SubmitTimeAfter": number,  
        "SubmitTimeBefore": number  
    },  
    "MaxResults": number,  
    "NextToken": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [Filter \(p. 374\)](#)

Filters the jobs that are returned. You can filter jobs on their name, status, or the date and time that they were submitted. You can only set one filter at a time.

Type: [EntitiesDetectionJobFilter \(p. 512\)](#) object

Required: No

#### [MaxResults \(p. 374\)](#)

The maximum number of results to return in each page. The default is 100.

Type: Integer

Valid Range: Minimum value of 1. Maximum value of 500.

Required: No

#### [NextToken \(p. 374\)](#)

Identifies the next page of results to return.

Type: String

Length Constraints: Minimum length of 1.

Required: No

### Response Syntax

```
{  
    "EntitiesDetectionJobPropertiesList": [  
        {  
            "JobName": "string",  
            "JobStatus": "string",  
            "SubmitTime": number,  
            "Text": "string",  
            "Entities": [ { "Entity": "string", "Score": number } ]  
        }  
    ]  
}
```

```
"DataAccessRoleArn": "string",
"EndTime": number,
"EntityRecognizerArn": "string",
"InputDataConfig": {
    "DocumentReaderConfig": {
        "DocumentReadAction": "string",
        "DocumentReadMode": "string",
        "FeatureTypes": [ "string" ]
    },
    "InputFormat": "string",
    "S3Uri": "string"
},
"JobArn": "string",
"JobId": "string",
"JobName": "string",
"JobStatus": "string",
"LanguageCode": "string",
"Message": "string",
"OutputDataConfig": {
    "KmsKeyId": "string",
    "S3Uri": "string"
},
"SubmitTime": number,
"VolumeKmsKeyId": "string",
"VpcConfig": {
    "SecurityGroupIds": [ "string" ],
    "Subnets": [ "string" ]
}
},
"NextToken": "string"
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [EntitiesDetectionJobPropertiesList \(p. 374\)](#)

A list containing the properties of each job that is returned.

Type: Array of [EntitiesDetectionJobProperties \(p. 513\)](#) objects

### [NextToken \(p. 374\)](#)

Identifies the next page of results to return.

Type: String

Length Constraints: Minimum length of 1.

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidFilterException**

The filter specified for the operation is invalid. Specify a different filter.

HTTP Status Code: 400

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## ListEntityRecognizers

Gets a list of the properties of all entity recognizers that you created, including recognizers currently in training. Allows you to filter the list of recognizers based on criteria such as status and submission time. This call returns up to 500 entity recognizers in the list, with a default number of 100 recognizers in the list.

The results of this list are not in any particular order. Please get the list and sort locally if needed.

### Request Syntax

```
{  
    "Filter": {  
        "RecognizerName": "string",  
        "Status": "string",  
        "SubmitTimeAfter": number,  
        "SubmitTimeBefore": number  
    },  
    "MaxResults": number,  
    "NextToken": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [Filter \(p. 377\)](#)

Filters the list of entities returned. You can filter on `Status`, `SubmitTimeBefore`, or `SubmitTimeAfter`. You can only set one filter at a time.

Type: [EntityRecognizerFilter \(p. 523\)](#) object

Required: No

#### [MaxResults \(p. 377\)](#)

The maximum number of results to return on each page. The default is 100.

Type: Integer

Valid Range: Minimum value of 1. Maximum value of 500.

Required: No

#### [NextToken \(p. 377\)](#)

Identifies the next page of results to return.

Type: String

Length Constraints: Minimum length of 1.

Required: No

### Response Syntax

```
{
```

```

"EntityRecognizerPropertiesList": [
  {
    "DataAccessRoleArn": "string",
    "EndTime": number,
    "EntityRecognizerArn": "string",
    "InputDataConfig": {
      "Annotations": {
        "S3Uri": "string",
        "TestS3Uri": "string"
      },
      "AugmentedManifests": [
        {
          "AnnotationDataS3Uri": "string",
          "AttributeNames": [ "string" ],
          "DocumentType": "string",
          "S3Uri": "string",
          "SourceDocumentsS3Uri": "string",
          "Split": "string"
        }
      ],
      "DataFormat": "string",
      "Documents": {
        "InputFormat": "string",
        "S3Uri": "string",
        "TestS3Uri": "string"
      },
      "EntityList": {
        "S3Uri": "string"
      },
      "EntityType": [
        {
          "Type": "string"
        }
      ]
    },
    "LanguageCode": "string",
    "Message": "string",
    "ModelKmsKeyId": "string",
    "RecognizerMetadata": {
      "EntityType": [
        {
          "EvaluationMetrics": {
            "F1Score": number,
            "Precision": number,
            "Recall": number
          },
          "NumberOfTrainMentions": number,
          "Type": "string"
        }
      ],
      "EvaluationMetrics": {
        "F1Score": number,
        "Precision": number,
        "Recall": number
      },
      "NumberOfTestDocuments": number,
      "NumberOfTrainedDocuments": number
    },
    "SourceModelArn": "string",
    "Status": "string",
    "SubmitTime": number,
    "TrainingEndTime": number,
    "TrainingStartTime": number,
    "VersionName": "string",
    "VolumeKmsKeyId": "string",
    "VpcConfig": {

```

```
        "SecurityGroupIds": [ "string" ],
        "Subnets": [ "string" ]
    }
],
"NextToken": "string"
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### **EntityRecognizerPropertiesList (p. 377)**

The list of properties of an entity recognizer.

Type: Array of [EntityRecognizerProperties \(p. 528\)](#) objects

### **NextToken (p. 377)**

Identifies the next page of results to return.

Type: String

Length Constraints: Minimum length of 1.

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidFilterException**

The filter specified for the operation is invalid. Specify a different filter.

HTTP Status Code: 400

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)

- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## ListEntityRecognizerSummaries

Gets a list of summaries for the entity recognizers that you have created.

### Request Syntax

```
{  
    "MaxResults": number,  
    "NextToken": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [MaxResults \(p. 381\)](#)

The maximum number of results to return on each page. The default is 100.

Type: Integer

Valid Range: Minimum value of 1. Maximum value of 500.

Required: No

#### [NextToken \(p. 381\)](#)

Identifies the next page of results to return.

Type: String

Length Constraints: Minimum length of 1.

Required: No

### Response Syntax

```
{  
    "EntityRecognizerSummariesList": [  
        {  
            "LatestVersionCreatedAt": number,  
            "LatestVersionName": "string",  
            "LatestVersionStatus": "string",  
            "NumberOfVersions": number,  
            "RecognizerName": "string"  
        }  
    ],  
    "NextToken": "string"  
}
```

### Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [EntityRecognizerSummariesList \(p. 381\)](#)

The list entity recognizer summaries.

Type: Array of [EntityRecognizerSummary \(p. 531\)](#) objects

### [NextToken \(p. 381\)](#)

The list entity recognizer summaries.

Type: String

Length Constraints: Minimum length of 1.

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## ListEventsDetectionJobs

Gets a list of the events detection jobs that you have submitted.

### Request Syntax

```
{  
    "Filter": {  
        "JobName": "string",  
        "JobStatus": "string",  
        "SubmitTimeAfter": number,  
        "SubmitTimeBefore": number  
    },  
    "MaxResults": number,  
    "NextToken": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### **Filter (p. 383)**

Filters the jobs that are returned. You can filter jobs on their name, status, or the date and time that they were submitted. You can only set one filter at a time.

Type: [EventsDetectionJobFilter \(p. 535\)](#) object

Required: No

#### **MaxResults (p. 383)**

The maximum number of results to return in each page.

Type: Integer

Valid Range: Minimum value of 1. Maximum value of 500.

Required: No

#### **NextToken (p. 383)**

Identifies the next page of results to return.

Type: String

Length Constraints: Minimum length of 1.

Required: No

### Response Syntax

```
{  
    "EventsDetectionJobPropertiesList": [  
        {  
            "DataAccessRoleArn": "string",  
            "JobId": "string",  
            "JobName": "string",  
            "JobStatus": "string",  
            "LanguageCode": "string",  
            "SubmitTime": number  
        }  
    ]  
}
```

```
"EndTime": number,
"InputDataConfig": {
    "DocumentReaderConfig": {
        "DocumentReadAction": "string",
        "DocumentReadMode": "string",
        "FeatureTypes": [ "string" ]
    },
    "InputFormat": "string",
    "S3Uri": "string"
},
"JobArn": "string",
"JobId": "string",
"JobName": "string",
"JobStatus": "string",
"LanguageCode": "string",
"Message": "string",
"OutputDataConfig": {
    "KmsKeyId": "string",
    "S3Uri": "string"
},
"SubmitTime": number,
"TargetEventTypes": [ "string" ]
},
],
"NextToken": "string
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [EventsDetectionJobPropertiesList \(p. 383\)](#)

A list containing the properties of each job that is returned.

Type: Array of [EventsDetectionJobProperties \(p. 536\)](#) objects

### [NextToken \(p. 383\)](#)

Identifies the next page of results to return.

Type: String

Length Constraints: Minimum length of 1.

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidFilterException**

The filter specified for the operation is invalid. Specify a different filter.

HTTP Status Code: 400

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## ListKeyPhrasesDetectionJobs

Get a list of key phrase detection jobs that you have submitted.

### Request Syntax

```
{  
    "Filter": {  
        "JobName": "string",  
        "JobStatus": "string",  
        "SubmitTimeAfter": number,  
        "SubmitTimeBefore": number  
    },  
    "MaxResults": number,  
    "NextToken": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [Filter \(p. 386\)](#)

Filters the jobs that are returned. You can filter jobs on their name, status, or the date and time that they were submitted. You can only set one filter at a time.

Type: [KeyPhrasesDetectionJobFilter \(p. 542\)](#) object

Required: No

#### [MaxResults \(p. 386\)](#)

The maximum number of results to return in each page. The default is 100.

Type: Integer

Valid Range: Minimum value of 1. Maximum value of 500.

Required: No

#### [NextToken \(p. 386\)](#)

Identifies the next page of results to return.

Type: String

Length Constraints: Minimum length of 1.

Required: No

### Response Syntax

```
{  
    "KeyPhrasesDetectionJobPropertiesList": [  
        {  
            "DataAccessRoleArn": "string",  
            "EndTime": number,  
            "JobId": "string",  
            "JobName": "string",  
            "JobStatus": "string",  
            "LanguageCode": "string",  
            "SubmitTime": number  
        }  
    ]  
}
```

```
"InputDataConfig": {  
    "DocumentReaderConfig": {  
        "DocumentReadAction": "string",  
        "DocumentReadMode": "string",  
        "FeatureTypes": [ "string" ]  
    },  
    "InputFormat": "string",  
    "S3Uri": "string"  
},  
"JobArn": "string",  
"JobId": "string",  
"JobName": "string",  
"JobStatus": "string",  
"LanguageCode": "string",  
"Message": "string",  
"OutputDataConfig": {  
    "KmsKeyId": "string",  
    "S3Uri": "string"  
},  
"SubmitTime": number,  
"VolumeKmsKeyId": "string",  
"VpcConfig": {  
    "SecurityGroupIds": [ "string" ],  
    "Subnets": [ "string" ]  
}  
}  
],  
"NextToken": "string"  
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [KeyPhrasesDetectionJobPropertiesList \(p. 386\)](#)

A list containing the properties of each job that is returned.

Type: Array of [KeyPhrasesDetectionJobProperties \(p. 543\)](#) objects

### [NextToken \(p. 386\)](#)

Identifies the next page of results to return.

Type: String

Length Constraints: Minimum length of 1.

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidFilterException**

The filter specified for the operation is invalid. Specify a different filter.

HTTP Status Code: 400

**InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

**TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## ListPiiEntitiesDetectionJobs

Gets a list of the PII entity detection jobs that you have submitted.

### Request Syntax

```
{  
    "Filter": {  
        "JobName": "string",  
        "JobStatus": "string",  
        "SubmitTimeAfter": number,  
        "SubmitTimeBefore": number  
    },  
    "MaxResults": number,  
    "NextToken": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [Filter \(p. 389\)](#)

Filters the jobs that are returned. You can filter jobs on their name, status, or the date and time that they were submitted. You can only set one filter at a time.

Type: [PiiEntitiesDetectionJobFilter \(p. 548\)](#) object

Required: No

#### [MaxResults \(p. 389\)](#)

The maximum number of results to return in each page.

Type: Integer

Valid Range: Minimum value of 1. Maximum value of 500.

Required: No

#### [NextToken \(p. 389\)](#)

Identifies the next page of results to return.

Type: String

Length Constraints: Minimum length of 1.

Required: No

### Response Syntax

```
{  
    "NextToken": "string",  
    "PiiEntitiesDetectionJobPropertiesList": [  
        ...  
    ]  
}
```

```
{
    "DataAccessRoleArn": "string",
    "EndTime": number,
    "InputDataConfig": {
        "DocumentReaderConfig": {
            "DocumentReadAction": "string",
            "DocumentReadMode": "string",
            "FeatureTypes": [ "string" ]
        },
        "InputFormat": "string",
        "S3Uri": "string"
    },
    "JobArn": "string",
    "JobId": "string",
    "JobName": "string",
    "JobStatus": "string",
    "LanguageCode": "string",
    "Message": "string",
    "Mode": "string",
    "OutputDataConfig": {
        "KmsKeyId": "string",
        "S3Uri": "string"
    },
    "RedactionConfig": {
        "MaskCharacter": "string",
        "MaskMode": "string",
        "PiiEntityTypes": [ "string" ]
    },
    "SubmitTime": number
}
]
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [NextToken \(p. 389\)](#)

Identifies the next page of results to return.

Type: String

Length Constraints: Minimum length of 1.

### [PiiEntitiesDetectionJobPropertiesList \(p. 389\)](#)

A list containing the properties of each job that is returned.

Type: Array of [PiiEntitiesDetectionJobProperties \(p. 549\)](#) objects

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidFilterException**

The filter specified for the operation is invalid. Specify a different filter.

HTTP Status Code: 400

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## ListSentimentDetectionJobs

Gets a list of sentiment detection jobs that you have submitted.

### Request Syntax

```
{  
    "Filter": {  
        "JobName": "string",  
        "JobStatus": "string",  
        "SubmitTimeAfter": number,  
        "SubmitTimeBefore": number  
    },  
    "MaxResults": number,  
    "NextToken": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [Filter \(p. 392\)](#)

Filters the jobs that are returned. You can filter jobs on their name, status, or the date and time that they were submitted. You can only set one filter at a time.

Type: [SentimentDetectionJobFilter \(p. 556\)](#) object

Required: No

#### [MaxResults \(p. 392\)](#)

The maximum number of results to return in each page. The default is 100.

Type: Integer

Valid Range: Minimum value of 1. Maximum value of 500.

Required: No

#### [NextToken \(p. 392\)](#)

Identifies the next page of results to return.

Type: String

Length Constraints: Minimum length of 1.

Required: No

### Response Syntax

```
{  
    "NextToken": "string",  
    "SentimentDetectionJobPropertiesList": [  
        {  
            "DataAccessRoleArn": "string",  
            "JobId": "string",  
            "JobName": "string",  
            "JobStatus": "string",  
            "LanguageCode": "string",  
            "SentimentType": "string",  
            "SubmitTime": number  
        }  
    ]  
}
```

```

        "EndTime": number,
        "InputDataConfig": {
            "DocumentReaderConfig": {
                "DocumentReadAction": "string",
                "DocumentReadMode": "string",
                "FeatureTypes": [ "string" ]
            },
            "InputFormat": "string",
            "S3Uri": "string"
        },
        "JobArn": "string",
        "JobId": "string",
        "JobName": "string",
        "JobStatus": "string",
        "LanguageCode": "string",
        "Message": "string",
        "OutputDataConfig": {
            "KmsKeyId": "string",
            "S3Uri": "string"
        },
        "SubmitTime": number,
        "VolumeKmsKeyId": "string",
        "VpcConfig": {
            "SecurityGroupIds": [ "string" ],
            "Subnets": [ "string" ]
        }
    }
}
]
}
}

```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [NextToken \(p. 392\)](#)

Identifies the next page of results to return.

Type: String

Length Constraints: Minimum length of 1.

### [SentimentDetectionJobPropertiesList \(p. 392\)](#)

A list containing the properties of each job that is returned.

Type: Array of [SentimentDetectionJobProperties \(p. 557\)](#) objects

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidFilterException**

The filter specified for the operation is invalid. Specify a different filter.

HTTP Status Code: 400

**InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

**TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## ListTagsForResource

Lists all tags associated with a given Amazon Comprehend resource.

### Request Syntax

```
{  
    "ResourceArn": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### ResourceArn (p. 395)

The Amazon Resource Name (ARN) of the given Amazon Comprehend resource you are querying.

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[ ^:]\*)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:[a-zA-Z0-9-]{1,64}/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*)?

Required: Yes

### Response Syntax

```
{  
    "ResourceArn": "string",  
    "Tags": [  
        {  
            "Key": "string",  
            "Value": "string"  
        }  
    ]  
}
```

### Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

#### ResourceArn (p. 395)

The Amazon Resource Name (ARN) of the given Amazon Comprehend resource you are querying.

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:[a-zA-Z0-9-]  
{1,64}/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*)?

### Tags (p. 395)

Tags associated with the Amazon Comprehend resource being queried. A tag is a key-value pair that adds as a metadata to a resource used by Amazon Comprehend. For example, a tag with "Sales" as the key might be added to a resource to indicate its use by the sales department.

Type: Array of [Tag \(p. 562\)](#) objects

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### InternalServerError

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### InvalidRequestException

The request is invalid.

HTTP Status Code: 400

### ResourceNotFoundException

The specified resource ARN was not found. Check the ARN and try your request again.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## ListTargetedSentimentDetectionJobs

Gets a list of targeted sentiment detection jobs that you have submitted.

### Request Syntax

```
{  
    "Filter": {  
        "JobName": "string",  
        "JobStatus": "string",  
        "SubmitTimeAfter": number,  
        "SubmitTimeBefore": number  
    },  
    "MaxResults": number,  
    "NextToken": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [Filter \(p. 397\)](#)

Filters the jobs that are returned. You can filter jobs on their name, status, or the date and time that they were submitted. You can only set one filter at a time.

Type: [TargetedSentimentDetectionJobFilter \(p. 563\)](#) object

Required: No

#### [MaxResults \(p. 397\)](#)

The maximum number of results to return in each page. The default is 100.

Type: Integer

Valid Range: Minimum value of 1. Maximum value of 500.

Required: No

#### [NextToken \(p. 397\)](#)

Identifies the next page of results to return.

Type: String

Length Constraints: Minimum length of 1.

Required: No

### Response Syntax

```
{  
    "NextToken": "string",  
    "TargetedSentimentDetectionJobPropertiesList": [  
        {  
            "DataAccessRoleArn": "string",  
            "JobId": "string",  
            "JobName": "string",  
            "JobStatus": "string",  
            "LanguageCode": "string",  
            "SentimentType": "string",  
            "SubmitTime": number  
        }  
    ]  
}
```

```

        "EndTime": number,
        "InputDataConfig": {
            "DocumentReaderConfig": {
                "DocumentReadAction": "string",
                "DocumentReadMode": "string",
                "FeatureTypes": [ "string" ]
            },
            "InputFormat": "string",
            "S3Uri": "string"
        },
        "JobArn": "string",
        "JobId": "string",
        "JobName": "string",
        "JobStatus": "string",
        "LanguageCode": "string",
        "Message": "string",
        "OutputDataConfig": {
            "KmsKeyId": "string",
            "S3Uri": "string"
        },
        "SubmitTime": number,
        "VolumeKmsKeyId": "string",
        "VpcConfig": {
            "SecurityGroupIds": [ "string" ],
            "Subnets": [ "string" ]
        }
    }
}
]
}
}

```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [NextToken \(p. 397\)](#)

Identifies the next page of results to return.

Type: String

Length Constraints: Minimum length of 1.

### [TargetedSentimentDetectionJobPropertiesList \(p. 397\)](#)

A list containing the properties of each job that is returned.

Type: Array of [TargetedSentimentDetectionJobProperties \(p. 564\)](#) objects

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidFilterException**

The filter specified for the operation is invalid. Specify a different filter.

HTTP Status Code: 400

**InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

**TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## ListTopicsDetectionJobs

Gets a list of the topic detection jobs that you have submitted.

### Request Syntax

```
{  
    "Filter": {  
        "JobName": "string",  
        "JobStatus": "string",  
        "SubmitTimeAfter": number,  
        "SubmitTimeBefore": number  
    },  
    "MaxResults": number,  
    "NextToken": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [Filter \(p. 400\)](#)

Filters the jobs that are returned. Jobs can be filtered on their name, status, or the date and time that they were submitted. You can set only one filter at a time.

Type: [TopicsDetectionJobFilter \(p. 567\)](#) object

Required: No

#### [MaxResults \(p. 400\)](#)

The maximum number of results to return in each page. The default is 100.

Type: Integer

Valid Range: Minimum value of 1. Maximum value of 500.

Required: No

#### [NextToken \(p. 400\)](#)

Identifies the next page of results to return.

Type: String

Length Constraints: Minimum length of 1.

Required: No

### Response Syntax

```
{  
    "NextToken": "string",  
    "TopicsDetectionJobPropertiesList": [  
        {  
            "DataAccessRoleArn": "string",  
            "JobId": "string",  
            "JobName": "string",  
            "JobStatus": "string",  
            "Language": "string",  
            "SubmitTime": number  
        }  
    ]  
}
```

```
        "EndTime": number,
        "InputDataConfig": {
            "DocumentReaderConfig": {
                "DocumentReadAction": "string",
                "DocumentReadMode": "string",
                "FeatureTypes": [ "string" ]
            },
            "InputFormat": "string",
            "S3Uri": "string"
        },
        "JobArn": "string",
        "JobId": "string",
        "JobName": "string",
        "JobStatus": "string",
        "Message": "string",
        "NumberOfTopics": number,
        "OutputDataConfig": {
            "KmsKeyId": "string",
            "S3Uri": "string"
        },
        "SubmitTime": number,
        "VolumeKmsKeyId": "string",
        "VpcConfig": {
            "SecurityGroupIds": [ "string" ],
            "Subnets": [ "string" ]
        }
    }
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [NextToken \(p. 400\)](#)

Identifies the next page of results to return.

Type: String

Length Constraints: Minimum length of 1.

### [TopicsDetectionJobPropertiesList \(p. 400\)](#)

A list containing the properties of each job that is returned.

Type: Array of [TopicsDetectionJobProperties \(p. 568\)](#) objects

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidFilterException**

The filter specified for the operation is invalid. Specify a different filter.

HTTP Status Code: 400

**InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

**TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## PutResourcePolicy

Attaches a resource-based policy to a custom model. You can use this policy to authorize an entity in another AWS account to import the custom model, which replicates it in Amazon Comprehend in their account.

### Request Syntax

```
{  
    "PolicyRevisionId": "string",  
    "ResourceArn": "string",  
    "ResourcePolicy": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [PolicyRevisionId \(p. 403\)](#)

The revision ID that Amazon Comprehend assigned to the policy that you are updating. If you are creating a new policy that has no prior version, don't use this parameter. Amazon Comprehend creates the revision ID for you.

Type: String

Length Constraints: Maximum length of 64.

Pattern: [0-9A-Fa-f]+

Required: No

#### [ResourceArn \(p. 403\)](#)

The Amazon Resource Name (ARN) of the custom model to attach the policy to.

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:(document-classifier|entity-recognizer)/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*)?

Required: Yes

#### [ResourcePolicy \(p. 403\)](#)

The JSON resource-based policy to attach to your custom model. Provide your JSON as a UTF-8 encoded string without line breaks. To provide valid JSON for your policy, enclose the attribute names and values in double quotes. If the JSON body is also enclosed in double quotes, then you must escape the double quotes that are inside the policy:

```
"{\"attribute\": \"value\", \"attribute\": [\"value\"]}"
```

To avoid escaping quotes, you can use single quotes to enclose the policy and double quotes to enclose the JSON names and values:

```
'{"attribute": "value", "attribute": ["value"]}'
```

Type: String

Length Constraints: Minimum length of 1. Maximum length of 20000.

