

# Use prebuilt Document intelligence models

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## 1. Introduction

<https://learn.microsoft.com/en-us/training/modules/use-prebuilt-form-recognizer-models/1-introduction>

## Introduction

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Many forms and documents that businesses handle are common across disparate companies in different sectors. For example, most companies use invoices and receipts. Microsoft Azure Document Intelligence includes prebuilt models so you can handle common document types easily.

Imagine you conduct polls for private companies and political parties. Participants submit their responses as paper forms or as online PDFs. You've decided to deploy Azure Document Intelligence to streamline data entry. You want to know if you can use the prebuilt models to generate meaningful data from your forms.

In this module, you'll learn about the capabilities of the prebuilt models in Azure Document Intelligence and how to use them.

## Learning objectives

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At the end of this module, you'll be able to:

- Identify business problems that you can solve by using prebuilt models in Azure Document Intelligence.
- Analyze forms by using the General Document, Read, and Layout models.
- Analyze forms by using financial, ID, and tax prebuilt models.

## 2. Understand prebuilt models

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<https://learn.microsoft.com/en-us/training/modules/use-prebuilt-form-recognizer-models/2-understand-prebuilt-models>

# Understand prebuilt models

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Prebuilt models in Azure Document Intelligence enable you to extract data from common forms and documents without training your own models.

In your polling company, polling forms are unique to each survey project, but you also use invoices and receipts to record financial transactions and you have many unstructured documents. You want to know how much work is required to extract names, addresses, amounts, and other information from these documents.

Here, you learn how prebuilt models can help you analyze common document types.

## What are prebuilt models?

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The general approach used in AI solutions is to provide a large quantity of sample data and then train an optimized model by trying different data features, parameters, and statistical treatments. The combination that best predicts the values that interest you constitute the trained model, and you can use this model to predict values from new data.

Many of the forms that businesses use from day to day are of a few common types. For example, most businesses issue or receive invoices and receipts. Any business that has employees in the United States must use the W-2 tax declaration form. Also you often have more general documents that you might want to extract data from. For these cases, Microsoft helps you by providing prebuilt models. Prebuilt models are already trained on large numbers of their target form type.

If you want to use Document Intelligence to extract data from one of these common forms or documents, you can choose to use a prebuilt model and you don't have to train your own. Because Microsoft trains these models on a large corpus of examples, you can expect them to provide accurate and reliable results when dealing with their intended forms.

Several of the prebuilt models are trained on specific form types:

- **Invoice model.** Extracts common fields and their values from invoices.
- **Receipt model.** Extracts common fields and their values from receipts.
- **US Tax model.** Unified US tax model that can extract from forms such as W-2, 1098, 1099, and 1040.
- **ID document model.** Extracts common fields and their values from US drivers' licenses, European Union IDs and drivers license, and international passports.
- **Business card model.** Extracts common fields and their values from business cards.
- **Health insurance card model.** Extracts common fields and their values from health insurance cards.
- **Marriage certificate.** Extracts information from marriage certificates.
- **Credit/Debit card model.** Extracts common information from bank cards.
- **Mortgage documents.** Extracts information from mortgage closing disclosure, Uniform Residential Loan Application (Form 1003), Appraisal (Form 1004), Validation of Employment (Form 1005), and Uniform Underwriting and Transmittal Summary (Form 1008).
- **Bank statement model.** Extracts account information including beginning and ending balances, transaction details from bank statements.
- **Pay Stub model.** Extracts wages, hours, deductions, net pay, and other common pay stub fields.
- **Check model.** Extracts payee, amount, date, and other relevant information from checks.

The other models are designed to extract values from documents with less specific structures:

- **Read model.** Extracts text and languages from documents.
- **General document model.** Extract text, keys, values, entities, and selection marks from documents.
- **Layout model.** Extracts text and structure information from documents.

