Text Analysis services available with Major Cloud Providers

Introduction

There are several cloud service providers today which offer Text analytics services. The most popular ones are AWS AI services, Azure Cognitive services & Google machine Learning. Most of these services provide analysis on Text, Video, Audio, Images etc. Our focus in this document is to explore various Text analytics services available for use by these cloud providers. I did a review of these services and am presenting the most prominent Text Analysis services from these three cloud providers:

Microsoft Azure Cognitive Services:

Microsoft offers a wide variety of Text analysis services which are grouped under the cognitive services

Microsoft has many Text analysis services grouped into Decision, Language & Speech

Decision

Anomaly Detector: Identify potential problems early on.

Content Moderator: Detect potentially offensive or unwanted content.

Metrics Advisor: Monitor metrics and diagnose issues.

Personalizer: Create rich, personalized experiences for every user.

Language

Immersive Reader: Help readers of all abilities comprehend text using audio and visual cues.

Language Understanding: Build natural language understanding into apps, bots, and IoT devices.

QnA Maker: Create a conversational question and answer layer over your data.

Text Analytics: Detect sentiment, key phrases, and named entities.

Speech

Speech to Text: Transcribe audible speech into readable, searchable text.

Text to Speech: Convert text to lifelike speech for more natural interfaces.

Speech Translation: Integrate real-time speech translation into your apps.

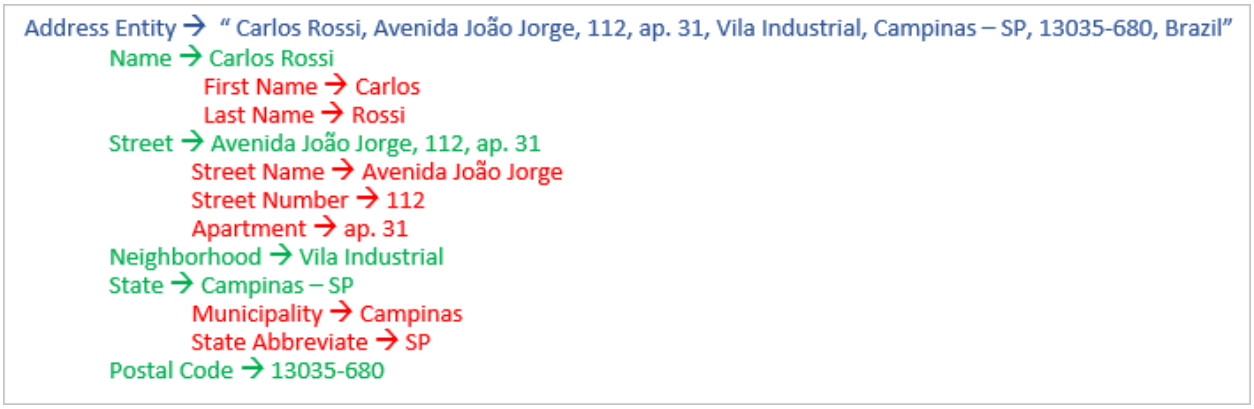
Speaker Recognition: Identify and verify the people speaking based on audio.

Language Understanding

Out of these I delved a little deeper into the Language Understanding: This service helps in building applications capable of understanding natural language. Using machine teaching technology and our

visual user interface, developers and subject matter experts can build custom machine-learned language models that interprets user goals and extracts key information from conversational phrases.

Language Understanding (LUIS) is a cloud-based conversational AI service that applies custom machine-learning intelligence to a user's conversational, natural language text to predict overall meaning, and pull out relevant, detailed information.



Sample result of a training LUIS model

A client application for LUIS is any conversational application that communicates with a user in natural language to complete a task. Examples of client applications include social media apps, AI chatbots, and speech-enabled desktop applications.

LUIS is an especially useful tool used in the chat bots which are ubiquitous these days.

All Azure cognitive services provide either SDK or Rest APIs to operate.

Amazon Web Services

Amazon Comprehend

Amazon Comprehend is a natural language processing (NLP) service that uses machine learning to find insights and relationships in text.

Amazon Comprehend uses machine learning to help you uncover the insights and relationships in your unstructured data. The service identifies the language of the text; extracts key phrases, places, people, brands, or events; understands how positive or negative the text is; analyzes text using tokenization and parts of speech; and automatically organizes a collection of text files by topic.

Keyphrase Extraction: The Keyphrase Extraction API returns the key phrases or talking points and a confidence score to support that this is a key phrase.

Sentiment Analysis: The Sentiment Analysis API returns the overall sentiment of a text (Positive, Negative, Neutral, or Mixed).

Syntax Analysis: The Amazon Comprehend Syntax API enables customers to analyze text using tokenization and Parts of Speech (PoS), and identify word boundaries and labels like nouns and adjectives within the text.

Entity Recognition: The Entity Recognition API returns the named entities ("People," "Places," "Locations," etc.) that are automatically categorized based on the provided text.