Pattern: [\u0009\u000A\u000D\u0020-\u00FF]+

Required: Yes

## Response Syntax

```
{  
    "PolicyRevisionId": "string"  
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [PolicyRevisionId \(p. 404\)](#)

The revision ID of the policy. Each time you modify a policy, Amazon Comprehend assigns a new revision ID, and it deletes the prior version of the policy.

Type: String

Length Constraints: Maximum length of 64.

Pattern: [0-9A-Fa-f]+

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **ResourceNotFoundException**

The specified resource ARN was not found. Check the ARN and try your request again.

HTTP Status Code: 400

## Examples

### [Example resource-based policy for a custom model](#)

The following example shows a resource-based policy for a custom model in Amazon Comprehend. The policy allows an entity in another AWS account to import the model that the policy is attached to. The

policy specifies the authorized entity for the `Principal` attribute, and it specifies the ARN of the model version for the `Resource` attribute.

```
{  
    "Version": "2017-01-01",  
    "Statement": [  
        {  
            "Effect": "Allow",  
            "Action": "comprehend:ImportModel",  
            "Resource": [  
                "arn:aws:comprehend:us-west-2:111122223333:document-classifier/foo/version/*"  
            ],  
            "Principal": {  
                "AWS": "arn:aws:iam::444455556666:root"  
            }  
        }  
    ]  
}
```

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## StartDocumentClassificationJob

Starts an asynchronous document classification job. Use the [DescribeDocumentClassificationJob \(p. 301\)](#) operation to track the progress of the job.

### Request Syntax

```
{  
    "ClientRequestToken": "string",  
    "DataAccessRoleArn": "string",  
    "DocumentClassifierArn": "string",  
    "InputDataConfig": {  
        "DocumentReaderConfig": {  
            "DocumentReadAction": "string",  
            "DocumentReadMode": "string",  
            "FeatureTypes": [ "string" ]  
        },  
        "InputFormat": "string",  
        "S3Uri": "string"  
    },  
    "JobName": "string",  
    "OutputDataConfig": {  
        "KmsKeyId": "string",  
        "S3Uri": "string"  
    },  
    "Tags": [  
        {  
            "Key": "string",  
            "Value": "string"  
        }  
    ],  
    "VolumeKmsKeyId": "string",  
    "VpcConfig": {  
        "SecurityGroupIds": [ "string" ],  
        "Subnets": [ "string" ]  
    }  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [ClientRequestToken \(p. 406\)](#)

A unique identifier for the request. If you do not set the client request token, Amazon Comprehend generates one.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 64.

Pattern: ^[a-zA-Z0-9-]+\$

Required: No

#### [DataAccessRoleArn \(p. 406\)](#)

The Amazon Resource Name (ARN) of the AWS Identity and Access Management (IAM) role that grants Amazon Comprehend read access to your input data.

Type: String

Length Constraints: Minimum length of 20. Maximum length of 2048.

Pattern: arn:aws(-[^:]+)?::iam::[0-9]{12}:role/.+

Required: Yes

#### [DocumentClassifierArn \(p. 406\)](#)

The Amazon Resource Name (ARN) of the document classifier to use to process the job.

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]+)?::comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:document-classifier/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*?)?

Required: Yes

#### [InputDataConfig \(p. 406\)](#)

Specifies the format and location of the input data for the job.

Type: [InputDataConfig \(p. 539\)](#) object

Required: Yes

#### [JobName \(p. 406\)](#)

The identifier of the job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 256.

Pattern: ^([\p{L}\p{Z}]\p{N}\_.:/:=+\-%@]\*\$

Required: No

#### [OutputDataConfig \(p. 406\)](#)

Specifies where to send the output files.

Type: [OutputDataConfig \(p. 546\)](#) object

Required: Yes

#### [Tags \(p. 406\)](#)

Tags to be associated with the document classification job. A tag is a key-value pair that adds metadata to a resource used by Amazon Comprehend. For example, a tag with "Sales" as the key might be added to a resource to indicate its use by the sales department.

Type: Array of [Tag \(p. 562\)](#) objects

Required: No

#### [VolumeKmsKeyId \(p. 406\)](#)

ID for the AWS Key Management Service (KMS) key that Amazon Comprehend uses to encrypt data on the storage volume attached to the ML compute instance(s) that process the analysis job. The VolumeKmsKeyId can be either of the following formats:

- KMS Key ID: "1234abcd-12ab-34cd-56ef-1234567890ab"
- Amazon Resource Name (ARN) of a KMS Key: "arn:aws:kms:us-west-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab"

Type: String

Length Constraints: Maximum length of 2048.

Pattern: ^\p{ASCII}+\$

Required: No

#### [VpcConfig \(p. 406\)](#)

Configuration parameters for an optional private Virtual Private Cloud (VPC) containing the resources you are using for your document classification job. For more information, see [Amazon VPC](#).

Type: [VpcConfig \(p. 571\)](#) object

Required: No

## Response Syntax

```
{  
    "JobArn": "string",  
    "JobId": "string",  
    "JobStatus": "string"  
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

#### [JobArn \(p. 408\)](#)

The Amazon Resource Name (ARN) of the document classification job. It is a unique, fully qualified identifier for the job. It includes the AWS account, Region, and the job ID. The format of the ARN is as follows:

`arn:<partition>:comprehend:<region>:<account-id>:document-classification-job/<job-id>`

The following is an example job ARN:

`arn:aws:comprehend:us-west-2:111122223333:document-classification-job/1234abcd12ab34cd56ef1234567890ab`

Type: String

Length Constraints: Maximum length of 256.

Pattern: `arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]*:[0-9]{12}:[a-zA-Z0-9-]{1,64}/[a-zA-Z0-9](-*[a-zA-Z0-9])*(/version/[a-zA-Z0-9](-*[a-zA-Z0-9])*)?`

#### [JobId \(p. 408\)](#)

The identifier generated for the job. To get the status of the job, use this identifier with the [DescribeDocumentClassificationJob \(p. 301\)](#) operation.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:/-+\\-%@]\*\$

#### [JobStatus \(p. 408\)](#)

The status of the job:

- SUBMITTED - The job has been received and queued for processing.
- IN\_PROGRESS - Amazon Comprehend is processing the job.
- COMPLETED - The job was successfully completed and the output is available.
- FAILED - The job did not complete. For details, use the [DescribeDocumentClassificationJob \(p. 301\)](#) operation.
- STOP\_REQUESTED - Amazon Comprehend has received a stop request for the job and is processing the request.
- STOPPED - The job was successfully stopped without completing.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **KmsKeyValidationException**

The KMS customer managed key (CMK) entered cannot be validated. Verify the key and re-enter it.

HTTP Status Code: 400

### **ResourceNotFoundException**

The specified resource ARN was not found. Check the ARN and try your request again.

HTTP Status Code: 400

### **ResourceUnavailableException**

The specified resource is not available. Check the resource and try your request again.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

### TooManyTagsException

The request contains more tags than can be associated with a resource (50 tags per resource). The maximum number of tags includes both existing tags and those included in your current request.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## StartDominantLanguageDetectionJob

Starts an asynchronous dominant language detection job for a collection of documents. Use the [DescribeDominantLanguageDetectionJob \(p. 307\)](#) operation to track the status of a job.

### Request Syntax

```
{  
    "ClientRequestToken": "string",  
    "DataAccessRoleArn": "string",  
    "InputDataConfig": {  
        "DocumentReaderConfig": {  
            "DocumentReadAction": "string",  
            "DocumentReadMode": "string",  
            "FeatureTypes": [ "string" ]  
        },  
        "InputFormat": "string",  
        "S3Uri": "string"  
    },  
    "JobName": "string",  
    "OutputDataConfig": {  
        "KmsKeyId": "string",  
        "S3Uri": "string"  
    },  
    "Tags": [  
        {  
            "Key": "string",  
            "Value": "string"  
        }  
    ],  
    "VolumeKmsKeyId": "string",  
    "VpcConfig": {  
        "SecurityGroupIds": [ "string" ],  
        "Subnets": [ "string" ]  
    }  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [ClientRequestToken \(p. 411\)](#)

A unique identifier for the request. If you do not set the client request token, Amazon Comprehend generates one.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 64.

Pattern: ^[a-zA-Z0-9-]+\$

Required: No

#### [DataAccessRoleArn \(p. 411\)](#)

The Amazon Resource Name (ARN) of the AWS Identity and Access Management (IAM) role that grants Amazon Comprehend read access to your input data. For more information, see <https://>

[docs.aws.amazon.com/comprehend/latest/dg/access-control-managing-permissions.html#auth-role-permissions](https://docs.aws.amazon.com/comprehend/latest/dg/access-control-managing-permissions.html#auth-role-permissions).

Type: String

Length Constraints: Minimum length of 20. Maximum length of 2048.

Pattern: arn:aws(-[^:]+)?:iam::[0-9]{12}:role/.+

Required: Yes

#### [InputDataConfig \(p. 411\)](#)

Specifies the format and location of the input data for the job.

Type: [InputDataConfig \(p. 539\)](#) object

Required: Yes

#### [JobName \(p. 411\)](#)

An identifier for the job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 256.

Pattern: ^([\p{L}\p{Z}]\p{N}\_.:/:=+\-%@]\*\$

Required: No

#### [OutputDataConfig \(p. 411\)](#)

Specifies where to send the output files.

Type: [OutputDataConfig \(p. 546\)](#) object

Required: Yes

#### [Tags \(p. 411\)](#)

Tags to be associated with the dominant language detection job. A tag is a key-value pair that adds metadata to a resource used by Amazon Comprehend. For example, a tag with "Sales" as the key might be added to a resource to indicate its use by the sales department.

Type: Array of [Tag \(p. 562\)](#) objects

Required: No

#### [VolumeKmsKeyId \(p. 411\)](#)

ID for the AWS Key Management Service (KMS) key that Amazon Comprehend uses to encrypt data on the storage volume attached to the ML compute instance(s) that process the analysis job. The VolumeKmsKeyId can be either of the following formats:

- KMS Key ID: "1234abcd-12ab-34cd-56ef-1234567890ab"
- Amazon Resource Name (ARN) of a KMS Key: "arn:aws:kms:us-west-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab"

Type: String

Length Constraints: Maximum length of 2048.

Pattern: ^\p{ASCII}+\$

Required: No

### **VpcConfig (p. 411)**

Configuration parameters for an optional private Virtual Private Cloud (VPC) containing the resources you are using for your dominant language detection job. For more information, see [Amazon VPC](#).

Type: [VpcConfig \(p. 571\)](#) object

Required: No

## Response Syntax

```
{  
    "JobArn": "string",  
    "JobId": "string",  
    "JobStatus": "string"  
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### **JobArn (p. 413)**

The Amazon Resource Name (ARN) of the dominant language detection job. It is a unique, fully qualified identifier for the job. It includes the AWS account, Region, and the job ID. The format of the ARN is as follows:

```
arn:<partition>:comprehend:<region>:<account-id>:dominant-language-detection-job/<job-id>
```

The following is an example job ARN:

```
arn:aws:comprehend:us-west-2:111122223333:dominant-language-detection-job/1234abcd12ab34cd56ef1234567890ab
```

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^\:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:[a-zA-Z0-9-]{1,64}/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*)?

### **JobId (p. 413)**

The identifier generated for the job. To get the status of a job, use this identifier with the [DescribeDominantLanguageDetectionJob \(p. 307\)](#) operation.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/+=\-%@]\*)\$

### **JobStatus (p. 413)**

The status of the job.

- SUBMITTED - The job has been received and is queued for processing.

- IN\_PROGRESS - Amazon Comprehend is processing the job.
- COMPLETED - The job was successfully completed and the output is available.
- FAILED - The job did not complete. To get details, use the [DescribeDominantLanguageDetectionJob \(p. 307\)](#) operation.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### InternalServerError

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### InvalidRequestException

The request is invalid.

HTTP Status Code: 400

### KmsKeyValidationException

The KMS customer managed key (CMK) entered cannot be validated. Verify the key and re-enter it.

HTTP Status Code: 400

### TooManyRequestsException

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

### TooManyTagsException

The request contains more tags than can be associated with a resource (50 tags per resource). The maximum number of tags includes both existing tags and those included in your current request.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)



## StartEntitiesDetectionJob

Starts an asynchronous entity detection job for a collection of documents. Use the [DescribeEntitiesDetectionJob \(p. 312\)](#) operation to track the status of a job.

This API can be used for either standard entity detection or custom entity recognition. In order to be used for custom entity recognition, the optional `EntityRecognizerArn` must be used in order to provide access to the recognizer being used to detect the custom entity.

### Request Syntax

```
{  
    "ClientRequestToken": "string",  
    "DataAccessRoleArn": "string",  
    "EntityRecognizerArn": "string",  
    "InputDataConfig": {  
        "DocumentReaderConfig": {  
            "DocumentReadAction": "string",  
            "DocumentReadMode": "string",  
            "FeatureTypes": [ "string" ]  
        },  
        "InputFormat": "string",  
        "S3Uri": "string"  
    },  
    "JobName": "string",  
    "LanguageCode": "string",  
    "OutputDataConfig": {  
        "KmsKeyId": "string",  
        "S3Uri": "string"  
    },  
    "Tags": [  
        {  
            "Key": "string",  
            "Value": "string"  
        }  
    ],  
    "VolumeKmsKeyId": "string",  
    "VpcConfig": {  
        "SecurityGroupIds": [ "string" ],  
        "Subnets": [ "string" ]  
    }  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### **ClientRequestToken (p. 416)**

A unique identifier for the request. If you don't set the client request token, Amazon Comprehend generates one.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 64.

Pattern: ^[a-zA-Z0-9-]+\$

Required: No

#### [DataAccessRoleArn \(p. 416\)](#)

The Amazon Resource Name (ARN) of the AWS Identity and Access Management (IAM) role that grants Amazon Comprehend read access to your input data. For more information, see <https://docs.aws.amazon.com/comprehend/latest/dg/access-control-managing-permissions.html#auth-role-permissions>.

Type: String

Length Constraints: Minimum length of 20. Maximum length of 2048.

Pattern: arn:aws(-[^:]+)?::iam::[0-9]{12}:role/.+

Required: Yes

#### [EntityRecognizerArn \(p. 416\)](#)

The Amazon Resource Name (ARN) that identifies the specific entity recognizer to be used by the StartEntitiesDetectionJob. This ARN is optional and is only used for a custom entity recognition job.

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]+)?::comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:entity-recognizer/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*)?

Required: No

#### [InputDataConfig \(p. 416\)](#)

Specifies the format and location of the input data for the job.

Type: [InputDataConfig \(p. 539\)](#) object

Required: Yes

#### [JobName \(p. 416\)](#)

The identifier of the job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 256.

Pattern: ^([\p{L}\p{Z}]\p{N}\_.:/=+\-%@]\*)\$

Required: No

#### [LanguageCode \(p. 416\)](#)

The language of the input documents. All documents must be in the same language. You can specify any of the languages supported by Amazon Comprehend. If custom entities recognition is used, this parameter is ignored and the language used for training the model is used instead.

Type: String

Valid Values: en | es | fr | de | it | pt | ar | hi | ja | ko | zh | zh-TW

Required: Yes

#### [OutputDataConfig \(p. 416\)](#)

Specifies where to send the output files.

Type: [OutputDataConfig \(p. 546\)](#) object

Required: Yes

#### [Tags \(p. 416\)](#)

Tags to be associated with the entities detection job. A tag is a key-value pair that adds metadata to a resource used by Amazon Comprehend. For example, a tag with "Sales" as the key might be added to a resource to indicate its use by the sales department.

Type: Array of [Tag \(p. 562\)](#) objects

Required: No

#### [VolumeKmsKeyId \(p. 416\)](#)

ID for the AWS Key Management Service (KMS) key that Amazon Comprehend uses to encrypt data on the storage volume attached to the ML compute instance(s) that process the analysis job. The VolumeKmsKeyId can be either of the following formats:

- KMS Key ID: "1234abcd-12ab-34cd-56ef-1234567890ab"
- Amazon Resource Name (ARN) of a KMS Key: "arn:aws:kms:us-west-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab"

Type: String

Length Constraints: Maximum length of 2048.

Pattern: ^\p{ASCII}+\$

Required: No

#### [VpcConfig \(p. 416\)](#)

Configuration parameters for an optional private Virtual Private Cloud (VPC) containing the resources you are using for your entity detection job. For more information, see [Amazon VPC](#).

Type: [VpcConfig \(p. 571\)](#) object

Required: No

## Response Syntax

```
{  
    "JobArn": "string",  
    "JobId": "string",  
    "JobStatus": "string"  
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

#### [JobArn \(p. 418\)](#)

The Amazon Resource Name (ARN) of the entities detection job. It is a unique, fully qualified identifier for the job. It includes the AWS account, Region, and the job ID. The format of the ARN is as follows:

`arn:<partition>:comprehend:<region>:<account-id>:entities-detection-job/<job-id>`

The following is an example job ARN:

`arn:aws:comprehend:us-west-2:111122223333:entities-detection-job/1234abcd12ab34cd56ef1234567890ab`

Type: String

Length Constraints: Maximum length of 256.

Pattern: `arn:aws(-[^\:]+)?:comprehend:[a-zA-Z0-9-]*:[0-9]{12}:[a-zA-Z0-9-]{1,64}/[a-zA-Z0-9](-*[a-zA-Z0-9])*(/version/[a-zA-Z0-9](-*[a-zA-Z0-9])*)?`

### **JobId (p. 418)**

The identifier generated for the job. To get the status of job, use this identifier with the [DescribeEntitiesDetectionJob \(p. 312\)](#) operation.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: `^([\p{L}\p{Z}\p{N}_.:/=+\-%@]*)$`

### **JobStatus (p. 418)**

The status of the job.

- SUBMITTED - The job has been received and is queued for processing.
- IN\_PROGRESS - Amazon Comprehend is processing the job.
- COMPLETED - The job was successfully completed and the output is available.
- FAILED - The job did not complete. To get details, use the [DescribeEntitiesDetectionJob \(p. 312\)](#) operation.
- STOP\_REQUESTED - Amazon Comprehend has received a stop request for the job and is processing the request.
- STOPPED - The job was successfully stopped without completing.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **KmsKeyValidationException**

The KMS customer managed key (CMK) entered cannot be validated. Verify the key and re-enter it.

HTTP Status Code: 400

**ResourceNotFoundException**

The specified resource ARN was not found. Check the ARN and try your request again.

HTTP Status Code: 400

**ResourceUnavailableException**

The specified resource is not available. Check the resource and try your request again.

HTTP Status Code: 400

**TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

**TooManyTagsException**

The request contains more tags than can be associated with a resource (50 tags per resource). The maximum number of tags includes both existing tags and those included in your current request.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## StartEventsDetectionJob

Starts an asynchronous event detection job for a collection of documents.

### Request Syntax

```
{  
    "ClientRequestToken": "string",  
    "DataAccessRoleArn": "string",  
    "InputDataConfig": {  
        "DocumentReaderConfig": {  
            "DocumentReadAction": "string",  
            "DocumentReadMode": "string",  
            "FeatureTypes": [ "string" ]  
        },  
        "InputFormat": "string",  
        "S3Uri": "string"  
    },  
    "JobName": "string",  
    "LanguageCode": "string",  
    "OutputDataConfig": {  
        "KmsKeyId": "string",  
        "S3Uri": "string"  
    },  
    "Tags": [  
        {  
            "Key": "string",  
            "Value": "string"  
        }  
    ],  
    "TargetEventTypes": [ "string" ]  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [ClientRequestToken \(p. 421\)](#)

An unique identifier for the request. If you don't set the client request token, Amazon Comprehend generates one.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 64.

Pattern: ^[a-zA-Z0-9-]+\$

Required: No

#### [DataAccessRoleArn \(p. 421\)](#)

The Amazon Resource Name (ARN) of the AWS Identity and Access Management (IAM) role that grants Amazon Comprehend read access to your input data.

Type: String

Length Constraints: Minimum length of 20. Maximum length of 2048.

Pattern: arn:aws(-[^:]+)?:iam::[0-9]{12}:role/.+

Required: Yes

#### [InputDataConfig \(p. 421\)](#)

Specifies the format and location of the input data for the job.

Type: [InputDataConfig \(p. 539\)](#) object

Required: Yes

#### [JobName \(p. 421\)](#)

The identifier of the events detection job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 256.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/=+\-%@]\*\$

Required: No

#### [LanguageCode \(p. 421\)](#)

The language code of the input documents.

Type: String

Valid Values: en

Required: Yes

#### [OutputDataConfig \(p. 421\)](#)

Specifies where to send the output files.

Type: [OutputDataConfig \(p. 546\)](#) object

Required: Yes

#### [Tags \(p. 421\)](#)

Tags to be associated with the events detection job. A tag is a key-value pair that adds metadata to a resource used by Amazon Comprehend. For example, a tag with "Sales" as the key might be added to a resource to indicate its use by the sales department.

Type: Array of [Tag \(p. 562\)](#) objects

Required: No

#### [TargetEventTypes \(p. 421\)](#)

The types of events to detect in the input documents.

Type: Array of strings

Array Members: Minimum number of 1 item.

Length Constraints: Minimum length of 1. Maximum length of 40.

Pattern: [A-Z\_]\*

Required: Yes

## Response Syntax

```
{  
    "JobArn": "string",  
    "JobId": "string",  
    "JobStatus": "string"  
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [JobArn \(p. 423\)](#)

The Amazon Resource Name (ARN) of the events detection job. It is a unique, fully qualified identifier for the job. It includes the AWS account, Region, and the job ID. The format of the ARN is as follows:

`arn:<partition>:comprehend:<region>:<account-id>:events-detection-job/<job-id>`

The following is an example job ARN:

`arn:aws:comprehend:us-west-2:111122223333:events-detection-job/1234abcd12ab34cd56ef1234567890ab`

Type: String

Length Constraints: Maximum length of 256.

Pattern: `arn:aws(-[^\:]+)?:comprehend:[a-zA-Z0-9-]*:[0-9]{12}:[a-zA-Z0-9-]{1,64}/[a-zA-Z0-9](-*[a-zA-Z0-9])*(/version/[a-zA-Z0-9](-*[a-zA-Z0-9])*)?`

### [JobId \(p. 423\)](#)

An unique identifier for the request. If you don't set the client request token, Amazon Comprehend generates one.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: `^([\\p{L}\\p{Z}]\\p{N}_.:+/-%@]*$`

### [JobStatus \(p. 423\)](#)

The status of the events detection job.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

**InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

**KmsKeyValidationException**

The KMS customer managed key (CMK) entered cannot be validated. Verify the key and re-enter it.

HTTP Status Code: 400

**TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

**TooManyTagsException**

The request contains more tags than can be associated with a resource (50 tags per resource). The maximum number of tags includes both existing tags and those included in your current request.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## StartKeyPhrasesDetectionJob

Starts an asynchronous key phrase detection job for a collection of documents. Use the [DescribeKeyPhrasesDetectionJob \(p. 320\)](#) operation to track the status of a job.

### Request Syntax

```
{  
    "ClientRequestToken": "string",  
    "DataAccessRoleArn": "string",  
    "InputDataConfig": {  
        "DocumentReaderConfig": {  
            "DocumentReadAction": "string",  
            "DocumentReadMode": "string",  
            "FeatureTypes": [ "string" ]  
        },  
        "InputFormat": "string",  
        "S3Uri": "string"  
    },  
    "JobName": "string",  
    "LanguageCode": "string",  
    "OutputDataConfig": {  
        "KmsKeyId": "string",  
        "S3Uri": "string"  
    },  
    "Tags": [  
        {  
            "Key": "string",  
            "Value": "string"  
        }  
    ],  
    "VolumeKmsKeyId": "string",  
    "VpcConfig": {  
        "SecurityGroupIds": [ "string" ],  
        "Subnets": [ "string" ]  
    }  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [ClientRequestToken \(p. 425\)](#)

A unique identifier for the request. If you don't set the client request token, Amazon Comprehend generates one.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 64.