## Features of prebuilt models

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The prebuilt models are designed to extract different types of data from the documents and forms users submit. To select the right model for your requirements, you must understand these features:

- **Text extraction.** All the prebuilt models extract lines of text and words from hand-written and printed text.
- **Key-value pairs.** Many models extract spans of text within a document that identify a label or key and its response or value as key-values pairs. For example, a typical key might be **Weight** and its value might be **31 kg**.
- **Entities.** Text that includes common, more complex data structures can be extracted as entities. Entity types include people, locations, and dates.

- **Selection marks.** Some models extract spans of text that indicate a choice as selection marks. These marks include radio buttons and check boxes.
- **Tables.** Many models can extract tables in scanned forms included the data contained in cells, the numbers of columns and rows, and column and row headings. Tables with merged cells are supported.
- **Fields.** Models trained for a specific form type identify the values of a fixed set of fields. For example, the Invoice model includes **CustomerName** and **InvoiceTotal** fields.

Also consider that prebuilt models are designed for and trained on generic document and form types. If you have an industry-specific or unique form type that you use often, you might be able to obtain more reliable and predictable results by using a custom model. However, custom models take time to develop because you must invest the time and resources to train them on example forms before you can use it. The larger the number of example forms you provide for training, the better the model is at predicting form content accurately.

## Input requirements

The prebuilt models are flexible but you can help them to return accurate and helpful results by submitting one clear photo or high-quality scan for each document.

You must also comply with these requirements when you submit a form for analysis:

- The file must be in JPEG, PNG, BMP, TIFF, or PDF format. Additionally, the Read model can accept Microsoft Office files.
- The file must be smaller than 500 MB for the standard tier, and 4 MB for the free tier.
- Images must have dimensions between 50 x 50 pixels and 10,000 x 10,000 pixels.
- PDF documents must have dimensions less than 17 x 17 inches or A3 paper size.
- PDF documents must not be protected with a password.

### Note

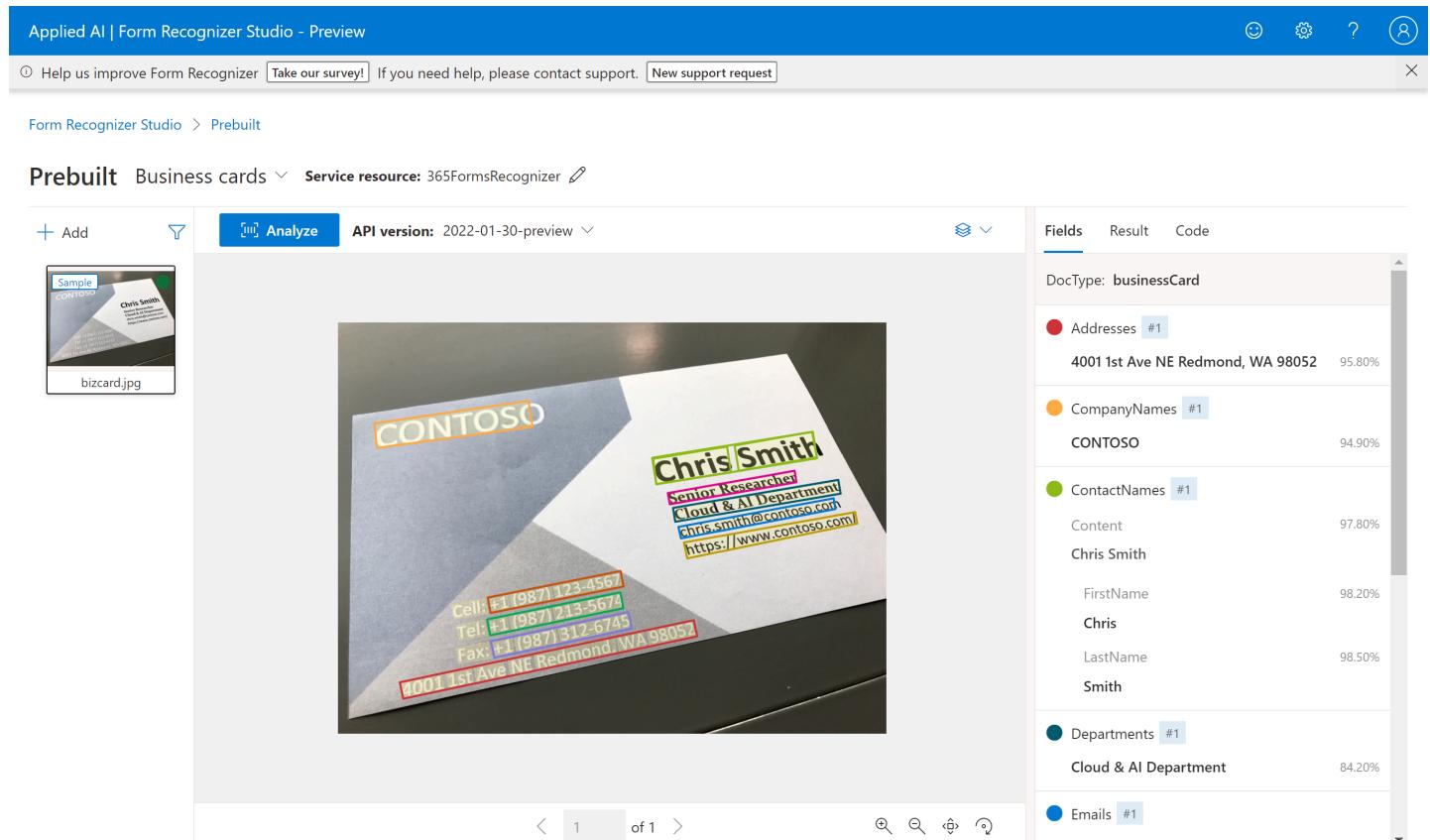
If you can, submit text-embedded PDF files because they eliminate errors in character recognition.