Comprehend Medical: Medical Named Entity and Relationship Extraction (NERe)

The Medical NERe API returns the medical information such as medication, medical condition, test, treatment and procedures (TTP), anatomy, and Protected Health Information (PHI). It also identifies relationships between extracted sub-types associated to Medications and TTP. There is also contextual information provided as entity "traits" (negation, or if a diagnosis is a sign or symptom). The table below shows the extracted information with relevant sub-types and entity traits.

Medical Ontology Linking: The Medical Ontology Linking APIs identifies medical information and links them to codes and concepts in standard medical ontologies. Medical conditions are linked to ICD-10-CM codes (e.g. "headache" is linked to the "R51" code) with the InferICD10CM API, while medications are linked to RxNorm codes ("Acetaminophine / Codeine" is linked to the "C2341132" cui). The Medical Ontology Linking APIs also detects contextual information as entity traits (e.g. negation).

Custom Entities: Custom Entities allows you to customize Amazon Comprehend to identify terms that are specific to your domain. Using AutoML, Comprehend will learn from a small private index of examples (for example, a list of policy numbers and text in which they are used), and then train a private, custom model to recognize these terms in any other block of text. There are no servers to manage, and no algorithms to master.

Language Detection: The Language Detection API automatically identifies text written in over 100 languages and returns the dominant language with a confidence score to support that a language is dominant.

Custom Classification: The Custom Classification API enables you to easily build custom text classification models using your business-specific labels without learning ML. For example, your customer support organization can use Custom Classification to automatically categorize inbound requests by problem type based on how the customer has described the issue. Creating a custom model is simple. You provide examples of text for each of the labels you want to use, and Comprehend trains on those to create your custom model. No machine learning experience required, you can build your custom model without using a single line of code. An SDK is available for you to integrate your customer classifier into your current applications. With your custom model, it is easy to moderate website comments, triage customer feedback, and organize workgroup documents. Refer to this documentation page for more details.

Topic Modeling: Topic Modeling identifies relevant terms or topics from a collection of documents stored in Amazon S3. It will identify the most common topics in the collection and organize them in groups and then map which documents belong to which topic.

Amazon Comprehend Medial

Amazon Comprehend Medical is a natural language processing service that makes it easy to use machine learning to extract relevant medical information from unstructured text. Using Amazon Comprehend Medical, you can quickly and accurately gather information, such as medical condition, medication, dosage, strength, and frequency from a variety of sources like doctors' notes, clinical trial reports, and

patient health records. Amazon Comprehend Medical can also link the detected information to medical ontologies such as ICD-10-CM or RxNorm so it can be used easily by downstream healthcare applications

Amazon Textract

Amazon Textract uses OCR technology to identify form labels and values and extracts information from tables without compromising the structure at a low cost. You only pay for what you use and there are no upfront commitments or long-term contracts.

Google Natural Language

Using Natural Language API to quickly reveal the structure and meaning of text — using thousands of pretrained classifications and using AutoML Natural Language to classify content into custom categories to suit your specific needs

It supports the following features:

Feature	Description
Syntax analysis	Extract tokens and sentences, identify parts of speech and create dependency parse trees for each sentence.
Entity analysis	Identify entities within documents — including receipts, invoices, and contracts — and label them by types such as date, person, contact information, organization, location, events, products, and media.
Custom entity extraction	Identify entities within documents and label them based on your own domain-specific keywords or phrases.
Sentiment analysis	Understand the overall opinion, feeling, or attitude sentiment expressed in a block of text.
Custom sentiment analysis	Understand the overall opinion, feeling, or attitude expressed in a block of text tuned to your own domain-specific sentiment scores.
Content classification	Classify documents in 700+ predefined categories.
Custom content classification	Create labels to customize models for unique use cases, using your own training data.
Custom models	Train custom machine learning models with minimum effort and machine learning expertise.
Spatial structure understanding	Use the structure and layout information in PDFs to improve custom entity extraction performance.
Large dataset support	Unlock complex use cases with support for 5,000 classification labels, 1 million documents, and 10 MB document size.

Business Scenarios / Usage of

There can be a tone of Business scenarios which can leverage these services. A few uses which companies have used to solve real business problems:

Tender Risk Analysis – Text analysis to read tenders / documents and analyze documents with risk clauses, risk scoring, contextual summarization, rich validations.

Mailroom process automation: Auto classification of incoming emails across hundreds of categories. Auto routing. Summarizing emails and convert the documents into semantically searchable documents.

Lease Abstraction: Extract data points from thousands of lease documents and create a summary of the document.

Chat bot: Natural language understanding to provide human like chat experiences with bots serving variety of business.

Profanity / Adult content filters, flagging age-inappropriate content.

There are limitless applications of the Text analysis services.

Conclusion

All three cloud providers offer a variety of rich services which can be used to serve varied business requirements. The interesting ones being Natural language processing which can help in a lot of accessibility features. A lot of business scenarios can be covered using these services. Also, these services provide pre-trained models and provide ability to bring in our own models, democratizing the complex NLP, text analysis process. While doing my research on these providers I found

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