Pattern: ^[a-zA-Z0-9-]+\$

Required: No

#### [DataAccessRoleArn \(p. 425\)](#)

The Amazon Resource Name (ARN) of the AWS Identity and Access Management (IAM) role that grants Amazon Comprehend read access to your input data. For more information, see <https://>

[docs.aws.amazon.com/comprehend/latest/dg/access-control-managing-permissions.html#auth-role-permissions](https://docs.aws.amazon.com/comprehend/latest/dg/access-control-managing-permissions.html#auth-role-permissions).

Type: String

Length Constraints: Minimum length of 20. Maximum length of 2048.

Pattern: arn:aws(-[^:]+)?:iam::[0-9]{12}:role/.+

Required: Yes

#### [InputDataConfig \(p. 425\)](#)

Specifies the format and location of the input data for the job.

Type: [InputDataConfig \(p. 539\)](#) object

Required: Yes

#### [JobName \(p. 425\)](#)

The identifier of the job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 256.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/+\\-%@]\*\$

Required: No

#### [LanguageCode \(p. 425\)](#)

The language of the input documents. You can specify any of the primary languages supported by Amazon Comprehend. All documents must be in the same language.

Type: String

Valid Values: en | es | fr | de | it | pt | ar | hi | ja | ko | zh | zh-TW

Required: Yes

#### [OutputDataConfig \(p. 425\)](#)

Specifies where to send the output files.

Type: [OutputDataConfig \(p. 546\)](#) object

Required: Yes

#### [Tags \(p. 425\)](#)

Tags to be associated with the key phrases detection job. A tag is a key-value pair that adds metadata to a resource used by Amazon Comprehend. For example, a tag with "Sales" as the key might be added to a resource to indicate its use by the sales department.

Type: Array of [Tag \(p. 562\)](#) objects

Required: No

#### [VolumeKmsKeyId \(p. 425\)](#)

ID for the AWS Key Management Service (KMS) key that Amazon Comprehend uses to encrypt data on the storage volume attached to the ML compute instance(s) that process the analysis job. The VolumeKmsKeyId can be either of the following formats:

- KMS Key ID: "1234abcd-12ab-34cd-56ef-1234567890ab"
- Amazon Resource Name (ARN) of a KMS Key: "arn:aws:kms:us-west-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab"

Type: String

Length Constraints: Maximum length of 2048.

Pattern: ^\p{ASCII}+\$

Required: No

#### [VpcConfig \(p. 425\)](#)

Configuration parameters for an optional private Virtual Private Cloud (VPC) containing the resources you are using for your key phrases detection job. For more information, see [Amazon VPC](#).

Type: [VpcConfig \(p. 571\)](#) object

Required: No

## Response Syntax

```
{  
    "JobArn": "string",  
    "JobId": "string",  
    "JobStatus": "string"  
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

#### [JobArn \(p. 427\)](#)

The Amazon Resource Name (ARN) of the key phrase detection job. It is a unique, fully qualified identifier for the job. It includes the AWS account, Region, and the job ID. The format of the ARN is as follows:

```
arn:<partition>:comprehend:<region>:<account-id>:key-phrases-detection-job/  
<job-id>
```

The following is an example job ARN:

```
arn:aws:comprehend:us-west-2:111122223333:key-phrases-detection-  
job/1234abcd12ab34cd56ef1234567890ab
```

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:[a-zA-Z0-9-]  
{1,64}/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*?)?

#### [JobId \(p. 427\)](#)

The identifier generated for the job. To get the status of a job, use this identifier with the [DescribeKeyPhrasesDetectionJob \(p. 320\)](#) operation.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:/-+\\-%@]\*\$

#### **JobStatus (p. 427)**

The status of the job.

- SUBMITTED - The job has been received and is queued for processing.
- IN\_PROGRESS - Amazon Comprehend is processing the job.
- COMPLETED - The job was successfully completed and the output is available.
- FAILED - The job did not complete. To get details, use the [DescribeKeyPhrasesDetectionJob \(p. 320\)](#) operation.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

#### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

#### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

#### **KmsKeyValidationException**

The KMS customer managed key (CMK) entered cannot be validated. Verify the key and re-enter it.

HTTP Status Code: 400

#### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

#### **TooManyTagsException**

The request contains more tags than can be associated with a resource (50 tags per resource). The maximum number of tags includes both existing tags and those included in your current request.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)

- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## StartPiiEntitiesDetectionJob

Starts an asynchronous PII entity detection job for a collection of documents.

### Request Syntax

```
{  
    "ClientRequestToken": "string",  
    "DataAccessRoleArn": "string",  
    "InputDataConfig": {  
        "DocumentReaderConfig": {  
            "DocumentReadAction": "string",  
            "DocumentReadMode": "string",  
            "FeatureTypes": [ "string" ]  
        },  
        "InputFormat": "string",  
        "S3Uri": "string"  
    },  
    "JobName": "string",  
    "LanguageCode": "string",  
    "Mode": "string",  
    "OutputDataConfig": {  
        "KmsKeyId": "string",  
        "S3Uri": "string"  
    },  
    "RedactionConfig": {  
        "MaskCharacter": "string",  
        "MaskMode": "string",  
        "PiiEntityTypes": [ "string" ]  
    },  
    "Tags": [  
        {  
            "Key": "string",  
            "Value": "string"  
        }  
    ]  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [ClientRequestToken \(p. 430\)](#)

A unique identifier for the request. If you don't set the client request token, Amazon Comprehend generates one.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 64.

Pattern: ^[a-zA-Z0-9-]+\$

Required: No

#### [DataAccessRoleArn \(p. 430\)](#)

The Amazon Resource Name (ARN) of the AWS Identity and Access Management (IAM) role that grants Amazon Comprehend read access to your input data.

Type: String

Length Constraints: Minimum length of 20. Maximum length of 2048.

Pattern: arn:aws(-[^:]+)?:iam::[0-9]{12}:role/.+

Required: Yes

#### [InputDataConfig \(p. 430\)](#)

The input properties for a PII entities detection job.

Type: [InputDataConfig \(p. 539\)](#) object

Required: Yes

#### [JobName \(p. 430\)](#)

The identifier of the job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 256.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/+=\-%@]\*\$

Required: No

#### [LanguageCode \(p. 430\)](#)

The language of the input documents. Currently, English is the only valid language.

Type: String

Valid Values: en

Required: Yes

#### [Mode \(p. 430\)](#)

Specifies whether the output provides the locations (offsets) of PII entities or a file in which PII entities are redacted.

Type: String

Valid Values: ONLY\_REDACTION | ONLY\_OFFSETS

Required: Yes

#### [OutputDataConfig \(p. 430\)](#)

Provides configuration parameters for the output of PII entity detection jobs.

Type: [OutputDataConfig \(p. 546\)](#) object

Required: Yes

#### [RedactionConfig \(p. 430\)](#)

Provides configuration parameters for PII entity redaction.

This parameter is required if you set the Mode parameter to ONLY\_REDACTION. In that case, you must provide a RedactionConfig definition that includes the PiiEntityTypes parameter.

Type: [RedactionConfig \(p. 555\)](#) object

Required: No

### [Tags \(p. 430\)](#)

Tags to be associated with the PII entities detection job. A tag is a key-value pair that adds metadata to a resource used by Amazon Comprehend. For example, a tag with "Sales" as the key might be added to a resource to indicate its use by the sales department.

Type: Array of [Tag \(p. 562\)](#) objects

Required: No

## Response Syntax

```
{  
    "JobArn": "string",  
    "JobId": "string",  
    "JobStatus": "string"  
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

### [JobArn \(p. 432\)](#)

The Amazon Resource Name (ARN) of the PII entity detection job. It is a unique, fully qualified identifier for the job. It includes the AWS account, Region, and the job ID. The format of the ARN is as follows:

```
arn:<partition>:comprehend:<region>:<account-id>:pii-entities-detection-job/  
<job-id>
```

The following is an example job ARN:

```
arn:aws:comprehend:us-west-2:111122223333:pii-entities-detection-  
job/1234abcd12ab34cd56ef1234567890ab
```

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:[a-zA-Z0-9-]  
{1,64}/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*?)?

### [JobId \(p. 432\)](#)

The identifier generated for the job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}]\p{N}\_.:/=+\-%@]\*\$

### [JobStatus \(p. 432\)](#)

The status of the job.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **KmsKeyValidationException**

The KMS customer managed key (CMK) entered cannot be validated. Verify the key and re-enter it.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

### **TooManyTagsException**

The request contains more tags than can be associated with a resource (50 tags per resource). The maximum number of tags includes both existing tags and those included in your current request.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## StartSentimentDetectionJob

Starts an asynchronous sentiment detection job for a collection of documents. Use the [DescribeSentimentDetectionJob \(p. 329\)](#) operation to track the status of a job.

### Request Syntax

```
{  
    "ClientRequestToken": "string",  
    "DataAccessRoleArn": "string",  
    "InputDataConfig": {  
        "DocumentReaderConfig": {  
            "DocumentReadAction": "string",  
            "DocumentReadMode": "string",  
            "FeatureTypes": [ "string" ]  
        },  
        "InputFormat": "string",  
        "S3Uri": "string"  
    },  
    "JobName": "string",  
    "LanguageCode": "string",  
    "OutputDataConfig": {  
        "KmsKeyId": "string",  
        "S3Uri": "string"  
    },  
    "Tags": [  
        {  
            "Key": "string",  
            "Value": "string"  
        }  
    ],  
    "VolumeKmsKeyId": "string",  
    "VpcConfig": {  
        "SecurityGroupIds": [ "string" ],  
        "Subnets": [ "string" ]  
    }  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [ClientRequestToken \(p. 434\)](#)

A unique identifier for the request. If you don't set the client request token, Amazon Comprehend generates one.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 64.

Pattern: ^[a-zA-Z0-9-]+\$

Required: No

#### [DataAccessRoleArn \(p. 434\)](#)

The Amazon Resource Name (ARN) of the AWS Identity and Access Management (IAM) role that grants Amazon Comprehend read access to your input data. For more information, see <https://>

[docs.aws.amazon.com/comprehend/latest/dg/access-control-managing-permissions.html#auth-role-permissions](https://docs.aws.amazon.com/comprehend/latest/dg/access-control-managing-permissions.html#auth-role-permissions).

Type: String

Length Constraints: Minimum length of 20. Maximum length of 2048.

Pattern: arn:aws(-[^:]+)?:iam::[0-9]{12}:role/.+

Required: Yes

#### [InputDataConfig \(p. 434\)](#)

Specifies the format and location of the input data for the job.

Type: [InputDataConfig \(p. 539\)](#) object

Required: Yes

#### [JobName \(p. 434\)](#)

The identifier of the job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 256.

Pattern: ^([\p{L}\p{Z}]\p{N}\_.:/:=+\-%@]\*\$

Required: No

#### [LanguageCode \(p. 434\)](#)

The language of the input documents. You can specify any of the primary languages supported by Amazon Comprehend. All documents must be in the same language.

Type: String

Valid Values: en | es | fr | de | it | pt | ar | hi | ja | ko | zh | zh-TW

Required: Yes

#### [OutputDataConfig \(p. 434\)](#)

Specifies where to send the output files.

Type: [OutputDataConfig \(p. 546\)](#) object

Required: Yes

#### [Tags \(p. 434\)](#)

Tags to be associated with the sentiment detection job. A tag is a key-value pair that adds metadata to a resource used by Amazon Comprehend. For example, a tag with "Sales" as the key might be added to a resource to indicate its use by the sales department.

Type: Array of [Tag \(p. 562\)](#) objects

Required: No

#### [VolumeKmsKeyId \(p. 434\)](#)

ID for the AWS Key Management Service (KMS) key that Amazon Comprehend uses to encrypt data on the storage volume attached to the ML compute instance(s) that process the analysis job. The VolumeKmsKeyId can be either of the following formats:

- KMS Key ID: "1234abcd-12ab-34cd-56ef-1234567890ab"
- Amazon Resource Name (ARN) of a KMS Key: "arn:aws:kms:us-west-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab"

Type: String

Length Constraints: Maximum length of 2048.

Pattern: ^\p{ASCII}+\$

Required: No

#### [VpcConfig \(p. 434\)](#)

Configuration parameters for an optional private Virtual Private Cloud (VPC) containing the resources you are using for your sentiment detection job. For more information, see [Amazon VPC](#).

Type: [VpcConfig \(p. 571\)](#) object

Required: No

## Response Syntax

```
{  
    "JobArn": "string",  
    "JobId": "string",  
    "JobStatus": "string"  
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

#### [JobArn \(p. 436\)](#)

The Amazon Resource Name (ARN) of the sentiment detection job. It is a unique, fully qualified identifier for the job. It includes the AWS account, Region, and the job ID. The format of the ARN is as follows:

```
arn:<partition>:comprehend:<region>:<account-id>:sentiment-detection-job/  
<job-id>
```

The following is an example job ARN:

```
arn:aws:comprehend:us-west-2:111122223333:sentiment-detection-  
job/1234abcd12ab34cd56ef1234567890ab
```

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:[a-zA-Z0-9-]  
{1,64}/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*?)?

#### [JobId \(p. 436\)](#)

The identifier generated for the job. To get the status of a job, use this identifier with the [DescribeSentimentDetectionJob \(p. 329\)](#) operation.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/+\\-%@]\*\$

#### **JobStatus (p. 436)**

The status of the job.

- SUBMITTED - The job has been received and is queued for processing.
- IN\_PROGRESS - Amazon Comprehend is processing the job.
- COMPLETED - The job was successfully completed and the output is available.
- FAILED - The job did not complete. To get details, use the [DescribeSentimentDetectionJob \(p. 329\)](#) operation.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **KmsKeyValidationException**

The KMS customer managed key (CMK) entered cannot be validated. Verify the key and re-enter it.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

### **TooManyTagsException**

The request contains more tags than can be associated with a resource (50 tags per resource). The maximum number of tags includes both existing tags and those included in your current request.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)

- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## StartTargetedSentimentDetectionJob

Starts an asynchronous targeted sentiment detection job for a collection of documents. Use the [DescribeTargetedSentimentDetectionJob \(p. 332\)](#) operation to track the status of a job.

### Request Syntax

```
{  
    "ClientRequestToken": "string",  
    "DataAccessRoleArn": "string",  
    "InputDataConfig": {  
        "DocumentReaderConfig": {  
            "DocumentReadAction": "string",  
            "DocumentReadMode": "string",  
            "FeatureTypes": [ "string" ]  
        },  
        "InputFormat": "string",  
        "S3Uri": "string"  
    },  
    "JobName": "string",  
    "LanguageCode": "string",  
    "OutputDataConfig": {  
        "KmsKeyId": "string",  
        "S3Uri": "string"  
    },  
    "Tags": [  
        {  
            "Key": "string",  
            "Value": "string"  
        }  
    ],  
    "VolumeKmsKeyId": "string",  
    "VpcConfig": {  
        "SecurityGroupIds": [ "string" ],  
        "Subnets": [ "string" ]  
    }  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [ClientRequestToken \(p. 439\)](#)

A unique identifier for the request. If you don't set the client request token, Amazon Comprehend generates one.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 64.

Pattern: ^[a-zA-Z0-9-]+\$

Required: No

### [DataAccessRoleArn \(p. 439\)](#)

The Amazon Resource Name (ARN) of the AWS Identity and Access Management (IAM) role that grants Amazon Comprehend read access to your input data. For more information, see [Role-based permissions](#).

Type: String

Length Constraints: Minimum length of 20. Maximum length of 2048.

Pattern: `arn:aws(-[^:]*)?:iam::[0-9]{12}:role/.+`

Required: Yes

### [InputDataConfig \(p. 439\)](#)

The input properties for an inference job.

Type: [InputDataConfig \(p. 539\)](#) object

Required: Yes

### [JobName \(p. 439\)](#)

The identifier of the job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 256.

Pattern: `^([\p{L}\p{Z}\p{N}_.:/=+\-%@]*$)`

Required: No

### [LanguageCode \(p. 439\)](#)

The language of the input documents. Currently, English is the only valid language.

Type: String

Valid Values: `en`

Required: Yes

### [OutputDataConfig \(p. 439\)](#)

Specifies where to send the output files.

Type: [OutputDataConfig \(p. 546\)](#) object

Required: Yes

### [Tags \(p. 439\)](#)

Tags to be associated with the targeted sentiment detection job. A tag is a key-value pair that adds metadata to a resource used by Amazon Comprehend. For example, a tag with "Sales" as the key might be added to a resource to indicate its use by the sales department.

Type: Array of [Tag \(p. 562\)](#) objects

Required: No

### [VolumeKmsKeyId \(p. 439\)](#)

ID for the AWS KMS key that Amazon Comprehend uses to encrypt data on the storage volume attached to the ML compute instance(s) that process the analysis job. The VolumeKmsKeyId can be either of the following formats:

- KMS Key ID: "1234abcd-12ab-34cd-56ef-1234567890ab"
- Amazon Resource Name (ARN) of a KMS Key: "arn:aws:kms:us-west-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab"

Type: String

Length Constraints: Maximum length of 2048.

Pattern: ^\p{ASCII}+\$

Required: No

#### [VpcConfig \(p. 439\)](#)

Configuration parameters for an optional private Virtual Private Cloud (VPC) containing the resources you are using for the job. For more information, see [Amazon VPC](#).

Type: [VpcConfig \(p. 571\)](#) object

Required: No

## Response Syntax

```
{  
    "JobArn": "string",  
    "JobId": "string",  
    "JobStatus": "string"  
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

#### [JobArn \(p. 441\)](#)

The Amazon Resource Name (ARN) of the targeted sentiment detection job. It is a unique, fully qualified identifier for the job. It includes the AWS account, Region, and the job ID. The format of the ARN is as follows:

```
arn:<partition>:comprehend:<region>:<account-id>:targeted-sentiment-detection-job/<job-id>
```

The following is an example job ARN:

```
arn:aws:comprehend:us-west-2:111122223333:targeted-sentiment-detection-job/1234abcd12ab34cd56ef1234567890ab
```

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:[a-zA-Z0-9-]{1,64}/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*)?

#### [JobId \(p. 441\)](#)

The identifier generated for the job. To get the status of a job, use this identifier with the [DescribeTargetedSentimentDetectionJob \(p. 332\)](#) operation.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/=+\-%@]\*\$

#### **JobStatus (p. 441)**

The status of the job.

- SUBMITTED - The job has been received and is queued for processing.
- IN\_PROGRESS - Amazon Comprehend is processing the job.
- COMPLETED - The job was successfully completed and the output is available.
- FAILED - The job did not complete. To get details, use the [DescribeTargetedSentimentDetectionJob \(p. 332\)](#) operation.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **KmsKeyValidationException**

The KMS customer managed key (CMK) entered cannot be validated. Verify the key and re-enter it.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

### **TooManyTagsException**

The request contains more tags than can be associated with a resource (50 tags per resource). The maximum number of tags includes both existing tags and those included in your current request.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)

- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## StartTopicsDetectionJob

Starts an asynchronous topic detection job. Use the `DescribeTopicDetectionJob` operation to track the status of a job.

### Request Syntax

```
{  
    "ClientRequestToken": "string",  
    "DataAccessRoleArn": "string",  
    "InputDataConfig": {  
        "DocumentReaderConfig": {  
            "DocumentReadAction": "string",  
            "DocumentReadMode": "string",  
            "FeatureTypes": [ "string" ]  
        },  
        "InputFormat": "string",  
        "S3Uri": "string"  
    },  
    "JobName": "string",  
    "NumberOfTopics": number,  
    "OutputDataConfig": {  
        "KmsKeyId": "string",  
        "S3Uri": "string"  
    },  
    "Tags": [  
        {  
            "Key": "string",  
            "Value": "string"  
        }  
    ],  
    "VolumeKmsKeyId": "string",  
    "VpcConfig": {  
        "SecurityGroupIds": [ "string" ],  
        "Subnets": [ "string" ]  
    }  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### **ClientRequestToken (p. 444)**

A unique identifier for the request. If you do not set the client request token, Amazon Comprehend generates one.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 64.

Pattern: ^[a-zA-Z0-9-]+\$

Required: No

#### **DataAccessRoleArn (p. 444)**

The Amazon Resource Name (ARN) of the AWS Identity and Access Management (IAM) role that grants Amazon Comprehend read access to your input data. For more information, see <https://>

[docs.aws.amazon.com/comprehend/latest/dg/access-control-managing-permissions.html#auth-role-permissions](https://docs.aws.amazon.com/comprehend/latest/dg/access-control-managing-permissions.html#auth-role-permissions).

Type: String

Length Constraints: Minimum length of 20. Maximum length of 2048.

Pattern: arn:aws(-[^:]\*)?:iam::[0-9]{12}:role/.+

Required: Yes

#### [InputDataConfig \(p. 444\)](#)

Specifies the format and location of the input data for the job.

Type: [InputDataConfig \(p. 539\)](#) object

Required: Yes

#### [JobName \(p. 444\)](#)

The identifier of the job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 256.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/=+\-%@]\*\$

Required: No

#### [NumberOfTopics \(p. 444\)](#)

The number of topics to detect.

Type: Integer

Valid Range: Minimum value of 1. Maximum value of 100.

Required: No

#### [OutputDataConfig \(p. 444\)](#)

Specifies where to send the output files. The output is a compressed archive with two files, `topic-terms.csv` that lists the terms associated with each topic, and `doc-topics.csv` that lists the documents associated with each topic

Type: [OutputDataConfig \(p. 546\)](#) object

Required: Yes

#### [Tags \(p. 444\)](#)

Tags to be associated with the topics detection job. A tag is a key-value pair that adds metadata to a resource used by Amazon Comprehend. For example, a tag with "Sales" as the key might be added to a resource to indicate its use by the sales department.

Type: Array of [Tag \(p. 562\)](#) objects

Required: No

#### [VolumeKmsKeyId \(p. 444\)](#)

ID for the AWS Key Management Service (KMS) key that Amazon Comprehend uses to encrypt data on the storage volume attached to the ML compute instance(s) that process the analysis job. The VolumeKmsKeyId can be either of the following formats:

- KMS Key ID: "1234abcd-12ab-34cd-56ef-1234567890ab"
- Amazon Resource Name (ARN) of a KMS Key: "arn:aws:kms:us-west-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab"

Type: String

Length Constraints: Maximum length of 2048.

Pattern: ^\p{ASCII}+\$

Required: No

#### VpcConfig (p. 444)

Configuration parameters for an optional private Virtual Private Cloud (VPC) containing the resources you are using for your topic detection job. For more information, see [Amazon VPC](#).

Type: [VpcConfig \(p. 571\)](#) object

Required: No

## Response Syntax

```
{  
    "JobArn": "string",  
    "JobId": "string",  
    "JobStatus": "string"  
}
```

## Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

#### JobArn (p. 446)

The Amazon Resource Name (ARN) of the topics detection job. It is a unique, fully qualified identifier for the job. It includes the AWS account, Region, and the job ID. The format of the ARN is as follows:

arn:<partition>:comprehend:<region>:<account-id>:topics-detection-job/<job-id>

The following is an example job ARN:

arn:aws:comprehend:us-west-2:111122223333:document-classification-job/1234abcd12ab34cd56ef1234567890ab

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^\:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:[a-zA-Z0-9-]{1,64}/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*?)?