PDF and TIFF files can have any number of pages but, in the standard tier, only the first 2,000 pages are analyzed. In the free tier, only the first two pages are analyzed.

## Try out prebuilt models with Azure Document Intelligence Studio

Azure Document Intelligence is designed as a web service you can call using code in your custom applications. However, it's often helpful to explore the models and how they behave with your forms visually. You can perform such experiments by using [Azure Document Intelligence Studio](#) and use the experience to help design and write your code.

You can choose any of the prebuilt models in Azure Document Intelligence Studio. Microsoft provides some sample documents for use with each model or you can add your own documents and analyze them.



The screenshot shows the 'Form Recognizer Studio - Preview' interface. At the top, there are navigation links for 'Applied AI' and 'Form Recognizer Studio > Prebuilt'. Below this, the 'Prebuilt' tab is selected, followed by 'Business cards' and 'Service resource: 365FormsRecognizer'. The 'Analyze' button is highlighted in blue. The API version is set to '2022-01-30-preview'. On the left, there's a preview area showing a sample business card image labeled 'bizcard.jpg'. The main area displays the analyzed business card with various fields highlighted in different colors (e.g., green for name, blue for email). To the right, a results table lists the extracted information:

Fields	Result	Code
DocType:	businessCard	
Addresses	#1 4001 1st Ave NE Redmond, WA 98052	95.80%
CompanyNames	#1 CONTOSO	94.90%
ContactNames	#1 Content Chris Smith	97.80%
FirstName	Chris	98.20%
LastName	Smith	98.50%
Departments	#1 Cloud & AI Department	84.20%
Emails	#1	

## Calling prebuilt models by using APIs

Because Azure Document Intelligence implements RESTful web services, you can use web service calls from any language that supports them. However, when you use Microsoft's Azure Document Intelligence APIs, security and session management is simplified and you have to write less code.