#### JobId (p. 446)

The identifier generated for the job. To get the status of the job, use this identifier with the [DescribeTopicDetectionJob](#) operation.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/+\\-%@]\*\$

#### **JobStatus (p. 446)**

The status of the job:

- SUBMITTED - The job has been received and is queued for processing.
- IN\_PROGRESS - Amazon Comprehend is processing the job.
- COMPLETED - The job was successfully completed and the output is available.
- FAILED - The job did not complete. To get details, use the [DescribeTopicDetectionJob](#) operation.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **KmsKeyValidationException**

The KMS customer managed key (CMK) entered cannot be validated. Verify the key and re-enter it.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

### **TooManyTagsException**

The request contains more tags than can be associated with a resource (50 tags per resource). The maximum number of tags includes both existing tags and those included in your current request.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)

- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## StopDominantLanguageDetectionJob

Stops a dominant language detection job in progress.

If the job state is `IN_PROGRESS` the job is marked for termination and put into the `STOP_REQUESTED` state. If the job completes before it can be stopped, it is put into the `COMPLETED` state; otherwise the job is stopped and put into the `STOPPED` state.

If the job is in the `COMPLETED` or `FAILED` state when you call the `StopDominantLanguageDetectionJob` operation, the operation returns a 400 Internal Request Exception.

When a job is stopped, any documents already processed are written to the output location.

### Request Syntax

```
{  
    "JobId": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### **JobId (p. 449)**

The identifier of the dominant language detection job to stop.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}]\p{N}\_.:/:=+-%@]\*\$

Required: Yes

### Response Syntax

```
{  
    "JobId": "string",  
    "JobStatus": "string"  
}
```

### Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

#### **JobId (p. 449)**

The identifier of the dominant language detection job to stop.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([ \p{L}\p{Z}\p{N}\_.:/-+\\-%@]\*\$

#### [JobStatus \(p. 449\)](#)

Either STOP\_REQUESTED if the job is currently running, or STOPPED if the job was previously stopped with the StopDominantLanguageDetectionJob operation.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **JobNotFoundException**

The specified job was not found. Check the job ID and try again.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## StopEntitiesDetectionJob

Stops an entities detection job in progress.

If the job state is `IN_PROGRESS` the job is marked for termination and put into the `STOP_REQUESTED` state. If the job completes before it can be stopped, it is put into the `COMPLETED` state; otherwise the job is stopped and put into the `STOPPED` state.

If the job is in the `COMPLETED` or `FAILED` state when you call the `StopDominantLanguageDetectionJob` operation, the operation returns a 400 Internal Request Exception.

When a job is stopped, any documents already processed are written to the output location.

### Request Syntax

```
{  
    "JobId": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### **JobId (p. 451)**

The identifier of the entities detection job to stop.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}]\p{N}\_.:/:=+-%@]\*\$

Required: Yes

### Response Syntax

```
{  
    "JobId": "string",  
    "JobStatus": "string"  
}
```

### Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

#### **JobId (p. 451)**

The identifier of the entities detection job to stop.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:/-+-%@]\*\$

#### [JobStatus \(p. 451\)](#)

Either STOP\_REQUESTED if the job is currently running, or STOPPED if the job was previously stopped with the StopEntitiesDetectionJob operation.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **JobNotFoundException**

The specified job was not found. Check the job ID and try again.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## StopEventsDetectionJob

Stops an events detection job in progress.

### Request Syntax

```
{  
    "JobId": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### **JobId** (p. 453)

The identifier of the events detection job to stop.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/+=\-%@]\*\$

Required: Yes

### Response Syntax

```
{  
    "JobId": "string",  
    "JobStatus": "string"  
}
```

### Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

#### **JobId** (p. 453)

The identifier of the events detection job to stop.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/+=\-%@]\*\$

#### **JobStatus** (p. 453)

The status of the events detection job.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **JobNotFoundException**

The specified job was not found. Check the job ID and try again.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## StopKeyPhrasesDetectionJob

Stops a key phrases detection job in progress.

If the job state is `IN_PROGRESS` the job is marked for termination and put into the `STOP_REQUESTED` state. If the job completes before it can be stopped, it is put into the `COMPLETED` state; otherwise the job is stopped and put into the `STOPPED` state.

If the job is in the `COMPLETED` or `FAILED` state when you call the `StopDominantLanguageDetectionJob` operation, the operation returns a 400 Internal Request Exception.

When a job is stopped, any documents already processed are written to the output location.

### Request Syntax

```
{  
    "JobId": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### **JobId (p. 455)**

The identifier of the key phrases detection job to stop.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([ \p{L}\p{Z}\p{N}\_.:/=+\-%@]\*\$

Required: Yes

### Response Syntax

```
{  
    "JobId": "string",  
    "JobStatus": "string"  
}
```

### Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

#### **JobId (p. 455)**

The identifier of the key phrases detection job to stop.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:/-+\\-%@]\*\$

#### [JobStatus \(p. 455\)](#)

Either STOP\_REQUESTED if the job is currently running, or STOPPED if the job was previously stopped with the StopKeyPhrasesDetectionJob operation.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **JobNotFoundException**

The specified job was not found. Check the job ID and try again.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## StopPiiEntitiesDetectionJob

Stops a PII entities detection job in progress.

### Request Syntax

```
{  
    "JobId": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### **JobId** (p. 457)

The identifier of the PII entities detection job to stop.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}]\p{N}\_.:/+\\-%@]\*\$

Required: Yes

### Response Syntax

```
{  
    "JobId": "string",  
    "JobStatus": "string"  
}
```

### Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

#### **JobId** (p. 457)

The identifier of the PII entities detection job to stop.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}]\p{N}\_.:/+\\-%@]\*\$

#### **JobStatus** (p. 457)

The status of the PII entities detection job.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **JobNotFoundException**

The specified job was not found. Check the job ID and try again.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## StopSentimentDetectionJob

Stops a sentiment detection job in progress.

If the job state is `IN_PROGRESS`, the job is marked for termination and put into the `STOP_REQUESTED` state. If the job completes before it can be stopped, it is put into the `COMPLETED` state; otherwise the job is stopped and put into the `STOPPED` state.

If the job is in the `COMPLETED` or `FAILED` state when you call the `StopDominantLanguageDetectionJob` operation, the operation returns a 400 Internal Request Exception.

When a job is stopped, any documents already processed are written to the output location.

### Request Syntax

```
{  
    "JobId": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### **JobId (p. 459)**

The identifier of the sentiment detection job to stop.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}]\p{N}\_.:/:=+-%@]\*\$

Required: Yes

### Response Syntax

```
{  
    "JobId": "string",  
    "JobStatus": "string"  
}
```

### Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

#### **JobId (p. 459)**

The identifier of the sentiment detection job to stop.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:/-+%-@]\*\$

#### [JobStatus \(p. 459\)](#)

Either STOP\_REQUESTED if the job is currently running, or STOPPED if the job was previously stopped with the StopSentimentDetectionJob operation.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **JobNotFoundException**

The specified job was not found. Check the job ID and try again.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## StopTargetedSentimentDetectionJob

Stops a targeted sentiment detection job in progress.

If the job state is `IN_PROGRESS`, the job is marked for termination and put into the `STOP_REQUESTED` state. If the job completes before it can be stopped, it is put into the `COMPLETED` state; otherwise the job is stopped and put into the `STOPPED` state.

If the job is in the `COMPLETED` or `FAILED` state when you call the `StopDominantLanguageDetectionJob` operation, the operation returns a 400 Internal Request Exception.

When a job is stopped, any documents already processed are written to the output location.

### Request Syntax

```
{  
    "JobId": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### **JobId (p. 461)**

The identifier of the targeted sentiment detection job to stop.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}]\p{N}\_.:/:=+-%@]\*\$

Required: Yes

### Response Syntax

```
{  
    "JobId": "string",  
    "JobStatus": "string"  
}
```

### Response Elements

If the action is successful, the service sends back an HTTP 200 response.

The following data is returned in JSON format by the service.

#### **JobId (p. 461)**

The identifier of the targeted sentiment detection job to stop.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:/-+\\-%@]\*\$

#### [JobStatus \(p. 461\)](#)

Either STOP\_REQUESTED if the job is currently running, or STOPPED if the job was previously stopped with the StopSentimentDetectionJob operation.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **JobNotFoundException**

The specified job was not found. Check the job ID and try again.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## StopTrainingDocumentClassifier

Stops a document classifier training job while in progress.

If the training job state is `TRAINING`, the job is marked for termination and put into the `STOP_REQUESTED` state. If the training job completes before it can be stopped, it is put into the `TRAINED`; otherwise the training job is stopped and put into the `STOPPED` state and the service sends back an HTTP 200 response with an empty HTTP body.

### Request Syntax

```
{  
    "DocumentClassifierArn": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### **DocumentClassifierArn (p. 463)**

The Amazon Resource Name (ARN) that identifies the document classifier currently being trained.

Type: String

Length Constraints: Maximum length of 256.

Pattern: `arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]*:[0-9]{12}:document-classifier/[a-zA-Z0-9](-*[a-zA-Z0-9])*(/version/[a-zA-Z0-9](-*[a-zA-Z0-9])*)?`

Required: Yes

### Response Elements

If the action is successful, the service sends back an HTTP 200 response with an empty HTTP body.

### Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

#### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

#### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

#### **ResourceNotFoundException**

The specified resource ARN was not found. Check the ARN and try your request again.

HTTP Status Code: 400

### TooManyRequestsException

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## StopTrainingEntityRecognizer

Stops an entity recognizer training job while in progress.

If the training job state is `TRAINING`, the job is marked for termination and put into the `STOP_REQUESTED` state. If the training job completes before it can be stopped, it is put into the `TRAINED`; otherwise the training job is stopped and put into the `STOPPED` state and the service sends back an HTTP 200 response with an empty HTTP body.

### Request Syntax

```
{  
    "EntityRecognizerArn": "string"  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### **EntityRecognizerArn (p. 465)**

The Amazon Resource Name (ARN) that identifies the entity recognizer currently being trained.

Type: String

Length Constraints: Maximum length of 256.

Pattern: `arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]*:[0-9]{12}:entity-recognizer/[a-zA-Z0-9](-*[a-zA-Z0-9])*(/version/[a-zA-Z0-9](-*[a-zA-Z0-9])*)?`

Required: Yes

### Response Elements

If the action is successful, the service sends back an HTTP 200 response with an empty HTTP body.

### Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

#### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

#### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

#### **ResourceNotFoundException**

The specified resource ARN was not found. Check the ARN and try your request again.

HTTP Status Code: 400

### TooManyRequestsException

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## TagResource

Associates a specific tag with an Amazon Comprehend resource. A tag is a key-value pair that adds as a metadata to a resource used by Amazon Comprehend. For example, a tag with "Sales" as the key might be added to a resource to indicate its use by the sales department.

### Request Syntax

```
{  
    "ResourceArn": "string",  
    "Tags": [  
        {  
            "Key": "string",  
            "Value": "string"  
        }  
    ]  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### **ResourceArn (p. 467)**

The Amazon Resource Name (ARN) of the given Amazon Comprehend resource to which you want to associate the tags.

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:[a-zA-Z0-9-]{1,64}/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*)?

Required: Yes

#### **Tags (p. 467)**

Tags being associated with a specific Amazon Comprehend resource. There can be a maximum of 50 tags (both existing and pending) associated with a specific resource.

Type: Array of [Tag \(p. 562\)](#) objects

Required: Yes

## Response Elements

If the action is successful, the service sends back an HTTP 200 response with an empty HTTP body.

### Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **ConcurrentModificationException**

Concurrent modification of the tags associated with an Amazon Comprehend resource is not supported.

HTTP Status Code: 400

### **InternalServerException**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **ResourceNotFoundException**

The specified resource ARN was not found. Check the ARN and try your request again.

HTTP Status Code: 400

### **TooManyTagsException**

The request contains more tags than can be associated with a resource (50 tags per resource). The maximum number of tags includes both existing tags and those included in your current request.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## UntagResource

Removes a specific tag associated with an Amazon Comprehend resource.

### Request Syntax

```
{  
    "ResourceArn": "string",  
    "TagKeys": [ "string" ]  
}
```

### Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

#### [ResourceArn \(p. 469\)](#)

The Amazon Resource Name (ARN) of the given Amazon Comprehend resource from which you want to remove the tags.

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^\:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:[a-zA-Z0-9-]{1,64}/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*)?

Required: Yes

#### [TagKeys \(p. 469\)](#)

The initial part of a key-value pair that forms a tag being removed from a given resource. For example, a tag with "Sales" as the key might be added to a resource to indicate its use by the sales department. Keys must be unique and cannot be duplicated for a particular resource.

Type: Array of strings

Length Constraints: Minimum length of 1. Maximum length of 128.

Required: Yes

### Response Elements

If the action is successful, the service sends back an HTTP 200 response with an empty HTTP body.

### Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

#### [ConcurrentModificationException](#)

Concurrent modification of the tags associated with an Amazon Comprehend resource is not supported.

HTTP Status Code: 400

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **ResourceNotFoundException**

The specified resource ARN was not found. Check the ARN and try your request again.

HTTP Status Code: 400

### **TooManyTagKeysException**

The request contains more tag keys than can be associated with a resource (50 tag keys per resource).

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

# UpdateEndpoint

Updates information about the specified endpoint. For information about endpoints, see [Managing endpoints](#).

## Request Syntax

```
{  
    "DesiredDataAccessRoleArn": "string",  
    "DesiredInferenceUnits": number,  
    "DesiredModelArn": "string",  
    "EndpointArn": "string"  
}
```

## Request Parameters

For information about the parameters that are common to all actions, see [Common Parameters \(p. 571\)](#).

The request accepts the following data in JSON format.

### [DesiredDataAccessRoleArn \(p. 471\)](#)

Data access role ARN to use in case the new model is encrypted with a customer CMK.

Type: String

Length Constraints: Minimum length of 20. Maximum length of 2048.

Pattern: arn:aws(-[^:]+)?::iam::[0-9]{12}:role/.+

Required: No

### [DesiredInferenceUnits \(p. 471\)](#)

The desired number of inference units to be used by the model using this endpoint. Each inference unit represents of a throughput of 100 characters per second.

Type: Integer

Valid Range: Minimum value of 1.

Required: No

### [DesiredModelArn \(p. 471\)](#)

The ARN of the new model to use when updating an existing endpoint.

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]+)?::comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:(document-classifier|entity-recognizer)/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*)?

Required: No

### [EndpointArn \(p. 471\)](#)

The Amazon Resource Number (ARN) of the endpoint being updated.

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:(document-classifier-endpoint|entity-recognizer-endpoint)/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*

Required: Yes

## Response Elements

If the action is successful, the service sends back an HTTP 200 response with an empty HTTP body.

## Errors

For information about the errors that are common to all actions, see [Common Errors \(p. 573\)](#).

### **InternalServerError**

An internal server error occurred. Retry your request.

HTTP Status Code: 500

### **InvalidRequestException**

The request is invalid.

HTTP Status Code: 400

### **ResourceInUseException**

The specified resource name is already in use. Use a different name and try your request again.

HTTP Status Code: 400

### **ResourceLimitExceeded**

The maximum number of resources per account has been exceeded. Review the resources, and then try your request again.

HTTP Status Code: 400

### **ResourceNotFoundException**

The specified resource ARN was not found. Check the ARN and try your request again.

HTTP Status Code: 400

### **ResourceUnavailableException**

The specified resource is not available. Check the resource and try your request again.

HTTP Status Code: 400

### **TooManyRequestsException**

The number of requests exceeds the limit. Resubmit your request later.

HTTP Status Code: 400

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS Command Line Interface](#)
- [AWS SDK for .NET](#)
- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for JavaScript](#)
- [AWS SDK for PHP V3](#)
- [AWS SDK for Python](#)
- [AWS SDK for Ruby V3](#)

## Data Types

The following data types are supported:

- [AugmentedManifestsListItem \(p. 475\)](#)
- [BatchDetectDominantLanguageItemResult \(p. 477\)](#)
- [BatchDetectEntitiesItemResult \(p. 478\)](#)
- [BatchDetectKeyPhrasesItemResult \(p. 479\)](#)
- [BatchDetectSentimentItemResult \(p. 480\)](#)
- [BatchDetectSyntaxItemResult \(p. 481\)](#)
- [BatchItemError \(p. 482\)](#)
- [ClassifierEvaluationMetrics \(p. 483\)](#)
- [ClassifierMetadata \(p. 485\)](#)
- [DocumentClass \(p. 486\)](#)
- [DocumentClassificationJobFilter \(p. 487\)](#)
- [DocumentClassificationJobProperties \(p. 488\)](#)
- [DocumentClassifierFilter \(p. 491\)](#)
- [DocumentClassifierInputDataConfig \(p. 492\)](#)
- [DocumentClassifierOutputDataConfig \(p. 494\)](#)
- [DocumentClassifierProperties \(p. 495\)](#)
- [DocumentClassifierSummary \(p. 499\)](#)
- [DocumentLabel \(p. 501\)](#)
- [DocumentReaderConfig \(p. 502\)](#)
- [DominantLanguage \(p. 503\)](#)
- [DominantLanguageDetectionJobFilter \(p. 504\)](#)
- [DominantLanguageDetectionJobProperties \(p. 505\)](#)
- [EndpointFilter \(p. 508\)](#)
- [EndpointProperties \(p. 509\)](#)
- [EntitiesDetectionJobFilter \(p. 512\)](#)
- [EntitiesDetectionJobProperties \(p. 513\)](#)
- [Entity \(p. 516\)](#)
- [EntityLabel \(p. 518\)](#)
- [EntityRecognizerAnnotations \(p. 519\)](#)
- [EntityRecognizerDocuments \(p. 520\)](#)
- [EntityRecognizerEntityList \(p. 521\)](#)

- [EntityRecognizerEvaluationMetrics \(p. 522\)](#)
- [EntityRecognizerFilter \(p. 523\)](#)
- [EntityRecognizerInputDataConfig \(p. 524\)](#)
- [EntityRecognizerMetadata \(p. 526\)](#)
- [EntityRecognizerMetadataEntityTypesListItem \(p. 527\)](#)
- [EntityRecognizerProperties \(p. 528\)](#)
- [EntityRecognizerSummary \(p. 531\)](#)
- [EntityTypesEvaluationMetrics \(p. 533\)](#)
- [EntityTypesListItem \(p. 534\)](#)
- [EventsDetectionJobFilter \(p. 535\)](#)
- [EventsDetectionJobProperties \(p. 536\)](#)
- [InputDataConfig \(p. 539\)](#)
- [KeyPhrase \(p. 541\)](#)
- [KeyPhrasesDetectionJobFilter \(p. 542\)](#)
- [KeyPhrasesDetectionJobProperties \(p. 543\)](#)
- [OutputDataConfig \(p. 546\)](#)
- [PartOfSpeechTag \(p. 547\)](#)
- [PiiEntitiesDetectionJobFilter \(p. 548\)](#)
- [PiiEntitiesDetectionJobProperties \(p. 549\)](#)
- [PiiEntity \(p. 552\)](#)
- [PiiOutputDataConfig \(p. 554\)](#)
- [RedactionConfig \(p. 555\)](#)
- [SentimentDetectionJobFilter \(p. 556\)](#)
- [SentimentDetectionJobProperties \(p. 557\)](#)
- [SentimentScore \(p. 560\)](#)
- [SyntaxToken \(p. 561\)](#)
- [Tag \(p. 562\)](#)
- [TargetedSentimentDetectionJobFilter \(p. 563\)](#)
- [TargetedSentimentDetectionJobProperties \(p. 564\)](#)
- [TopicsDetectionJobFilter \(p. 567\)](#)
- [TopicsDetectionJobProperties \(p. 568\)](#)
- [VpcConfig \(p. 571\)](#)

## AugmentedManifestsListItem

An augmented manifest file that provides training data for your custom model. An augmented manifest file is a labeled dataset that is produced by Amazon SageMaker Ground Truth.

### Contents

#### AnnotationDataS3Uri

The S3 prefix to the annotation files that are referred in the augmented manifest file.

Type: String

Length Constraints: Maximum length of 1024.

Pattern: s3://[a-zA-Z0-9][\.\-\a-zA-Z0-9]{1,61}[a-zA-Z0-9](/.\*)?

Required: No

#### AttributeNames

The JSON attribute that contains the annotations for your training documents. The number of attribute names that you specify depends on whether your augmented manifest file is the output of a single labeling job or a chained labeling job.

If your file is the output of a single labeling job, specify the LabelAttributeName key that was used when the job was created in Ground Truth.

If your file is the output of a chained labeling job, specify the LabelAttributeName key for one or more jobs in the chain. Each LabelAttributeName key provides the annotations from an individual job.

Type: Array of strings

Length Constraints: Minimum length of 1. Maximum length of 63.

Pattern: ^[a-zA-Z0-9](-\*[a-zA-Z0-9])\*

Required: Yes

#### DocumentType

The type of augmented manifest. PlainTextDocument or SemiStructuredDocument. If you don't specify, the default is PlainTextDocument.

- PLAIN\_TEXT\_DOCUMENT A document type that represents any unicode text that is encoded in UTF-8.
- SEMI\_STRUCTURED\_DOCUMENT A document type with positional and structural context, like a PDF. For training with Amazon Comprehend, only PDFs are supported. For inference, Amazon Comprehend support PDFs, DOCX and TXT.

Type: String

Valid Values: PLAIN\_TEXT\_DOCUMENT | SEMI\_STRUCTURED\_DOCUMENT

Required: No

#### S3Uri

The Amazon S3 location of the augmented manifest file.

Type: String

Length Constraints: Maximum length of 1024.

Pattern: `s3://[a-z0-9][\.\-\_a-z0-9]{1,61}[a-z0-9](/.*)?`

Required: Yes

#### **SourceDocumentsS3Uri**

The S3 prefix to the source files (PDFs) that are referred to in the augmented manifest file.

Type: String

Length Constraints: Maximum length of 1024.

Pattern: `s3://[a-z0-9][\.\-\_a-z0-9]{1,61}[a-z0-9](/.*)?`

Required: No

#### **Split**

The purpose of the data you've provided in the augmented manifest. You can either train or test this data. If you don't specify, the default is train.

TRAIN - all of the documents in the manifest will be used for training. If no test documents are provided, Amazon Comprehend will automatically reserve a portion of the training documents for testing.

TEST - all of the documents in the manifest will be used for testing.

Type: String

Valid Values: TRAIN | TEST

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## BatchDetectDominantLanguageItemResult

The result of calling the [BatchDetectDominantLanguage \(p. 257\)](#) operation. The operation returns one object for each document that is successfully processed by the operation.

### Contents

#### Index

The zero-based index of the document in the input list.

Type: Integer

Required: No

#### Languages

One or more [DominantLanguage \(p. 503\)](#) objects describing the dominant languages in the document.

Type: Array of [DominantLanguage \(p. 503\)](#) objects

Required: No

### See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## BatchDetectEntitiesItemResult

The result of calling the [BatchDetectEntities \(p. 260\)](#) operation. The operation returns one object for each document that is successfully processed by the operation.

### Contents

#### Entities

One or more [Entity \(p. 516\)](#) objects, one for each entity detected in the document.

Type: Array of [Entity \(p. 516\)](#) objects

Required: No

#### Index

The zero-based index of the document in the input list.

Type: Integer

Required: No

### See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## BatchDetectKeyPhrasesItemResult

The result of calling the [BatchDetectKeyPhrases \(p. 263\)](#) operation. The operation returns one object for each document that is successfully processed by the operation.

### Contents

#### Index

The zero-based index of the document in the input list.

Type: Integer

Required: No

#### KeyPhrases

One or more [KeyPhrase \(p. 541\)](#) objects, one for each key phrase detected in the document.

Type: Array of [KeyPhrase \(p. 541\)](#) objects

Required: No

### See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## BatchDetectSentimentItemResult

The result of calling the [BatchDetectSentiment \(p. 266\)](#) operation. The operation returns one object for each document that is successfully processed by the operation.

### Contents

#### Index

The zero-based index of the document in the input list.

Type: Integer

Required: No

#### Sentiment

The sentiment detected in the document.

Type: String

Valid Values: POSITIVE | NEGATIVE | NEUTRAL | MIXED

Required: No

#### SentimentScore

The level of confidence that Amazon Comprehend has in the accuracy of its sentiment detection.

Type: [SentimentScore \(p. 560\)](#) object

Required: No

### See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## BatchDetectSyntaxItemResult

The result of calling the [BatchDetectSyntax](#) (p. 269) operation. The operation returns one object that is successfully processed by the operation.

### Contents

#### Index

The zero-based index of the document in the input list.

Type: Integer

Required: No

#### SyntaxTokens

The syntax tokens for the words in the document, one token for each word.

Type: Array of [SyntaxToken](#) (p. 561) objects

Required: No

### See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## BatchItemError

Describes an error that occurred while processing a document in a batch. The operation returns one `BatchItemError` object for each document that contained an error.

### Contents

#### **ErrorCode**

The numeric error code of the error.

Type: String

Length Constraints: Minimum length of 1.

Required: No

#### **ErrorMessage**

A text description of the error.

Type: String

Length Constraints: Minimum length of 1.

Required: No

#### **Index**

The zero-based index of the document in the input list.

Type: Integer

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# ClassifierEvaluationMetrics

Describes the result metrics for the test data associated with an documentation classifier.

## Contents

### Accuracy

The fraction of the labels that were correct recognized. It is computed by dividing the number of labels in the test documents that were correctly recognized by the total number of labels in the test documents.

Type: Double

Required: No

### F1Score

A measure of how accurate the classifier results are for the test data. It is derived from the Precision and Recall values. The F1Score is the harmonic average of the two scores. The highest score is 1, and the worst score is 0.

Type: Double

Required: No

### HammingLoss

Indicates the fraction of labels that are incorrectly predicted. Also seen as the fraction of wrong labels compared to the total number of labels. Scores closer to zero are better.

Type: Double

Required: No

### MicroF1Score

A measure of how accurate the classifier results are for the test data. It is a combination of the Micro Precision and Micro Recall values. The Micro F1Score is the harmonic mean of the two scores. The highest score is 1, and the worst score is 0.

Type: Double

Required: No

### MicroPrecision

A measure of the usefulness of the recognizer results in the test data. High precision means that the recognizer returned substantially more relevant results than irrelevant ones. Unlike the Precision metric which comes from averaging the precision of all available labels, this is based on the overall score of all precision scores added together.

Type: Double

Required: No

### MicroRecall

A measure of how complete the classifier results are for the test data. High recall means that the classifier returned most of the relevant results. Specifically, this indicates how many of the correct categories in the text that the model can predict. It is a percentage of correct categories in the text that can be found. Instead of averaging the recall scores of all labels (as with Recall), micro Recall is based on the overall score of all recall scores added together.

Type: Double

Required: No

#### Precision

A measure of the usefulness of the classifier results in the test data. High precision means that the classifier returned substantially more relevant results than irrelevant ones.

Type: Double

Required: No

#### Recall

A measure of how complete the classifier results are for the test data. High recall means that the classifier returned most of the relevant results.

Type: Double

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# ClassifierMetadata

Provides information about a document classifier.

## Contents

### EvaluationMetrics

Describes the result metrics for the test data associated with an documentation classifier.

Type: [ClassifierEvaluationMetrics \(p. 483\)](#) object

Required: No

### NumberOfLabels

The number of labels in the input data.

Type: Integer

Required: No

### NumberOfTestDocuments

The number of documents in the input data that were used to test the classifier. Typically this is 10 to 20 percent of the input documents, up to 10,000 documents.

Type: Integer

Required: No

### NumberOfTrainedDocuments

The number of documents in the input data that were used to train the classifier. Typically this is 80 to 90 percent of the input documents.

Type: Integer

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## DocumentClass

Specifies the class that categorizes the document being analyzed

### Contents

#### Name

The name of the class.

Type: String

Length Constraints: Minimum length of 1.

Required: No

#### Score

The confidence score that Amazon Comprehend has this class correctly attributed.

Type: Float

Required: No

### See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## DocumentClassificationJobFilter

Provides information for filtering a list of document classification jobs. For more information, see the [ListDocumentClassificationJobs \(p. 360\)](#) operation. You can provide only one filter parameter in each request.

### Contents

#### JobName

Filters on the name of the job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 256.

Pattern: ^([\p{L}\p{Z}]\p{N}\_.:=/+\\-%@]\*\$

Required: No

#### JobStatus

Filters the list based on job status. Returns only jobs with the specified status.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

Required: No

#### SubmitTimeAfter

Filters the list of jobs based on the time that the job was submitted for processing. Returns only jobs submitted after the specified time. Jobs are returned in descending order, newest to oldest.

Type: Timestamp

Required: No

#### SubmitTimeBefore

Filters the list of jobs based on the time that the job was submitted for processing. Returns only jobs submitted before the specified time. Jobs are returned in ascending order, oldest to newest.

Type: Timestamp

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# DocumentClassificationJobProperties

Provides information about a document classification job.

## Contents

### DataAccessRoleArn

The Amazon Resource Name (ARN) of the AWS identity and Access Management (IAM) role that grants Amazon Comprehend read access to your input data.

Type: String

Length Constraints: Minimum length of 20. Maximum length of 2048.

Pattern: `arn:aws(-[^:]+)?:iam::[0-9]{12}:role/.+`

Required: No

### DocumentClassifierArn

The Amazon Resource Name (ARN) that identifies the document classifier.

Type: String

Length Constraints: Maximum length of 256.

Pattern: `arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]*:[0-9]{12}:document-classifier/[a-zA-Z0-9](-*[a-zA-Z0-9])*(/version/[a-zA-Z0-9](-*[a-zA-Z0-9])*)?`

Required: No

### EndTime

The time that the document classification job completed.

Type: Timestamp

Required: No

### InputDataConfig

The input data configuration that you supplied when you created the document classification job.

Type: [InputDataConfig \(p. 539\)](#) object

Required: No

### JobArn

The Amazon Resource Name (ARN) of the document classification job. It is a unique, fully qualified identifier for the job. It includes the AWS account, Region, and the job ID. The format of the ARN is as follows:

`arn:<partition>:comprehend:<region>:<account-id>:document-classification-job/<job-id>`

The following is an example job ARN:

`arn:aws:comprehend:us-west-2:111122223333:document-classification-job/1234abcd12ab34cd56ef1234567890ab`

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[ ^:]\*)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:[a-zA-Z0-9-]{1,64}/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*)?

Required: No

#### **JobId**

The identifier assigned to the document classification job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/=+\-%@]\*)\$

Required: No

#### **JobName**

The name that you assigned to the document classification job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 256.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/=+\-%@]\*)\$

Required: No

#### **JobStatus**

The current status of the document classification job. If the status is FAILED, the Message field shows the reason for the failure.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

Required: No

#### **Message**

A description of the status of the job.

Type: String

Required: No

#### **OutputDataConfig**

The output data configuration that you supplied when you created the document classification job.

Type: [OutputDataConfig \(p. 546\)](#) object

Required: No

#### **SubmitTime**

The time that the document classification job was submitted for processing.

Type: Timestamp

Required: No

**VolumeKmsKeyId**

ID for the AWS Key Management Service (KMS) key that Amazon Comprehend uses to encrypt data on the storage volume attached to the ML compute instance(s) that process the analysis job. The VolumeKmsKeyId can be either of the following formats:

- KMS Key ID: "1234abcd-12ab-34cd-56ef-1234567890ab"
- Amazon Resource Name (ARN) of a KMS Key: "arn:aws:kms:us-west-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab"

Type: String

Length Constraints: Maximum length of 2048.

Pattern: ^\p{ASCII}+\$

Required: No

**VpcConfig**

Configuration parameters for a private Virtual Private Cloud (VPC) containing the resources you are using for your document classification job. For more information, see [Amazon VPC](#).

Type: [VpcConfig \(p. 571\)](#) object

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## DocumentClassifierFilter

Provides information for filtering a list of document classifiers. You can only specify one filtering parameter in a request. For more information, see the [ListDocumentClassifiers \(p. 363\)](#) operation.

### Contents

#### DocumentClassifierName

The name that you assigned to the document classifier

Type: String

Length Constraints: Maximum length of 63.

Pattern: ^[a-zA-Z0-9](-\*[a-zA-Z0-9])\*\$

Required: No

#### Status

Filters the list of classifiers based on status.

Type: String

Valid Values: SUBMITTED | TRAINING | DELETING | STOP\_REQUESTED | STOPPED | IN\_ERROR | TRAINED

Required: No

#### SubmitTimeAfter

Filters the list of classifiers based on the time that the classifier was submitted for processing. Returns only classifiers submitted after the specified time. Classifiers are returned in descending order, newest to oldest.

Type: Timestamp

Required: No

#### SubmitTimeBefore

Filters the list of classifiers based on the time that the classifier was submitted for processing. Returns only classifiers submitted before the specified time. Classifiers are returned in ascending order, oldest to newest.

Type: Timestamp

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# DocumentClassifierInputDataConfig

The input properties for training a document classifier.

For more information on how the input file is formatted, see [Preparing training data \(p. 100\)](#).

## Contents

### AugmentedManifests

A list of augmented manifest files that provide training data for your custom model. An augmented manifest file is a labeled dataset that is produced by Amazon SageMaker Ground Truth.

This parameter is required if you set `DataFormat` to `AUGMENTED_MANIFEST`.

Type: Array of [AugmentedManifestsListItem \(p. 475\)](#) objects

Required: No

### DataFormat

The format of your training data:

- `COMPREHEND_CSV`: A two-column CSV file, where labels are provided in the first column, and documents are provided in the second. If you use this value, you must provide the `S3Uri` parameter in your request.
- `AUGMENTED_MANIFEST`: A labeled dataset that is produced by Amazon SageMaker Ground Truth. This file is in JSON lines format. Each line is a complete JSON object that contains a training document and its associated labels.

If you use this value, you must provide the `AugmentedManifests` parameter in your request.

If you don't specify a value, Amazon Comprehend uses `COMPREHEND_CSV` as the default.

Type: String

Valid Values: `COMPREHEND_CSV` | `AUGMENTED_MANIFEST`

Required: No

### LabelDelimiter

Indicates the delimiter used to separate each label for training a multi-label classifier. The default delimiter between labels is a pipe (|). You can use a different character as a delimiter (if it's an allowed character) by specifying it under `Delimiter` for labels. If the training documents use a delimiter other than the default or the delimiter you specify, the labels on that line will be combined to make a single unique label, such as LABEL1LABEL2LABEL.

Type: String

Length Constraints: Fixed length of 1.

Pattern: ^[ ~!@#\$%^\*-\_+=|\\";:\t>?/]\$

Required: No

### S3Uri

The Amazon S3 URI for the input data. The S3 bucket must be in the same region as the API endpoint that you are calling. The URI can point to a single input file or it can provide the prefix for a collection of input files.

For example, if you use the URI `s3://bucketName/prefix`, if the prefix is a single file, Amazon Comprehend uses that file as input. If more than one file begins with the prefix, Amazon Comprehend uses all of them as input.

This parameter is required if you set `DataFormat` to `COMPREHEND_CSV`.

Type: String

Length Constraints: Maximum length of 1024.

Pattern: `s3://[a-z0-9][\.\-\a-z0-9]{1,61}[a-z0-9](/.*?)?`

Required: No

#### TestS3Uri

This specifies the Amazon S3 location where the test annotations for an entity recognizer are located. The URI must be in the same AWS Region as the API endpoint that you are calling.

Type: String

Length Constraints: Maximum length of 1024.

Pattern: `s3://[a-z0-9][\.\-\a-z0-9]{1,61}[a-z0-9](/.*?)?`

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# DocumentClassifierOutputDataConfig

Provides output results configuration parameters for custom classifier jobs.

## Contents

### KmsKeyId

ID for the AWS Key Management Service (KMS) key that Amazon Comprehend uses to encrypt the output results from an analysis job. The KmsKeyId can be one of the following formats:

- KMS Key ID: "1234abcd-12ab-34cd-56ef-1234567890ab"
- Amazon Resource Name (ARN) of a KMS Key: "arn:aws:kms:us-west-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab"
- KMS Key Alias: "alias/ExampleAlias"
- ARN of a KMS Key Alias: "arn:aws:kms:us-west-2:111122223333:alias/ExampleAlias"

Type: String

Length Constraints: Maximum length of 2048.

Pattern: ^\p{ASCII}+\$

Required: No

### S3Uri

When you use the `OutputDataConfig` object while creating a custom classifier, you specify the Amazon S3 location where you want to write the confusion matrix. The URI must be in the same region as the API endpoint that you are calling. The location is used as the prefix for the actual location of this output file.

When the custom classifier job is finished, the service creates the output file in a directory specific to the job. The `S3Uri` field contains the location of the output file, called `output.tar.gz`. It is a compressed archive that contains the confusion matrix.

Type: String

Length Constraints: Maximum length of 1024.

Pattern: s3://[a-z0-9][\.-a-z0-9]{1,61}[a-z0-9](/.\*)?

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# DocumentClassifierProperties

Provides information about a document classifier.

## Contents

### ClassifierMetadata

Information about the document classifier, including the number of documents used for training the classifier, the number of documents used for test the classifier, and an accuracy rating.

Type: [ClassifierMetadata \(p. 485\)](#) object

Required: No

### DataAccessRoleArn

The Amazon Resource Name (ARN) of the AWS Identity and Management (IAM) role that grants Amazon Comprehend read access to your input data.

Type: String

Length Constraints: Minimum length of 20. Maximum length of 2048.

Pattern: `arn:aws(-[^:]+)?::iam::[0-9]{12}:role/.+`

Required: No

### DocumentClassifierArn

The Amazon Resource Name (ARN) that identifies the document classifier.

Type: String

Length Constraints: Maximum length of 256.

Pattern: `arn:aws(-[^:]+)?::comprehend:[a-zA-Z0-9-]*:[0-9]{12}:document-classifier/[a-zA-Z0-9](-*[a-zA-Z0-9])*(/version/[a-zA-Z0-9](-*[a-zA-Z0-9])*?)?`

Required: No

### EndTime

The time that training the document classifier completed.

Type: Timestamp

Required: No

### InputDataConfig

The input data configuration that you supplied when you created the document classifier for training.

Type: [DocumentClassifierInputDataConfig \(p. 492\)](#) object

Required: No

### LanguageCode

The language code for the language of the documents that the classifier was trained on.

Type: String

Valid Values: en | es | fr | de | it | pt

Required: No

#### Message

Additional information about the status of the classifier.

Type: String

Required: No

#### Mode

Indicates the mode in which the specific classifier was trained. This also indicates the format of input documents and the format of the confusion matrix. Each classifier can only be trained in one mode and this cannot be changed once the classifier is trained.

Type: String

Valid Values: MULTI\_CLASS | MULTI\_LABEL

Required: No

#### ModelKmsKeyId

ID for the AWS Key Management Service (KMS) key that Amazon Comprehend uses to encrypt trained custom models. The ModelKmsKeyId can be either of the following formats:

- KMS Key ID: "1234abcd-12ab-34cd-56ef-1234567890ab"
- Amazon Resource Name (ARN) of a KMS Key: "arn:aws:kms:us-west-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab"

Type: String

Length Constraints: Maximum length of 2048.

Pattern: ^\p{ASCII}+\$

Required: No

#### OutputDataConfig

Provides output results configuration parameters for custom classifier jobs.

Type: [DocumentClassifierOutputDataConfig \(p. 494\)](#) object

Required: No

#### SourceModelArn

The Amazon Resource Name (ARN) of the source model. This model was imported from a different AWS account to create the document classifier model in your AWS account.

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:document-classifier/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*?)?

Required: No

### **Status**

The status of the document classifier. If the status is TRAINED the classifier is ready to use. If the status is FAILED you can see additional information about why the classifier wasn't trained in the Message field.

Type: String

Valid Values: SUBMITTED | TRAINING | DELETING | STOP\_REQUESTED | STOPPED | IN\_ERROR | TRAINED

Required: No

### **SubmitTime**

The time that the document classifier was submitted for training.

Type: Timestamp

Required: No

### **TrainingEndTime**

The time that training of the document classifier was completed. Indicates the time when the training completes on documentation classifiers. You are billed for the time interval between this time and the value of TrainingStartTime.

Type: Timestamp

Required: No

### **TrainingStartTime**

Indicates the time when the training starts on documentation classifiers. You are billed for the time interval between this time and the value of TrainingEndTime.

Type: Timestamp

Required: No

### **VersionName**

The version name that you assigned to the document classifier.

Type: String

Length Constraints: Maximum length of 63.

Pattern: ^[ a-zA-Z0-9 ](-\*[ a-zA-Z0-9 ])\*\$

Required: No

### **VolumeKmsKeyId**

ID for the AWS Key Management Service (KMS) key that Amazon Comprehend uses to encrypt data on the storage volume attached to the ML compute instance(s) that process the analysis job. The VolumeKmsKeyId can be either of the following formats:

- KMS Key ID: "1234abcd-12ab-34cd-56ef-1234567890ab"
- Amazon Resource Name (ARN) of a KMS Key: "arn:aws:kms:us-west-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab"

Type: String

Length Constraints: Maximum length of 2048.

Pattern: ^\p{ASCII}+\$

Required: No

#### VpcConfig

Configuration parameters for a private Virtual Private Cloud (VPC) containing the resources you are using for your custom classifier. For more information, see [Amazon VPC](#).

Type: [VpcConfig \(p. 571\)](#) object

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## DocumentClassifierSummary

Describes information about a document classifier and its versions.

### Contents

#### **DocumentClassifierName**

The name that you assigned the document classifier.

Type: String

Length Constraints: Maximum length of 63.

Pattern: ^[a-zA-Z0-9](-\*[a-zA-Z0-9])\*\$

Required: No

#### **LatestVersionCreatedAt**

The time that the latest document classifier version was submitted for processing.

Type: Timestamp

Required: No

#### **LatestVersionName**

The version name you assigned to the latest document classifier version.

Type: String

Length Constraints: Maximum length of 63.

Pattern: ^[a-zA-Z0-9](-\*[a-zA-Z0-9])\*\$

Required: No

#### **LatestVersionStatus**

Provides the status of the latest document classifier version.

Type: String

Valid Values: SUBMITTED | TRAINING | DELETING | STOP\_REQUESTED | STOPPED | IN\_ERROR | TRAINED

Required: No

#### **NumberOfVersions**

The number of versions you created.

Type: Integer

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)

- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## DocumentLabel

Specifies one of the label or labels that categorize the document being analyzed.

### Contents

#### Name

The name of the label.

Type: String

Length Constraints: Minimum length of 1.

Required: No

#### Score

The confidence score that Amazon Comprehend has this label correctly attributed.

Type: Float

Required: No

### See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# DocumentReaderConfig

The input properties for a topic detection job.

## Contents

### DocumentReadAction

This enum field will start with two values which will apply to PDFs:

- `TEXTRACT_DETECT_DOCUMENT_TEXT` - The service calls DetectDocumentText for PDF documents per page.
- `TEXTRACT_ANALYZE_DOCUMENT` - The service calls AnalyzeDocument for PDF documents per page.

Type: String

Valid Values: `TEXTRACT_DETECT_DOCUMENT_TEXT` | `TEXTRACT_ANALYZE_DOCUMENT`

Required: Yes

### DocumentReadMode

This enum field provides two values:

- `SERVICE_DEFAULT` - use service defaults for Document reading. For Digital PDF it would mean using an internal parser instead of Textract APIs
- `FORCE_DOCUMENT_READ_ACTION` - Always use specified action for DocumentReadAction, including Digital PDF.

Type: String

Valid Values: `SERVICE_DEFAULT` | `FORCE_DOCUMENT_READ_ACTION`

Required: No

### FeatureTypes

Specifies how the text in an input file should be processed:

Type: Array of strings

Array Members: Minimum number of 1 item. Maximum number of 2 items.

Valid Values: `TABLES` | `FORMS`

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## DominantLanguage

Returns the code for the dominant language in the input text and the level of confidence that Amazon Comprehend has in the accuracy of the detection.

### Contents

#### LanguageCode

The RFC 5646 language code for the dominant language. For more information about RFC 5646, see [Tags for Identifying Languages](#) on the *IETF Tools* web site.

Type: String

Length Constraints: Minimum length of 1.

Required: No

#### Score

The level of confidence that Amazon Comprehend has in the accuracy of the detection.

Type: Float

Required: No

### See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## DominantLanguageDetectionJobFilter

Provides information for filtering a list of dominant language detection jobs. For more information, see the [ListDominantLanguageDetectionJobs \(p. 368\)](#) operation.

### Contents

#### JobName

Filters on the name of the job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 256.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/+\\-%@]\*\$

Required: No

#### JobStatus

Filters the list of jobs based on job status. Returns only jobs with the specified status.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

Required: No

#### SubmitTimeAfter

Filters the list of jobs based on the time that the job was submitted for processing. Returns only jobs submitted after the specified time. Jobs are returned in descending order, newest to oldest.

Type: Timestamp

Required: No

#### SubmitTimeBefore

Filters the list of jobs based on the time that the job was submitted for processing. Returns only jobs submitted before the specified time. Jobs are returned in ascending order, oldest to newest.

Type: Timestamp

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# DominantLanguageDetectionJobProperties

Provides information about a dominant language detection job.

## Contents

### DataAccessRoleArn

The Amazon Resource Name (ARN) that gives Amazon Comprehend read access to your input data.

Type: String

Length Constraints: Minimum length of 20. Maximum length of 2048.

Pattern: `arn:aws(-[^:]+)?:iam::[0-9]{12}:role/.+`

Required: No

### EndTime

The time that the dominant language detection job completed.

Type: Timestamp

Required: No

### InputDataConfig

The input data configuration that you supplied when you created the dominant language detection job.

Type: [InputDataConfig \(p. 539\)](#) object

Required: No

### JobArn

The Amazon Resource Name (ARN) of the dominant language detection job. It is a unique, fully qualified identifier for the job. It includes the AWS account, Region, and the job ID. The format of the ARN is as follows:

`arn:<partition>:comprehend:<region>:<account-id>:dominant-language-detection-job/<job-id>`

The following is an example job ARN:

`arn:aws:comprehend:us-west-2:111122223333:dominant-language-detection-job/1234abcd12ab34cd56ef1234567890ab`

Type: String

Length Constraints: Maximum length of 256.

Pattern: `arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]*:[0-9]{12}:[a-zA-Z0-9-]{1,64}/[a-zA-Z0-9](-*[a-zA-Z0-9])*(/version/[a-zA-Z0-9](-*[a-zA-Z0-9])*?)?`

Required: No

### JobId

The identifier assigned to the dominant language detection job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:/-@]\*\$

Required: No

#### **JobName**

The name that you assigned to the dominant language detection job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 256.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:/-@]\*\$

Required: No

#### **JobStatus**

The current status of the dominant language detection job. If the status is FAILED, the Message field shows the reason for the failure.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

Required: No

#### **Message**

A description for the status of a job.

Type: String

Required: No

#### **OutputDataConfig**

The output data configuration that you supplied when you created the dominant language detection job.

Type: [OutputDataConfig \(p. 546\)](#) object

Required: No

#### **SubmitTime**

The time that the dominant language detection job was submitted for processing.

Type: Timestamp

Required: No

#### **VolumeKmsKeyId**

ID for the AWS Key Management Service (KMS) key that Amazon Comprehend uses to encrypt data on the storage volume attached to the ML compute instance(s) that process the analysis job. The VolumeKmsKeyId can be either of the following formats:

- KMS Key ID: "1234abcd-12ab-34cd-56ef-1234567890ab"
- Amazon Resource Name (ARN) of a KMS Key: "arn:aws:kms:us-west-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab"

Type: String

Length Constraints: Maximum length of 2048.

Pattern: ^\p{ASCII}+\$

Required: No

#### VpcConfig

Configuration parameters for a private Virtual Private Cloud (VPC) containing the resources you are using for your dominant language detection job. For more information, see [Amazon VPC](#).

Type: [VpcConfig \(p. 571\)](#) object

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## EndpointFilter

The filter used to determine which endpoints are returned. You can filter jobs on their name, model, status, or the date and time that they were created. You can only set one filter at a time.

### Contents

#### **CreationTimeAfter**

Specifies a date after which the returned endpoint or endpoints were created.

Type: Timestamp

Required: No

#### **CreationTimeBefore**

Specifies a date before which the returned endpoint or endpoints were created.

Type: Timestamp

Required: No

#### **ModelArn**

The Amazon Resource Number (ARN) of the model to which the endpoint is attached.

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:(document-classifier|entity-recognizer)/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*)?

Required: No

#### **Status**

Specifies the status of the endpoint being returned. Possible values are: Creating, Ready, Updating, Deleting, Failed.

Type: String

Valid Values: CREATING | DELETING | FAILED | IN\_SERVICE | UPDATING

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# EndpointProperties

Specifies information about the specified endpoint. For information about endpoints, see [Managing endpoints](#).

## Contents

### **CreationTime**

The creation date and time of the endpoint.

Type: Timestamp

Required: No

### **CurrentInferenceUnits**

The number of inference units currently used by the model using this endpoint.

Type: Integer

Valid Range: Minimum value of 1.

Required: No

### **DataAccessRoleArn**

The Amazon Resource Name (ARN) of the AWS identity and Access Management (IAM) role that grants Amazon Comprehend read access to trained custom models encrypted with a customer managed key (ModelKmsKeyId).

Type: String

Length Constraints: Minimum length of 20. Maximum length of 2048.

Pattern: `arn:aws(-[^:]+)?:iam::[0-9]{12}:role/.+`

Required: No

### **DesiredDataAccessRoleArn**

Data access role ARN to use in case the new model is encrypted with a customer KMS key.

Type: String

Length Constraints: Minimum length of 20. Maximum length of 2048.

Pattern: `arn:aws(-[^:]+)?:iam::[0-9]{12}:role/.+`

Required: No

### **DesiredInferenceUnits**

The desired number of inference units to be used by the model using this endpoint. Each inference unit represents of a throughput of 100 characters per second.

Type: Integer

Valid Range: Minimum value of 1.

Required: No

### **DesiredModelArn**

ARN of the new model to use for updating an existing endpoint. This ARN is going to be different from the model ARN when the update is in progress

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:(document-classifier|entity-recognizer)/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*)?

Required: No

### **EndpointArn**

The Amazon Resource Number (ARN) of the endpoint.

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:(document-classifier-endpoint|entity-recognizer-endpoint)/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*

Required: No

### **LastModifiedTime**

The date and time that the endpoint was last modified.

Type: Timestamp

Required: No

### **Message**

Specifies a reason for failure in cases of Failed status.

Type: String

Required: No

### **ModelArn**

The Amazon Resource Number (ARN) of the model to which the endpoint is attached.

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:(document-classifier|entity-recognizer)/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*)?

Required: No

### **Status**

Specifies the status of the endpoint. Because the endpoint updates and creation are asynchronous, so customers will need to wait for the endpoint to be Ready status before making inference requests.

Type: String

Valid Values: CREATING | DELETING | FAILED | IN\_SERVICE | UPDATING

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## EntitiesDetectionJobFilter

Provides information for filtering a list of dominant language detection jobs. For more information, see the [ListEntitiesDetectionJobs \(p. 374\)](#) operation.

### Contents

#### JobName

Filters on the name of the job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 256.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/=+\-%@]\*\$

Required: No

#### JobStatus

Filters the list of jobs based on job status. Returns only jobs with the specified status.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

Required: No

#### SubmitTimeAfter

Filters the list of jobs based on the time that the job was submitted for processing. Returns only jobs submitted after the specified time. Jobs are returned in descending order, newest to oldest.

Type: Timestamp

Required: No

#### SubmitTimeBefore

Filters the list of jobs based on the time that the job was submitted for processing. Returns only jobs submitted before the specified time. Jobs are returned in ascending order, oldest to newest.

Type: Timestamp

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# EntitiesDetectionJobProperties

Provides information about an entities detection job.

## Contents

### DataAccessRoleArn

The Amazon Resource Name (ARN) that gives Amazon Comprehend read access to your input data.

Type: String

Length Constraints: Minimum length of 20. Maximum length of 2048.

Pattern: arn:aws(-[^:]+)?:iam::[0-9]{12}:role/.+

Required: No

### EndTime

The time that the entities detection job completed

Type: Timestamp

Required: No

### EntityRecognizerArn

The Amazon Resource Name (ARN) that identifies the entity recognizer.

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:entity-recognizer/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*)?

Required: No

### InputDataConfig

The input data configuration that you supplied when you created the entities detection job.

Type: [InputDataConfig \(p. 539\)](#) object

Required: No

### JobArn

The Amazon Resource Name (ARN) of the entities detection job. It is a unique, fully qualified identifier for the job. It includes the AWS account, Region, and the job ID. The format of the ARN is as follows:

arn:<partition>:comprehend:<region>:<account-id>:entities-detection-job/<job-id>

The following is an example job ARN:

arn:aws:comprehend:us-west-2:111122223333:entities-detection-job/1234abcd12ab34cd56ef1234567890ab

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^\:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:[a-zA-Z0-9-]{1,64}/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*)?

Required: No

#### **JobId**

The identifier assigned to the entities detection job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:/=+\-%@]\*)\$

Required: No

#### **JobName**

The name that you assigned the entities detection job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 256.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:/=+\-%@]\*)\$

Required: No

#### **JobStatus**

The current status of the entities detection job. If the status is FAILED, the Message field shows the reason for the failure.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

Required: No

#### **LanguageCode**

The language code of the input documents.

Type: String

Valid Values: en | es | fr | de | it | pt | ar | hi | ja | ko | zh | zh-TW

Required: No

#### **Message**

A description of the status of a job.

Type: String

Required: No

#### **OutputDataConfig**

The output data configuration that you supplied when you created the entities detection job.

Type: [OutputDataConfig \(p. 546\)](#) object

Required: No

**SubmitTime**

The time that the entities detection job was submitted for processing.

Type: Timestamp

Required: No

**VolumeKmsKeyId**

ID for the AWS Key Management Service (KMS) key that Amazon Comprehend uses to encrypt data on the storage volume attached to the ML compute instance(s) that process the analysis job. The VolumeKmsKeyId can be either of the following formats:

- KMS Key ID: "1234abcd-12ab-34cd-56ef-1234567890ab"
- Amazon Resource Name (ARN) of a KMS Key: "arn:aws:kms:us-west-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab"

Type: String

Length Constraints: Maximum length of 2048.

Pattern: ^\p{ASCII}+\$

Required: No

**VpcConfig**

Configuration parameters for a private Virtual Private Cloud (VPC) containing the resources you are using for your entity detection job. For more information, see [Amazon VPC](#).

Type: [VpcConfig \(p. 571\)](#) object

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## Entity

Provides information about an entity.

### Contents

#### **BeginOffset**

A character offset in the input text that shows where the entity begins (the first character is at position 0). The offset returns the position of each UTF-8 code point in the string. A *code point* is the abstract character from a particular graphical representation. For example, a multi-byte UTF-8 character maps to a single code point.

Type: Integer

Required: No

#### **EndOffset**

A character offset in the input text that shows where the entity ends. The offset returns the position of each UTF-8 code point in the string. A *code point* is the abstract character from a particular graphical representation. For example, a multi-byte UTF-8 character maps to a single code point.

Type: Integer

Required: No

#### **Score**

The level of confidence that Amazon Comprehend has in the accuracy of the detection.

Type: Float

Required: No

#### **Text**

The text of the entity.

Type: String

Length Constraints: Minimum length of 1.

Required: No

#### **Type**

The entity's type.

Type: String

Valid Values: PERSON | LOCATION | ORGANIZATION | COMMERCIAL\_ITEM | EVENT | DATE | QUANTITY | TITLE | OTHER

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)

- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## EntityLabel

Specifies one of the label or labels that categorize the personally identifiable information (PII) entity being analyzed.

### Contents

#### Name

The name of the label.

Type: String

Valid Values: BANK\_ACCOUNT\_NUMBER | BANK\_ROUTING | CREDIT\_DEBIT\_NUMBER |  
CREDIT\_DEBIT\_CVV | CREDIT\_DEBIT\_EXPIRY | PIN | EMAIL | ADDRESS | NAME |  
PHONE | SSN | DATE\_TIME | PASSPORT\_NUMBER | DRIVER\_ID | URL | AGE | USERNAME  
| PASSWORD | AWS\_ACCESS\_KEY | AWS\_SECRET\_KEY | IP\_ADDRESS | MAC\_ADDRESS

Required: Yes

#### Score

The level of confidence that Amazon Comprehend has in the accuracy of the detection.

Type: Float

Required: Yes

### See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# EntityRecognizerAnnotations

Describes the annotations associated with a entity recognizer.

## Contents

### S3Uri

Specifies the Amazon S3 location where the annotations for an entity recognizer are located. The URI must be in the same region as the API endpoint that you are calling.

Type: String

Length Constraints: Maximum length of 1024.

Pattern: s3://[a-z0-9][\.\-\\_a-z0-9]{1,61}[a-z0-9](/.\*)?

Required: Yes

### TestS3Uri

Specifies the Amazon S3 location where the test annotations for an entity recognizer are located. The URI must be in the same region as the API endpoint that you are calling.

Type: String

Length Constraints: Maximum length of 1024.

Pattern: s3://[a-z0-9][\.\-\\_a-z0-9]{1,61}[a-z0-9](/.\*)?

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# EntityRecognizerDocuments

Describes the training documents submitted with an entity recognizer.

## Contents

### **InputFormat**

Specifies how the text in an input file should be processed. This is optional, and the default is ONE\_DOC\_PER\_LINE. ONE\_DOC\_PER\_FILE - Each file is considered a separate document. Use this option when you are processing large documents, such as newspaper articles or scientific papers. ONE\_DOC\_PER\_LINE - Each line in a file is considered a separate document. Use this option when you are processing many short documents, such as text messages.

Type: String

Valid Values: ONE\_DOC\_PER\_FILE | ONE\_DOC\_PER\_LINE

Required: No

### **S3Uri**

Specifies the Amazon S3 location where the training documents for an entity recognizer are located. The URL must be in the same region as the API endpoint that you are calling.

Type: String

Length Constraints: Maximum length of 1024.

Pattern: s3://[a-z0-9][\.-a-z0-9]{1,61}[a-z0-9](/.\*)?

Required: Yes

### **TestS3Uri**

Specifies the Amazon S3 location where the test documents for an entity recognizer are located. The URI must be in the same AWS Region as the API endpoint that you are calling.

Type: String

Length Constraints: Maximum length of 1024.

Pattern: s3://[a-z0-9][\.-a-z0-9]{1,61}[a-z0-9](/.\*)?

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# EntityRecognizerEntityList

Describes the entity recognizer submitted with an entity recognizer.

## Contents

### S3Uri

Specifies the Amazon S3 location where the entity list is located. The URI must be in the same region as the API endpoint that you are calling.

Type: String

Length Constraints: Maximum length of 1024.

Pattern: s3://[a-zA-Z0-9][\.\-\w]{1,61}[a-zA-Z0-9](/.\*)?

Required: Yes

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# EntityRecognizerEvaluationMetrics

Detailed information about the accuracy of an entity recognizer.

## Contents

### F1Score

A measure of how accurate the recognizer results are for the test data. It is derived from the Precision and Recall values. The F1Score is the harmonic average of the two scores. For plain text entity recognizer models, the range is 0 to 100, where 100 is the best score. For PDF/Word entity recognizer models, the range is 0 to 1, where 1 is the best score.

Type: Double

Required: No

### Precision

A measure of the usefulness of the recognizer results in the test data. High precision means that the recognizer returned substantially more relevant results than irrelevant ones.

Type: Double

Required: No

### Recall

A measure of how complete the recognizer results are for the test data. High recall means that the recognizer returned most of the relevant results.

Type: Double

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# EntityRecognizerFilter

Provides information for filtering a list of entity recognizers. You can only specify one filtering parameter in a request. For more information, see the [ListEntityRecognizers \(p. 377\)](#) operation./>

## Contents

### RecognizerName

The name that you assigned the entity recognizer.

Type: String

Length Constraints: Maximum length of 63.

Pattern: ^[a-zA-Z0-9](-\*[a-zA-Z0-9])\*\$

Required: No

### Status

The status of an entity recognizer.

Type: String

Valid Values: SUBMITTED | TRAINING | DELETING | STOP\_REQUESTED | STOPPED | IN\_ERROR | TRAINED

Required: No

### SubmitTimeAfter

Filters the list of entities based on the time that the list was submitted for processing. Returns only jobs submitted after the specified time. Jobs are returned in ascending order, oldest to newest.

Type: Timestamp

Required: No

### SubmitTimeBefore

Filters the list of entities based on the time that the list was submitted for processing. Returns only jobs submitted before the specified time. Jobs are returned in descending order, newest to oldest.

Type: Timestamp

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# EntityRecognizerInputDataConfig

Specifies the format and location of the input data.

## Contents

### Annotations

The S3 location of the CSV file that annotates your training documents.

Type: [EntityRecognizerAnnotations \(p. 519\)](#) object

Required: No

### AugmentedManifests

A list of augmented manifest files that provide training data for your custom model. An augmented manifest file is a labeled dataset that is produced by Amazon SageMaker Ground Truth.

This parameter is required if you set `DataFormat` to `AUGMENTED_MANIFEST`.

Type: Array of [AugmentedManifestsListItem \(p. 475\)](#) objects

Required: No

### DataFormat

The format of your training data:

- `COMPREHEND_CSV`: A CSV file that supplements your training documents. The CSV file contains information about the custom entities that your trained model will detect. The required format of the file depends on whether you are providing annotations or an entity list.

If you use this value, you must provide your CSV file by using either the `Annotations` or `EntityList` parameters. You must provide your training documents by using the `Documents` parameter.

- `AUGMENTED_MANIFEST`: A labeled dataset that is produced by Amazon SageMaker Ground Truth. This file is in JSON lines format. Each line is a complete JSON object that contains a training document and its labels. Each label annotates a named entity in the training document.

If you use this value, you must provide the `AugmentedManifests` parameter in your request.

If you don't specify a value, Amazon Comprehend uses `COMPREHEND_CSV` as the default.

Type: String

Valid Values: `COMPREHEND_CSV` | `AUGMENTED_MANIFEST`

Required: No

### Documents

The S3 location of the folder that contains the training documents for your custom entity recognizer.

This parameter is required if you set `DataFormat` to `COMPREHEND_CSV`.

Type: [EntityRecognizerDocuments \(p. 520\)](#) object

Required: No

### EntityList

The S3 location of the CSV file that has the entity list for your custom entity recognizer.

Type: [EntityRecognizerEntityList \(p. 521\)](#) object

Required: No

#### EntityTypes

The entity types in the labeled training data that Amazon Comprehend uses to train the custom entity recognizer. Any entity types that you don't specify are ignored.

A maximum of 25 entity types can be used at one time to train an entity recognizer. Entity types must not contain the following invalid characters: \n (line break), \\n (escaped line break), \\r (carriage return), \\r (escaped carriage return), \\t (tab), \\\\t (escaped tab), space, and , (comma).

Type: Array of [EntityTypeListItems \(p. 534\)](#) objects

Required: Yes

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# EntityRecognizerMetadata

Detailed information about an entity recognizer.

## Contents

### EntityTypes

Entity types from the metadata of an entity recognizer.

Type: Array of [EntityRecognizerMetadataEntityTypesListItem \(p. 527\)](#) objects

Required: No

### EvaluationMetrics

Detailed information about the accuracy of an entity recognizer.

Type: [EntityRecognizerEvaluationMetrics \(p. 522\)](#) object

Required: No

### NumberOfTestDocuments

The number of documents in the input data that were used to test the entity recognizer. Typically this is 10 to 20 percent of the input documents.

Type: Integer

Required: No

### NumberOfTrainedDocuments

The number of documents in the input data that were used to train the entity recognizer. Typically this is 80 to 90 percent of the input documents.

Type: Integer

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# EntityRecognizerMetadataEntityTypesListItem

Individual item from the list of entity types in the metadata of an entity recognizer.

## Contents

### EvaluationMetrics

Detailed information about the accuracy of the entity recognizer for a specific item on the list of entity types.

Type: [EntityTypeEvaluationMetrics \(p. 533\)](#) object

Required: No

### NumberOfTrainMentions

Indicates the number of times the given entity type was seen in the training data.

Type: Integer

Required: No

### Type

Type of entity from the list of entity types in the metadata of an entity recognizer.

Type: String

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# EntityRecognizerProperties

Describes information about an entity recognizer.

## Contents

### DataAccessRoleArn

The Amazon Resource Name (ARN) of the AWS Identity and Management (IAM) role that grants Amazon Comprehend read access to your input data.

Type: String

Length Constraints: Minimum length of 20. Maximum length of 2048.

Pattern: `arn:aws(-[^\:]*)?:iam::[0-9]{12}:role/.+`

Required: No

### EndTime

The time that the recognizer creation completed.

Type: Timestamp

Required: No

### EntityRecognizerArn

The Amazon Resource Name (ARN) that identifies the entity recognizer.

Type: String

Length Constraints: Maximum length of 256.

Pattern: `arn:aws(-[^\:]*)?:comprehend:[a-zA-Z0-9-]*:[0-9]{12}:entity-recognizer/[a-zA-Z0-9](-*[a-zA-Z0-9])*(/version/[a-zA-Z0-9](-*[a-zA-Z0-9])*)?`

Required: No

### InputDataConfig

The input data properties of an entity recognizer.

Type: [EntityRecognizerInputDataConfig \(p. 524\)](#) object

Required: No

### LanguageCode

The language of the input documents. All documents must be in the same language. Only English ("en") is currently supported.

Type: String

Valid Values: `en | es | fr | it | de | pt`

Required: No

### Message

A description of the status of the recognizer.

Type: String

Required: No

**ModelKmsKeyId**

ID for the AWS Key Management Service (KMS) key that Amazon Comprehend uses to encrypt trained custom models. The ModelKmsKeyId can be either of the following formats:

- KMS Key ID: "1234abcd-12ab-34cd-56ef-1234567890ab"
- Amazon Resource Name (ARN) of a KMS Key: "arn:aws:kms:us-west-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab"

Type: String

Length Constraints: Maximum length of 2048.

Pattern: ^\p{ASCII}+\$

Required: No

**RecognizerMetadata**

Provides information about an entity recognizer.

Type: [EntityRecognizerMetadata \(p. 526\)](#) object

Required: No

**SourceModelArn**

The Amazon Resource Name (ARN) of the source model. This model was imported from a different AWS account to create the entity recognizer model in your AWS account.

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:entity-recognizer/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*)?

Required: No

**Status**

Provides the status of the entity recognizer.

Type: String

Valid Values: SUBMITTED | TRAINING | DELETING | STOP\_REQUESTED | STOPPED | IN\_ERROR | TRAINED

Required: No

**SubmitTime**

The time that the recognizer was submitted for processing.

Type: Timestamp

Required: No

**TrainingEndTime**

The time that training of the entity recognizer was completed.

Type: Timestamp

Required: No

**TrainingStartTime**

The time that training of the entity recognizer started.

Type: Timestamp

Required: No

**VersionName**

The version name you assigned to the entity recognizer.

Type: String

Length Constraints: Maximum length of 63.

Pattern: ^[a-zA-Z0-9](-\*[a-zA-Z0-9])\*\$

Required: No

**VolumeKmsKeyId**

ID for the AWS Key Management Service (KMS) key that Amazon Comprehend uses to encrypt data on the storage volume attached to the ML compute instance(s) that process the analysis job. The VolumeKmsKeyId can be either of the following formats:

- KMS Key ID: "1234abcd-12ab-34cd-56ef-1234567890ab"
- Amazon Resource Name (ARN) of a KMS Key: "arn:aws:kms:us-west-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab"

Type: String

Length Constraints: Maximum length of 2048.

Pattern: ^\p{ASCII}+\$

Required: No

**VpcConfig**

Configuration parameters for a private Virtual Private Cloud (VPC) containing the resources you are using for your custom entity recognizer. For more information, see [Amazon VPC](#).

Type: [VpcConfig \(p. 571\)](#) object

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# EntityRecognizerSummary

Describes the information about an entity recognizer and its versions.

## Contents

### **LatestVersionCreatedAt**

The time that the latest entity recognizer version was submitted for processing.

Type: Timestamp

Required: No

### **LatestVersionName**

The version name you assigned to the latest entity recognizer version.

Type: String

Length Constraints: Maximum length of 63.

Pattern: ^[a-zA-Z0-9](-\*[a-zA-Z0-9])\*\$

Required: No

### **LatestVersionStatus**

Provides the status of the latest entity recognizer version.

Type: String

Valid Values: SUBMITTED | TRAINING | DELETING | STOP\_REQUESTED | STOPPED | IN\_ERROR | TRAINED

Required: No

### **NumberOfVersions**

The number of versions you created.

Type: Integer

Required: No

### **RecognizerName**

The name that you assigned the entity recognizer.

Type: String

Length Constraints: Maximum length of 63.

Pattern: ^[a-zA-Z0-9](-\*[a-zA-Z0-9])\*\$

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)

- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# EntityTypesEvaluationMetrics

Detailed information about the accuracy of an entity recognizer for a specific entity type.

## Contents

### F1Score

A measure of how accurate the recognizer results are for a specific entity type in the test data. It is derived from the Precision and Recall values. The F1Score is the harmonic average of the two scores. The highest score is 1, and the worst score is 0.

Type: Double

Required: No

### Precision

A measure of the usefulness of the recognizer results for a specific entity type in the test data. High precision means that the recognizer returned substantially more relevant results than irrelevant ones.

Type: Double

Required: No

### Recall

A measure of how complete the recognizer results are for a specific entity type in the test data. High recall means that the recognizer returned most of the relevant results.

Type: Double

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## EntityTypesListItem

An entity type within a labeled training dataset that Amazon Comprehend uses to train a custom entity recognizer.

### Contents

#### Type

An entity type within a labeled training dataset that Amazon Comprehend uses to train a custom entity recognizer.

Entity types must not contain the following invalid characters: \n (line break), \\n (escaped line break), \r (carriage return), \\r (escaped carriage return), \t (tab), \\t (escaped tab), space, and , (comma).

Type: String

Length Constraints: Maximum length of 64.

Pattern: ^(?![\^\\n\\r\\t,]\*\\n|\\r|\\t)[^\\n\\r\\t,]+\$

Required: Yes

### See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## EventsDetectionJobFilter

Provides information for filtering a list of event detection jobs.

### Contents

#### **JobName**

Filters on the name of the events detection job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 256.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/+\\-%@]\*\$

Required: No

#### **JobStatus**

Filters the list of jobs based on job status. Returns only jobs with the specified status.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

Required: No

#### **SubmitTimeAfter**

Filters the list of jobs based on the time that the job was submitted for processing. Returns only jobs submitted after the specified time. Jobs are returned in descending order, newest to oldest.

Type: Timestamp

Required: No

#### **SubmitTimeBefore**

Filters the list of jobs based on the time that the job was submitted for processing. Returns only jobs submitted before the specified time. Jobs are returned in ascending order, oldest to newest.

Type: Timestamp

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# EventsDetectionJobProperties

Provides information about an events detection job.

## Contents

### DataAccessRoleArn

The Amazon Resource Name (ARN) of the AWS Identity and Access Management (IAM) role that grants Amazon Comprehend read access to your input data.

Type: String

Length Constraints: Minimum length of 20. Maximum length of 2048.

Pattern: arn:aws(-[^\:]+)\:iam\::[0-9]{12}\:role/.+

Required: No

### EndTime

The time that the events detection job completed.

Type: Timestamp

Required: No

### InputDataConfig

The input data configuration that you supplied when you created the events detection job.

Type: [InputDataConfig \(p. 539\)](#) object

Required: No

### JobArn

The Amazon Resource Name (ARN) of the events detection job. It is a unique, fully qualified identifier for the job. It includes the AWS account, Region, and the job ID. The format of the ARN is as follows:

arn:<partition>:comprehend:<region>:<account-id>:events-detection-job/<job-id>

The following is an example job ARN:

arn:aws:comprehend:us-west-2:111122223333:events-detection-job/1234abcd12ab34cd56ef1234567890ab

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^\:]+)\:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}\:[a-zA-Z0-9-]{1,64}\/[a-zA-Z0-9]\(-\*[a-zA-Z0-9]\)\*\(/version/[a-zA-Z0-9]\(-\*[a-zA-Z0-9]\)\*\)?

Required: No

### JobId

The identifier assigned to the events detection job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/+\\-%@]\*\$

Required: No

#### **JobName**

The name you assigned the events detection job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 256.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/+\\-%@]\*\$

Required: No

#### **JobStatus**

The current status of the events detection job.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

Required: No

#### **LanguageCode**

The language code of the input documents.

Type: String

Valid Values: en

Required: No

#### **Message**

A description of the status of the events detection job.

Type: String

Required: No

#### **OutputDataConfig**

The output data configuration that you supplied when you created the events detection job.

Type: [OutputDataConfig \(p. 546\)](#) object

Required: No

#### **SubmitTime**

The time that the events detection job was submitted for processing.

Type: Timestamp

Required: No

#### **TargetEventTypes**

The types of events that are detected by the job.

Type: Array of strings

Array Members: Minimum number of 1 item.

Length Constraints: Minimum length of 1. Maximum length of 40.

Pattern: [A-Z\_]\*

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# InputDataConfig

The input properties for an inference job.

## Contents

### DocumentReaderConfig

The document reader config field applies only for InputDataConfig of StartEntitiesDetectionJob.

Use DocumentReaderConfig to provide specifications about how you want your inference documents read. Currently it applies for PDF documents in StartEntitiesDetectionJob custom inference.

Type: [DocumentReaderConfig \(p. 502\)](#) object

Required: No

### InputFormat

Specifies how the text in an input file should be processed:

- ONE\_DOC\_PER\_FILE - Each file is considered a separate document. Use this option when you are processing large documents, such as newspaper articles or scientific papers.
- ONE\_DOC\_PER\_LINE - Each line in a file is considered a separate document. Use this option when you are processing many short documents, such as text messages.

Type: String

Valid Values: ONE\_DOC\_PER\_FILE | ONE\_DOC\_PER\_LINE

Required: No

### S3Uri

The Amazon S3 URI for the input data. The URI must be in same region as the API endpoint that you are calling. The URI can point to a single input file or it can provide the prefix for a collection of data files.

For example, if you use the URI `s3://bucketName/prefix`, if the prefix is a single file, Amazon Comprehend uses that file as input. If more than one file begins with the prefix, Amazon Comprehend uses all of them as input.

Type: String

Length Constraints: Maximum length of 1024.

Pattern: `s3://[a-zA-Z0-9][\.\-\w]{1,61}[a-zA-Z0-9](/.*)?`

Required: Yes

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)



## KeyPhrase

Describes a key noun phrase.

### Contents

#### **BeginOffset**

A character offset in the input text that shows where the key phrase begins (the first character is at position 0). The offset returns the position of each UTF-8 code point in the string. A *code point* is the abstract character from a particular graphical representation. For example, a multi-byte UTF-8 character maps to a single code point.

Type: Integer

Required: No

#### **EndOffset**

A character offset in the input text where the key phrase ends. The offset returns the position of each UTF-8 code point in the string. A *code point* is the abstract character from a particular graphical representation. For example, a multi-byte UTF-8 character maps to a single code point.

Type: Integer

Required: No

#### **Score**

The level of confidence that Amazon Comprehend has in the accuracy of the detection.

Type: Float

Required: No

#### **Text**

The text of a key noun phrase.

Type: String

Length Constraints: Minimum length of 1.

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## KeyPhrasesDetectionJobFilter

Provides information for filtering a list of dominant language detection jobs. For more information, see the [ListKeyPhrasesDetectionJobs \(p. 386\)](#) operation.

### Contents

#### JobName

Filters on the name of the job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 256.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/+\\-%@]\*\$

Required: No

#### JobStatus

Filters the list of jobs based on job status. Returns only jobs with the specified status.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

Required: No

#### SubmitTimeAfter

Filters the list of jobs based on the time that the job was submitted for processing. Returns only jobs submitted after the specified time. Jobs are returned in descending order, newest to oldest.

Type: Timestamp

Required: No

#### SubmitTimeBefore

Filters the list of jobs based on the time that the job was submitted for processing. Returns only jobs submitted before the specified time. Jobs are returned in ascending order, oldest to newest.

Type: Timestamp

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# KeyPhrasesDetectionJobProperties

Provides information about a key phrases detection job.

## Contents

### DataAccessRoleArn

The Amazon Resource Name (ARN) that gives Amazon Comprehend read access to your input data.

Type: String

Length Constraints: Minimum length of 20. Maximum length of 2048.

Pattern: arn:aws(-[^:]+)?:iam::[0-9]{12}:role/.+

Required: No

### EndTime

The time that the key phrases detection job completed.

Type: Timestamp

Required: No

### InputDataConfig

The input data configuration that you supplied when you created the key phrases detection job.

Type: [InputDataConfig \(p. 539\)](#) object

Required: No

### JobArn

The Amazon Resource Name (ARN) of the key phrases detection job. It is a unique, fully qualified identifier for the job. It includes the AWS account, Region, and the job ID. The format of the ARN is as follows:

```
arn:<partition>:comprehend:<region>:<account-id>:key-phrases-detection-job/<job-id>
```

The following is an example job ARN:

```
arn:aws:comprehend:us-west-2:111122223333:key-phrases-detection-job/1234abcd12ab34cd56ef1234567890ab
```

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:[a-zA-Z0-9-]{1,64}/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*)?

Required: No

### JobId

The identifier assigned to the key phrases detection job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/=+\-%@]\* )\$

Required: No

#### **JobName**

The name that you assigned the key phrases detection job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 256.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/=+\-%@]\* )\$

Required: No

#### **JobStatus**

The current status of the key phrases detection job. If the status is FAILED, the Message field shows the reason for the failure.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

Required: No

#### **LanguageCode**

The language code of the input documents.

Type: String

Valid Values: en | es | fr | de | it | pt | ar | hi | ja | ko | zh | zh-TW

Required: No

#### **Message**

A description of the status of a job.

Type: String

Required: No

#### **OutputDataConfig**

The output data configuration that you supplied when you created the key phrases detection job.

Type: [OutputDataConfig \(p. 546\)](#) object

Required: No

#### **SubmitTime**

The time that the key phrases detection job was submitted for processing.

Type: Timestamp

Required: No

#### **VolumeKmsKeyId**

ID for the AWS Key Management Service (KMS) key that Amazon Comprehend uses to encrypt data on the storage volume attached to the ML compute instance(s) that process the analysis job. The VolumeKmsKeyId can be either of the following formats:

- KMS Key ID: "1234abcd-12ab-34cd-56ef-1234567890ab"
- Amazon Resource Name (ARN) of a KMS Key: "arn:aws:kms:us-west-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab"

Type: String

Length Constraints: Maximum length of 2048.

Pattern: ^\p{ASCII}+\$

Required: No

#### VpcConfig

Configuration parameters for a private Virtual Private Cloud (VPC) containing the resources you are using for your key phrases detection job. For more information, see [Amazon VPC](#).

Type: [VpcConfig \(p. 571\)](#) object

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# OutputDataConfig

Provides configuration parameters for the output of inference jobs.

## Contents

### KmsKeyId

ID for the AWS Key Management Service (KMS) key that Amazon Comprehend uses to encrypt the output results from an analysis job. The KmsKeyId can be one of the following formats:

- KMS Key ID: "1234abcd-12ab-34cd-56ef-1234567890ab"
- Amazon Resource Name (ARN) of a KMS Key: "arn:aws:kms:us-west-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab"
- KMS Key Alias: "alias/ExampleAlias"
- ARN of a KMS Key Alias: "arn:aws:kms:us-west-2:111122223333:alias/ExampleAlias"

Type: String

Length Constraints: Maximum length of 2048.

Pattern: ^\p{ASCII}+\$

Required: No

### S3Uri

When you use the `OutputDataConfig` object with asynchronous operations, you specify the Amazon S3 location where you want to write the output data. The URI must be in the same region as the API endpoint that you are calling. The location is used as the prefix for the actual location of the output file.

When the topic detection job is finished, the service creates an output file in a directory specific to the job. The `s3Uri` field contains the location of the output file, called `output.tar.gz`. It is a compressed archive that contains the ouput of the operation.

For a PII entity detection job, the output file is plain text, not a compressed archive. The output file name is the same as the input file, with `.out` appended at the end.

Type: String

Length Constraints: Maximum length of 1024.

Pattern: s3://[a-z0-9][\.\-\\_a-z0-9]{1,61}[a-z0-9](/.\*)?

Required: Yes

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## PartOfSpeechTag

Identifies the part of speech represented by the token and gives the confidence that Amazon Comprehend has that the part of speech was correctly identified. For more information about the parts of speech that Amazon Comprehend can identify, see [Syntax analysis \(p. 26\)](#).

### Contents

#### Score

The confidence that Amazon Comprehend has that the part of speech was correctly identified.

Type: Float

Required: No

#### Tag

Identifies the part of speech that the token represents.

Type: String

Valid Values: ADJ | ADP | ADV | AUX | CONJ | CCONJ | DET | INTJ | NOUN | NUM | O | PART | PRON | PROPN | PUNCT | SCONJ | SYM | VERB

Required: No

### See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## PiiEntitiesDetectionJobFilter

Provides information for filtering a list of PII entity detection jobs.

### Contents

#### **JobName**

Filters on the name of the job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 256.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/+\\-%@]\*\$)

Required: No

#### **JobStatus**

Filters the list of jobs based on job status. Returns only jobs with the specified status.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

Required: No

#### **SubmitTimeAfter**

Filters the list of jobs based on the time that the job was submitted for processing. Returns only jobs submitted after the specified time. Jobs are returned in descending order, newest to oldest.

Type: Timestamp

Required: No

#### **SubmitTimeBefore**

Filters the list of jobs based on the time that the job was submitted for processing. Returns only jobs submitted before the specified time. Jobs are returned in ascending order, oldest to newest.

Type: Timestamp

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# PiiEntitiesDetectionJobProperties

Provides information about a PII entities detection job.

## Contents

### DataAccessRoleArn

The Amazon Resource Name (ARN) that gives Amazon Comprehend read access to your input data.

Type: String

Length Constraints: Minimum length of 20. Maximum length of 2048.

Pattern: arn:aws(-[^:]+)?::iam::[0-9]{12}:role/.+

Required: No

### EndTime

The time that the PII entities detection job completed.

Type: Timestamp

Required: No

### InputDataConfig

The input properties for a PII entities detection job.

Type: [InputDataConfig \(p. 539\)](#) object

Required: No

### JobArn

The Amazon Resource Name (ARN) of the PII entities detection job. It is a unique, fully qualified identifier for the job. It includes the AWS account, Region, and the job ID. The format of the ARN is as follows:

```
arn:<partition>:comprehend:<region>:<account-id>:pii-entities-detection-job/<job-id>
```

The following is an example job ARN:

```
arn:aws:comprehend:us-west-2:111122223333:pii-entities-detection-job/1234abcd12ab34cd56ef1234567890ab
```

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]+)?::comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:[a-zA-Z0-9-]{1,64}/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*)?

Required: No

### JobId

The identifier assigned to the PII entities detection job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:/-+\\-%@]\*\$

Required: No

#### **JobName**

The name that you assigned the PII entities detection job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 256.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:/-+\\-%@]\*\$

Required: No

#### **JobStatus**

The current status of the PII entities detection job. If the status is FAILED, the Message field shows the reason for the failure.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

Required: No

#### **LanguageCode**

The language code of the input documents

Type: String

Valid Values: en

Required: No

#### **Message**

A description of the status of a job.

Type: String

Required: No

#### **Mode**

Specifies whether the output provides the locations (offsets) of PII entities or a file in which PII entities are redacted.

Type: String

Valid Values: ONLY\_REDACTION | ONLY\_OFFSETS

Required: No

#### **OutputDataConfig**

The output data configuration that you supplied when you created the PII entities detection job.

Type: [PiiOutputDataConfig \(p. 554\)](#) object

Required: No

### **RedactionConfig**

Provides configuration parameters for PII entity redaction.

This parameter is required if you set the `Mode` parameter to `ONLY_REDACTION`. In that case, you must provide a `RedactionConfig` definition that includes the `PiiEntityTypes` parameter.

Type: [RedactionConfig \(p. 555\)](#) object

Required: No

### **SubmitTime**

The time that the PII entities detection job was submitted for processing.

Type: `Timestamp`

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## PiiEntity

Provides information about a PII entity.

### Contents

#### BeginOffset

A character offset in the input text that shows where the PII entity begins (the first character is at position 0). The offset returns the position of each UTF-8 code point in the string. A *code point* is the abstract character from a particular graphical representation. For example, a multi-byte UTF-8 character maps to a single code point.

Type: Integer

Required: No

#### EndOffset

A character offset in the input text that shows where the PII entity ends. The offset returns the position of each UTF-8 code point in the string. A *code point* is the abstract character from a particular graphical representation. For example, a multi-byte UTF-8 character maps to a single code point.

Type: Integer

Required: No

#### Score

The level of confidence that Amazon Comprehend has in the accuracy of the detection.

Type: Float

Required: No

#### Type

The entity's type.

Type: String

Valid Values: BANK\_ACCOUNT\_NUMBER | BANK\_ROUTING | CREDIT\_DEBIT\_NUMBER | CREDIT\_DEBIT\_CVV | CREDIT\_DEBIT\_EXPIRY | PIN | EMAIL | ADDRESS | NAME | PHONE | SSN | DATE\_TIME | PASSPORT\_NUMBER | DRIVER\_ID | URL | AGE | USERNAME | PASSWORD | AWS\_ACCESS\_KEY | AWS\_SECRET\_KEY | IP\_ADDRESS | MAC\_ADDRESS | LICENSE\_PLATE | VEHICLE\_IDENTIFICATION\_NUMBER | UK\_NATIONAL\_INSURANCE\_NUMBER | CA\_SOCIAL\_INSURANCE\_NUMBER | US\_INDIVIDUAL\_TAX\_IDENTIFICATION\_NUMBER | UK\_UNIQUE\_TAXPAYER\_REFERENCE\_NUMBER | IN\_PERMANENT\_ACCOUNT\_NUMBER | IN\_NREGA | INTERNATIONAL\_BANK\_ACCOUNT\_NUMBER | SWIFT\_CODE | UK\_NATIONAL\_HEALTH\_SERVICE\_NUMBER | CA\_HEALTH\_NUMBER | IN\_AADHAAR | IN\_VOTER\_NUMBER | ALL

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)

- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# PiiOutputDataConfig

Provides configuration parameters for the output of PII entity detection jobs.

## Contents

### KmsKeyId

ID for the AWS Key Management Service (KMS) key that Amazon Comprehend uses to encrypt the output results from an analysis job.

Type: String

Length Constraints: Maximum length of 2048.

Pattern: ^\p{ASCII}+\$

Required: No

### S3Uri

When you use the `PiiOutputDataConfig` object with asynchronous operations, you specify the Amazon S3 location where you want to write the output data.

For a PII entity detection job, the output file is plain text, not a compressed archive. The output file name is the same as the input file, with `.out` appended at the end.

Type: String

Length Constraints: Maximum length of 1024.

Pattern: s3://[a-z0-9][\.\-\\_a-z0-9]{1,61}[a-z0-9](/.\*)?

Required: Yes

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## RedactionConfig

Provides configuration parameters for PII entity redaction.

### Contents

#### MaskCharacter

A character that replaces each character in the redacted PII entity.

Type: String

Length Constraints: Fixed length of 1.

Pattern: [ !@#\$%&\* ]

Required: No

#### MaskMode

Specifies whether the PII entity is redacted with the mask character or the entity type.

Type: String

Valid Values: MASK | REPLACE\_WITH\_PII\_ENTITY\_TYPE

Required: No

#### PiiEntityTypes

An array of the types of PII entities that Amazon Comprehend detects in the input text for your request.

Type: Array of strings

Valid Values: BANK\_ACCOUNT\_NUMBER | BANK\_ROUTING | CREDIT\_DEBIT\_NUMBER | CREDIT\_DEBIT\_CVV | CREDIT\_DEBIT\_EXPIRY | PIN | EMAIL | ADDRESS | NAME | PHONE | SSN | DATE\_TIME | PASSPORT\_NUMBER | DRIVER\_ID | URL | AGE | USERNAME | PASSWORD | AWS\_ACCESS\_KEY | AWS\_SECRET\_KEY | IP\_ADDRESS | MAC\_ADDRESS | LICENSE\_PLATE | VEHICLE\_IDENTIFICATION\_NUMBER | UK\_NATIONAL\_INSURANCE\_NUMBER | CA\_SOCIAL\_INSURANCE\_NUMBER | US\_INDIVIDUAL\_TAX\_IDENTIFICATION\_NUMBER | UK\_UNIQUE\_TAXPAYER\_REFERENCE\_NUMBER | IN\_PERMANENT\_ACCOUNT\_NUMBER | IN\_NREGA | INTERNATIONAL\_BANK\_ACCOUNT\_NUMBER | SWIFT\_CODE | UK\_NATIONAL\_HEALTH\_SERVICE\_NUMBER | CA\_HEALTH\_NUMBER | IN\_AADHAAR | IN\_VOTER\_NUMBER | ALL

Required: No

### See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## SentimentDetectionJobFilter

Provides information for filtering a list of dominant language detection jobs. For more information, see the [ListSentimentDetectionJobs \(p. 392\)](#) operation.

### Contents

#### JobName

Filters on the name of the job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 256.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/+\\-%@]\*\$

Required: No

#### JobStatus

Filters the list of jobs based on job status. Returns only jobs with the specified status.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

Required: No

#### SubmitTimeAfter

Filters the list of jobs based on the time that the job was submitted for processing. Returns only jobs submitted after the specified time. Jobs are returned in descending order, newest to oldest.

Type: Timestamp

Required: No

#### SubmitTimeBefore

Filters the list of jobs based on the time that the job was submitted for processing. Returns only jobs submitted before the specified time. Jobs are returned in ascending order, oldest to newest.

Type: Timestamp

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# SentimentDetectionJobProperties

Provides information about a sentiment detection job.

## Contents

### DataAccessRoleArn

The Amazon Resource Name (ARN) that gives Amazon Comprehend read access to your input data.

Type: String

Length Constraints: Minimum length of 20. Maximum length of 2048.

Pattern: arn:aws(-[^:]+)?:iam::[0-9]{12}:role/.+

Required: No

### EndTime

The time that the sentiment detection job ended.

Type: Timestamp

Required: No

### InputDataConfig

The input data configuration that you supplied when you created the sentiment detection job.

Type: [InputDataConfig \(p. 539\)](#) object

Required: No

### JobArn

The Amazon Resource Name (ARN) of the sentiment detection job. It is a unique, fully qualified identifier for the job. It includes the AWS account, Region, and the job ID. The format of the ARN is as follows:

arn:<partition>:comprehend:<region>:<account-id>:sentiment-detection-job/<job-id>

The following is an example job ARN:

arn:aws:comprehend:us-west-2:111122223333:sentiment-detection-job/1234abcd12ab34cd56ef1234567890ab

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:[a-zA-Z0-9-]{1,64}/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*)?

Required: No

### JobId

The identifier assigned to the sentiment detection job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:/+%-@]\* )\$

Required: No

#### **JobName**

The name that you assigned to the sentiment detection job

Type: String

Length Constraints: Minimum length of 1. Maximum length of 256.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:/+%-@]\* )\$

Required: No

#### **JobStatus**

The current status of the sentiment detection job. If the status is FAILED, the `Messages` field shows the reason for the failure.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

Required: No

#### **LanguageCode**

The language code of the input documents.

Type: String

Valid Values: en | es | fr | de | it | pt | ar | hi | ja | ko | zh | zh-TW

Required: No

#### **Message**

A description of the status of a job.

Type: String

Required: No

#### **OutputDataConfig**

The output data configuration that you supplied when you created the sentiment detection job.

Type: [OutputDataConfig \(p. 546\)](#) object

Required: No

#### **SubmitTime**

The time that the sentiment detection job was submitted for processing.

Type: Timestamp

Required: No

#### **VolumeKmsKeyId**

ID for the AWS Key Management Service (KMS) key that Amazon Comprehend uses to encrypt data on the storage volume attached to the ML compute instance(s) that process the analysis job. The `VolumeKmsKeyId` can be either of the following formats:

- KMS Key ID: "1234abcd-12ab-34cd-56ef-1234567890ab"
- Amazon Resource Name (ARN) of a KMS Key: "arn:aws:kms:us-west-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab"

Type: String

Length Constraints: Maximum length of 2048.

Pattern: ^\p{ASCII}+\$

Required: No

#### VpcConfig

Configuration parameters for a private Virtual Private Cloud (VPC) containing the resources you are using for your sentiment detection job. For more information, see [Amazon VPC](#).

Type: [VpcConfig \(p. 571\)](#) object

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## SentimentScore

Describes the level of confidence that Amazon Comprehend has in the accuracy of its detection of sentiments.

### Contents

#### Mixed

The level of confidence that Amazon Comprehend has in the accuracy of its detection of the `MIXED` sentiment.

Type: Float

Required: No

#### Negative

The level of confidence that Amazon Comprehend has in the accuracy of its detection of the `NEGATIVE` sentiment.

Type: Float

Required: No

#### Neutral

The level of confidence that Amazon Comprehend has in the accuracy of its detection of the `NEUTRAL` sentiment.

Type: Float

Required: No

#### Positive

The level of confidence that Amazon Comprehend has in the accuracy of its detection of the `POSITIVE` sentiment.

Type: Float

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## SyntaxToken

Represents a work in the input text that was recognized and assigned a part of speech. There is one syntax token record for each word in the source text.

### Contents

#### **BeginOffset**

The zero-based offset from the beginning of the source text to the first character in the word.

Type: Integer

Required: No

#### **EndOffset**

The zero-based offset from the beginning of the source text to the last character in the word.

Type: Integer

Required: No

#### **PartOfSpeech**

Provides the part of speech label and the confidence level that Amazon Comprehend has that the part of speech was correctly identified. For more information, see [Syntax analysis \(p. 26\)](#).

Type: [PartOfSpeechTag \(p. 547\)](#) object

Required: No

#### **Text**

The word that was recognized in the source text.

Type: String

Length Constraints: Minimum length of 1.

Required: No

#### **TokenId**

A unique identifier for a token.

Type: Integer

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## Tag

A key-value pair that adds as a metadata to a resource used by Amazon Comprehend. For example, a tag with the key-value pair 'Department':'Sales' might be added to a resource to indicate its use by a particular department.

### Contents

#### Key

The initial part of a key-value pair that forms a tag associated with a given resource. For instance, if you want to show which resources are used by which departments, you might use "Department" as the key portion of the pair, with multiple possible values such as "sales," "legal," and "administration."

Type: String

Length Constraints: Minimum length of 1. Maximum length of 128.

Required: Yes

#### Value

The second part of a key-value pair that forms a tag associated with a given resource. For instance, if you want to show which resources are used by which departments, you might use "Department" as the initial (key) portion of the pair, with a value of "sales" to indicate the sales department.

Type: String

Length Constraints: Minimum length of 0. Maximum length of 256.

Required: No

### See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# TargetedSentimentDetectionJobFilter

Provides information for filtering a list of dominant language detection jobs. For more information, see the [ListTargetedSentimentDetectionJobs \(p. 397\)](#) operation.

## Contents

### JobName

Filters on the name of the job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 256.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/=+\-%@]\*\$

Required: No

### JobStatus

Filters the list of jobs based on job status. Returns only jobs with the specified status.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

Required: No

### SubmitTimeAfter

Filters the list of jobs based on the time that the job was submitted for processing. Returns only jobs submitted after the specified time. Jobs are returned in descending order, newest to oldest.

Type: Timestamp

Required: No

### SubmitTimeBefore

Filters the list of jobs based on the time that the job was submitted for processing. Returns only jobs submitted before the specified time. Jobs are returned in ascending order, oldest to newest.

Type: Timestamp

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# TargetedSentimentDetectionJobProperties

Provides information about a targeted sentiment detection job.

## Contents

### DataAccessRoleArn

The Amazon Resource Name (ARN) that gives Amazon Comprehend read access to your input data.

Type: String

Length Constraints: Minimum length of 20. Maximum length of 2048.

Pattern: arn:aws(-[^:]+)?:iam::[0-9]{12}:role/.+

Required: No

### EndTime

The time that the targeted sentiment detection job ended.

Type: Timestamp

Required: No

### InputDataConfig

The input properties for an inference job.

Type: [InputDataConfig \(p. 539\)](#) object

Required: No

### JobArn

The Amazon Resource Name (ARN) of the targeted sentiment detection job. It is a unique, fully qualified identifier for the job. It includes the AWS account, Region, and the job ID. The format of the ARN is as follows:

```
arn:<partition>:comprehend:<region>:<account-id>:targeted-sentiment-detection-job/<job-id>
```

The following is an example job ARN:

```
arn:aws:comprehend:us-west-2:111122223333:targeted-sentiment-detection-job/1234abcd12ab34cd56ef1234567890ab
```

Type: String

Length Constraints: Maximum length of 256.

Pattern: arn:aws(-[^:]+)?:comprehend:[a-zA-Z0-9-]\*:[0-9]{12}:[a-zA-Z0-9-]{1,64}/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*(/version/[a-zA-Z0-9](-\*[a-zA-Z0-9])\*)?

Required: No

### JobId

The identifier assigned to the targeted sentiment detection job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}]\p{N}\_.:/:=+\-%@]\* )\$

Required: No

#### **JobName**

The name that you assigned to the targeted sentiment detection job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 256.

Pattern: ^([\p{L}\p{Z}]\p{N}\_.:/:=+\-%@]\* )\$

Required: No

#### **JobStatus**

The current status of the targeted sentiment detection job. If the status is FAILED, the Messages field shows the reason for the failure.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

Required: No

#### **LanguageCode**

The language code of the input documents.

Type: String

Valid Values: en

Required: No

#### **Message**

A description of the status of a job.

Type: String

Required: No

#### **OutputDataConfig**

Provides configuration parameters for the output of inference jobs.

Type: [OutputDataConfig \(p. 546\)](#) object

Required: No

#### **SubmitTime**

The time that the targeted sentiment detection job was submitted for processing.

Type: Timestamp

Required: No

#### **VolumeKmsKeyId**

ID for the AWS Key Management Service (KMS) key that Amazon Comprehend uses to encrypt data on the storage volume attached to the ML compute instance(s) that process the targeted sentiment detection job. The VolumeKmsKeyId can be either of the following formats:

- KMS Key ID: "1234abcd-12ab-34cd-56ef-1234567890ab"
- Amazon Resource Name (ARN) of a KMS Key: "arn:aws:kms:us-west-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab"

Type: String

Length Constraints: Maximum length of 2048.

Pattern: ^\p{ASCII}+\$

Required: No

#### VpcConfig

Configuration parameters for an optional private Virtual Private Cloud (VPC) containing the resources you are using for the job. For more information, see [Amazon VPC](#).

Type: [VpcConfig \(p. 571\)](#) object

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## TopicsDetectionJobFilter

Provides information for filtering topic detection jobs. For more information, see [ListTopicsDetectionJobs \(p. 400\)](#).

### Contents

#### JobName

Type: String

Length Constraints: Minimum length of 1. Maximum length of 256.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:=/+\\-%@]\*\$

Required: No

#### JobStatus

Filters the list of topic detection jobs based on job status. Returns only jobs with the specified status.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

Required: No

#### SubmitTimeAfter

Filters the list of jobs based on the time that the job was submitted for processing. Only returns jobs submitted after the specified time. Jobs are returned in ascending order, oldest to newest.

Type: Timestamp

Required: No

#### SubmitTimeBefore

Filters the list of jobs based on the time that the job was submitted for processing. Only returns jobs submitted before the specified time. Jobs are returned in descending order, newest to oldest.

Type: Timestamp

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

# TopicsDetectionJobProperties

Provides information about a topic detection job.

## Contents

### DataAccessRoleArn

The Amazon Resource Name (ARN) of the AWS Identity and Management (IAM) role that grants Amazon Comprehend read access to your job data.

Type: String

Length Constraints: Minimum length of 20. Maximum length of 2048.

Pattern: `arn:aws(-[^\:]*)?:iam::[0-9]{12}:role/.+`

Required: No

### EndTime

The time that the topic detection job was completed.

Type: Timestamp

Required: No

### InputDataConfig

The input data configuration supplied when you created the topic detection job.

Type: [InputDataConfig \(p. 539\)](#) object

Required: No

### JobArn

The Amazon Resource Name (ARN) of the topics detection job. It is a unique, fully qualified identifier for the job. It includes the AWS account, Region, and the job ID. The format of the ARN is as follows:

`arn:<partition>:comprehend:<region>:<account-id>:topics-detection-job/<job-id>`

The following is an example job ARN:

`arn:aws:comprehend:us-west-2:111122223333:topics-detection-job/1234abcd12ab34cd56ef1234567890ab`

Type: String

Length Constraints: Maximum length of 256.

Pattern: `arn:aws(-[^\:]*)?:comprehend:[a-zA-Z0-9-]*:[0-9]{12}:[a-zA-Z0-9-]{1,64}/[a-zA-Z0-9](-*[a-zA-Z0-9])*(/version/[a-zA-Z0-9](-*[a-zA-Z0-9])*?)?`

Required: No

### JobId

The identifier assigned to the topic detection job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:/-+\\-%@]\*\$

Required: No

#### **JobName**

The name of the topic detection job.

Type: String

Length Constraints: Minimum length of 1. Maximum length of 256.

Pattern: ^([\p{L}\p{Z}\p{N}\_.:/-+\\-%@]\*\$

Required: No

#### **JobStatus**

The current status of the topic detection job. If the status is Failed, the reason for the failure is shown in the Message field.

Type: String

Valid Values: SUBMITTED | IN\_PROGRESS | COMPLETED | FAILED | STOP\_REQUESTED | STOPPED

Required: No

#### **Message**

A description for the status of a job.

Type: String

Required: No

#### **NumberOfTopics**

The number of topics to detect supplied when you created the topic detection job. The default is 10.

Type: Integer

Required: No

#### **OutputDataConfig**

The output data configuration supplied when you created the topic detection job.

Type: [OutputDataConfig \(p. 546\)](#) object

Required: No

#### **SubmitTime**

The time that the topic detection job was submitted for processing.

Type: Timestamp

Required: No

#### **VolumeKmsKeyId**

ID for the AWS Key Management Service (KMS) key that Amazon Comprehend uses to encrypt data on the storage volume attached to the ML compute instance(s) that process the analysis job. The VolumeKmsKeyId can be either of the following formats:

- KMS Key ID: "1234abcd-12ab-34cd-56ef-1234567890ab"
- Amazon Resource Name (ARN) of a KMS Key: "arn:aws:kms:us-west-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab"

Type: String

Length Constraints: Maximum length of 2048.

Pattern: ^\p{ASCII}+\$

Required: No

#### VpcConfig

Configuration parameters for a private Virtual Private Cloud (VPC) containing the resources you are using for your topic detection job. For more information, see [Amazon VPC](#).

Type: [VpcConfig \(p. 571\)](#) object

Required: No

## See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## VpcConfig

Configuration parameters for an optional private Virtual Private Cloud (VPC) containing the resources you are using for the job. For more information, see [Amazon VPC](#).

### Contents

#### SecurityGroupIds

The ID number for a security group on an instance of your private VPC. Security groups on your VPC function serve as a virtual firewall to control inbound and outbound traffic and provides security for the resources that you'll be accessing on the VPC. This ID number is preceded by "sg-", for instance: "sg-03b388029b0a285ea". For more information, see [Security Groups for your VPC](#).

Type: Array of strings

Array Members: Minimum number of 1 item. Maximum number of 5 items.

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: [-0-9a-zA-Z]+

Required: Yes

#### Subnets

The ID for each subnet being used in your private VPC. This subnet is a subset of the a range of IPv4 addresses used by the VPC and is specific to a given availability zone in the VPC's region. This ID number is preceded by "subnet-", for instance: "subnet-04ccf456919e69055". For more information, see [VPCs and Subnets](#).

Type: Array of strings

Array Members: Minimum number of 1 item. Maximum number of 16 items.

Length Constraints: Minimum length of 1. Maximum length of 32.

Pattern: [-0-9a-zA-Z]+

Required: Yes

### See Also

For more information about using this API in one of the language-specific AWS SDKs, see the following:

- [AWS SDK for C++](#)
- [AWS SDK for Go](#)
- [AWS SDK for Java V2](#)
- [AWS SDK for Ruby V3](#)

## Common Parameters

The following list contains the parameters that all actions use for signing Signature Version 4 requests with a query string. Any action-specific parameters are listed in the topic for that action. For more information about Signature Version 4, see [Signature Version 4 Signing Process](#) in the *Amazon Web Services General Reference*.

### Action

The action to be performed.

Type: string

Required: Yes

### Version

The API version that the request is written for, expressed in the format YYYY-MM-DD.

Type: string

Required: Yes

### X-Amz-Algorithm

The hash algorithm that you used to create the request signature.

Condition: Specify this parameter when you include authentication information in a query string instead of in the HTTP authorization header.

Type: string

Valid Values: AWS4-HMAC-SHA256

Required: Conditional

### X-Amz-Credential

The credential scope value, which is a string that includes your access key, the date, the region you are targeting, the service you are requesting, and a termination string ("aws4\_request"). The value is expressed in the following format: *access\_key/YYYYMMDD/region/service/aws4\_request*.

For more information, see [Task 2: Create a String to Sign for Signature Version 4](#) in the *Amazon Web Services General Reference*.

Condition: Specify this parameter when you include authentication information in a query string instead of in the HTTP authorization header.

Type: string

Required: Conditional

### X-Amz-Date

The date that is used to create the signature. The format must be ISO 8601 basic format (YYYYMMDD'T'HHMMSS'Z'). For example, the following date time is a valid X-Amz-Date value: 20120325T120000Z.

Condition: X-Amz-Date is optional for all requests; it can be used to override the date used for signing requests. If the Date header is specified in the ISO 8601 basic format, X-Amz-Date is not required. When X-Amz-Date is used, it always overrides the value of the Date header. For more information, see [Handling Dates in Signature Version 4](#) in the *Amazon Web Services General Reference*.

Type: string

Required: Conditional

### X-Amz-Security-Token

The temporary security token that was obtained through a call to AWS Security Token Service (AWS STS). For a list of services that support temporary security credentials from AWS Security Token Service, go to [AWS Services That Work with IAM](#) in the *IAM User Guide*.

Condition: If you're using temporary security credentials from the AWS Security Token Service, you must include the security token.

Type: string

Required: Conditional

**X-Amz-Signature**

Specifies the hex-encoded signature that was calculated from the string to sign and the derived signing key.

Condition: Specify this parameter when you include authentication information in a query string instead of in the HTTP authorization header.

Type: string

Required: Conditional

**X-Amz-SignedHeaders**

Specifies all the HTTP headers that were included as part of the canonical request. For more information about specifying signed headers, see [Task 1: Create a Canonical Request For Signature Version 4](#) in the *Amazon Web Services General Reference*.

Condition: Specify this parameter when you include authentication information in a query string instead of in the HTTP authorization header.

Type: string

Required: Conditional

## Common Errors

This section lists the errors common to the API actions of all AWS services. For errors specific to an API action for this service, see the topic for that API action.

**AccessDeniedException**

You do not have sufficient access to perform this action.

HTTP Status Code: 400

**IncompleteSignature**

The request signature does not conform to AWS standards.

HTTP Status Code: 400

**InternalFailure**

The request processing has failed because of an unknown error, exception or failure.

HTTP Status Code: 500

**InvalidAction**

The action or operation requested is invalid. Verify that the action is typed correctly.

HTTP Status Code: 400

**InvalidClientTokenId**

The X.509 certificate or AWS access key ID provided does not exist in our records.

HTTP Status Code: 403

**InvalidParameterCombination**

Parameters that must not be used together were used together.

HTTP Status Code: 400

**InvalidParameterValue**

An invalid or out-of-range value was supplied for the input parameter.

HTTP Status Code: 400

**InvalidQueryParameter**

The AWS query string is malformed or does not adhere to AWS standards.

HTTP Status Code: 400

**MalformedQueryString**

The query string contains a syntax error.

HTTP Status Code: 404

**MissingAction**

The request is missing an action or a required parameter.

HTTP Status Code: 400

**MissingAuthenticationToken**

The request must contain either a valid (registered) AWS access key ID or X.509 certificate.

HTTP Status Code: 403

**MissingParameter**

A required parameter for the specified action is not supplied.

HTTP Status Code: 400

**NotAuthorized**

You do not have permission to perform this action.

HTTP Status Code: 400

**OptInRequired**

The AWS access key ID needs a subscription for the service.

HTTP Status Code: 403

**RequestExpired**

The request reached the service more than 15 minutes after the date stamp on the request or more than 15 minutes after the request expiration date (such as for pre-signed URLs), or the date stamp on the request is more than 15 minutes in the future.

HTTP Status Code: 400

**ServiceUnavailable**

The request has failed due to a temporary failure of the server.

HTTP Status Code: 503

**ThrottlingException**

The request was denied due to request throttling.

HTTP Status Code: 400

**ValidationException**

The input fails to satisfy the constraints specified by an AWS service.

HTTP Status Code: 400

# Document history for Amazon Comprehend

The following table describes the documentation for this release of Amazon Comprehend.

update-history-change	update-history-description	update-history-date
<a href="#">Additional PII entity types</a>	Additional PII entity types now detected by Amazon Comprehend. For more information, see <a href="#">Detecting PII entities in Amazon Comprehend</a> .	May 20, 2022
<a href="#">Table of Contents restructure</a>	Restructured the Amazon Comprehend Developer Guide table of contents for easier navigation. For more information, see <a href="#">What is Amazon Comprehend</a> .	April 7, 2022
<a href="#">Targeted sentiment</a>	Amazon Comprehend now supports targeted sentiment analysis, which determines the sentiment associated with specific entities in a document. For more information, see <a href="#">Targeted sentiment in Amazon Comprehend</a> .	March 9, 2022
<a href="#">New feature</a>	Amazon Comprehend now allows you to analyze images for custom entity recognition. For more information, see <a href="#">Detecting custom entities in Amazon Comprehend</a> .	February 28, 2022
<a href="#">New feature</a>	You can now copy trained custom models between AWS accounts. For more information, see <a href="#">Copying custom models between accounts in Amazon Comprehend</a> .	February 2, 2022
<a href="#">New feature</a>	You can now use AWS Trusted Advisor to view recommendations that can help you optimize the cost and security of your Amazon Comprehend endpoints. For more information, see <a href="#">Using Trusted Advisor with Amazon Comprehend</a> .	September 29, 2021

New feature	Amazon Comprehend has launched a suite of features for Comprehend Custom which enable continuous model improvements by giving you the ability to create new model versions, continuously test on specific test sets, and perform live migration to new model endpoints.	September 21, 2021
New feature	Amazon Comprehend now allows you to analyze PDF and Word documents for custom entity recognition. With PDF and Word formats, you can extract information from documents containing headers, lists and tables.	September 14, 2021
New feature	Amazon Comprehend has launched a new endpoints overview feature which provides you a global view of your endpoints. From the endpoints overview page, you can view all of your endpoints in one place to understand your endpoint usage versus your actual resource usage.	August 24, 2021
New feature	Amazon Comprehend Medical now allows you to establish a private connection with your Virtual Private Cloud (VPC) by creating an interface VPC endpoint. For more information, see <a href="#">VPC endpoints(PrivateLink)</a> .	June 13, 2021
Language expansion	Amazon Comprehend has added four additional languages for the dominant language feature: Hausa (ha), Lao (lo), Maltese (mt), and Oromo (om). For more information, see <a href="#">Supported languages in Amazon Comprehend</a> .	May 10, 2021
New feature	With Amazon Comprehend, you can now encrypt custom models using a customer managed key (CMK). For more information, see <a href="#">KMS encryption in Amazon Comprehend</a> .	March 31, 2021

New feature	You can now use Amazon S3 Object Lambda Access Points to configure how documents that contain personally identifiable information (PII) are retrieved from your Amazon S3 bucket. You can control access of documents that contain PII and redact PII from documents. For more information, see <a href="#">Using Amazon S3 object Lambda access points for personally identifiable information (PII)</a> .	March 18, 2021
New feature	You can now label a document with personally identifiable information (PII). Amazon Comprehend can analyze your document for the presence of PII and return the labels of identified PII entity types such as name, address, bank account number, or phone number. For more information, see <a href="#">Label document with PII</a> .	March 11, 2021
New feature	With Amazon Comprehend, you can now detect events in a set of documents. When you create an asynchronous events detection job, Amazon Comprehend can detect supported types of financial events. For more information, see <a href="#">Detect events</a> .	November 24, 2020
New feature	Amazon Comprehend now allows you to use auto scaling for custom entity recognizer endpoints. With auto scaling, you can automatically set endpoint provisioning to fit your capacity needs. For more information, see <a href="#">Auto scaling with endpoints</a> .	September 28, 2020
New feature	To train custom classifiers or entity recognizers, you can now provide augmented manifest files, which are labeled datasets that are produced by Amazon SageMaker Ground Truth. For more information about these files, and for examples, see <a href="#">Multi-class mode</a> , <a href="#">Multi-label mode</a> , and <a href="#">Annotations</a> .	September 22, 2020

New tutorial	Amazon Comprehend now has a tutorial that walks you through a multi-service workflow of analyzing customer reviews and visualizing the analysis results. For more information, see <a href="#">Tutorial: Analyzing insights from reviews</a> .	September 17, 2020
New feature	With Amazon Comprehend, you can now detect entities in your text that contain personally identifiable information (PII), such as addresses, bank account numbers, or phone numbers. Amazon Comprehend can provide the location of each PII entity in your text, or it can provide a copy of your text in which the PII is redacted. For more information, see <a href="#">Detect personally identifiable information (PII)</a> .	September 17, 2020
New feature	Previously, you could only train a model on up to 12 custom entities. Now Amazon Comprehend allows you to train a model on up to 25 custom entities at a time. For more information, see <a href="#">Custom entity recognition</a> .	August 12, 2020
Language expansion	Amazon Comprehend has added five additional languages for the custom entity recognition feature: German (de), Spanish (es), French (fr), Italian (it), and Portuguese (pt). For more information, see <a href="#">Supported languages in Amazon Comprehend</a> .	August 12, 2020
New feature	Amazon Comprehend now allows you to establish a private connection with your Virtual Private Cloud (VPC) by creating an interface VPC endpoint. For more information, see <a href="#">VPC endpoints (AWS PrivateLink)</a> .	August 11, 2020

New feature	With Amazon Comprehend, you can now quickly detect custom entities in individual text documents by running real-time analysis. For more information, see <a href="#">Detecting custom entities in real time with amazon comprehend</a> .	July 9, 2020
New feature added	Amazon Comprehend now provides support for a second mode in asynchronous Custom Classification for documents that provides greater flexibility when applying custom classes to documents. While multi-class mode associates only a single class with each document, the new multi-label mode can associate more than one. For example, a movie can be classified as both science fiction and action at the same time. For more information, see <a href="#">Multi-class and multi-label modes in custom classification</a> .	December 19, 2019
New feature added	Amazon Comprehend now provides support for real-time Custom Classification for documents with unstructured text. Customers can use real-time custom classification to understand, label and route information based on their own business rules, synchronously. For more information, see <a href="#">Real-time analysis with custom classification</a> .	November 25, 2019
New languages added	Amazon Comprehend has added six additional languages for several of its features: Arabic (ar), Hindi (hi), Japanese (ja), Korean (ko), simplified Chinese (zh), and traditional Chinese (zh-TW). These new languages are supported only for Determine Sentiment, Detect Key Phrases, and non-custom Detect Entities operations. For more information, see <a href="#">Supported languages</a> .	November 6, 2019

New feature	Previously, you could only train a model on a single custom entity. As a result, you could only search for that one entity with an entity recognition operation. Amazon Comprehend has changed this and you can now train a model on up to 12 custom entities at a time. For more information, see <a href="#">Custom entity recognition</a>	July 9, 2019
New feature	Amazon Comprehend now provides a multi-class confusion matrix for added ability to analyze metrics when training a Custom Classifier. This is currently supported using the APIs only. For more information, see <a href="#">Tagging resources in Amazon Comprehend</a>	April 5, 2019
New feature	Amazon Comprehend provides tags for Custom Classifiers and Custom Entity Recognizers, which can be used as metadata that enables you to organize, filter, and control access to your resources with a finer level of control than ever. For more information, see <a href="#">Tagging resources in Amazon Comprehend</a>	April 3, 2019
New feature	Amazon S3 already enables you to encrypt your input documents, and Amazon Comprehend extends this even farther. By using your own KMS key, you can not only encrypt the output results of your job, but also the data on the storage volume attached to the compute instance that processes the analysis job. The result is end-to-end security. For more information, see <a href="#">KMS encryption in Amazon Comprehend</a>	March 28, 2019

New feature	Custom entity recognition extends the capability of Amazon Comprehend by enabling you to identify new entity types not supported as one of the preset generic entity types. This means you can analyze documents and extract entities like product codes or business-specific entities that fit your particular needs. For more information, see <a href="#">Custom entity recognition</a>	November 16, 2018
New feature	You can use Amazon Comprehend to build your own models for custom classification, assigning a document to a class or a category. For more information, see <a href="#">Document classification</a> .	November 15, 2018
Region expansion	Amazon Comprehend is now available in Europe (Frankfurt) (eu-central-1).	October 10, 2018
Language expansion	In addition to English and Spanish Amazon Comprehend can now also examine documents in French, German, Italian, and Portuguese. For more information, see <a href="#">Supported languages in Amazon Comprehend</a> .	October 10, 2018
Region expansion	Amazon Comprehend is now available in Asia Pacific (Sydney) (ap-southeast-2).	August 15, 2018
New feature	Amazon Comprehend now parses documents to discover the syntax of a document and the part of speech for each word. For more information, see <a href="#">Syntax</a> .	July 17, 2018
New feature	Amazon Comprehend now supports asynchronous batch processing for language, key phrase, entity, and sentiment detection. For more information, see <a href="#">Asynchronous batch processing</a> .	June 27, 2018
New guide (p. 576)	This is the first release of the <i>Amazon Comprehend Developer Guide</i> .	November 29, 2017

# AWS glossary

For the latest AWS terminology, see the [AWS glossary](#) in the *AWS General Reference*.