Azure Document Intelligence is available for:

- C# and other .NET languages.
- Java.
- Python.
- JavaScript.

Whenever you want to call Azure Document Intelligence, you must start by connecting and authenticating with the service in your Azure subscription. To make that connection, you need:

- **The service endpoint.** This value is the URL where the service is published.
- **The API key.** This value is a unique key that grants access.

You obtain both of these values from the Azure portal.

Because the service can take a few seconds to respond, it's best to use asynchronous calls to submit a form and then obtain results from the analysis:

```
AnalyzeDocumentOperation operation = await client.AnalyzeDocumentFromUriAsync(WaitUntil.Completed);

AnalyzeResult result = operation.Value;

poller = document_analysis_client.begin_analyze_document(
    "prebuilt-layout", AnalyzeDocumentRequest(url_source=docUrl
))
result: AnalyzeResult = poller.result()
```

The details you can extract from these results depend on the model you used.

## Learn more

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- [What is Azure Document Intelligence?](#)
- [Azure Document Intelligence models](#)

### 3. Use the General Document, Read, and Layout models

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<https://learn.microsoft.com/en-us/training/modules/use-prebuilt-form-recognizer-models/3-use-general-document-read-layout-models>

## Use the General Document, Read, and Layout models

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If you want to extract text, languages, and other information from documents with unpredictable structures, you can use the read, general document, or layout models.

In your polling company, customers and partners often send specifications, tenders, statements of work, and other documents with unpredictable structures. You want to know if Azure Document Intelligence can analyze and extract values from these documents.

Here, you'll learn about the prebuilt models that Microsoft provides for general documents.

## Using the read model

The Azure Document Intelligence read model extracts printed and handwritten text from documents and images. It's used to provide text extraction in all the other prebuilt models.

The read model can also detect the language that a line of text is written in and classify whether it's handwritten or printed text.

### Note

The read model supports more languages for printed text than handwritten text. Check the [documentation](#) to see the current list of supported languages.

For multi-page PDF or TIFF files, you can use the `pages` parameter in your request to fix a page range for the analysis.

The read model is ideal if you want to extract words and lines from documents with no fixed or predictable structure.

## Using the general document model

The general document model extends the functionality of the read model by adding the detection of key-value pairs, entities, selection marks, and tables. The model can extract these values from structured, semi-structured, and unstructured documents.

The general document model is the only prebuilt model to support entity extraction. It can recognize entities such as people, organizations, and dates and it runs against the whole document, not just key-value pairs. This approach ensures that, when structural complexity has prevented the model extracting a key-value pair, an entity can be extracted instead. Remember, however, that sometimes a single piece of text might return both a key-value pair and an entity.

The types of entities you can detect include:

- `Person` . The name of a person.
- `PersonType` . A job title or role.
- `Location` . Buildings, geographical features, geopolitical entities.
- `Organization` . Companies, government bodies, sports clubs, musical bands, and other groups.
- `Event` . Social gatherings, historical events, anniversaries.
- `Product` . Objects bought and sold.
- `Skill` . A capability belonging to a person.
- `Address` . Mailing address for a physical location.
- `Phone number` . Dialing codes and numbers for mobile phones and landlines.
- `Email` . Email addresses.
- `URL` . Webpage addresses.
- `IP Address` . Network addresses for computer hardware.
- `DateTime` . Calendar dates and times of day.
- `Quantity` . Numerical measurements with their units.

## Using the layout model

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As well as extracting text, the layout model returns selection marks and tables from the input image or PDF file. It's a good model to use when you need rich information about the structure of a document.

When you digitize a document, it can be at an odd angle. Tables can have complicated structures with or without headers, cells that span columns or rows, and incomplete columns or rows. The layout model can handle all of these difficulties to extract the complete document structure.

For example, each table cell is extracted with:

- Its content text.
- The size and position of its bounding box.
- If it's part of a header column.
- Indexes to indicate its row and column position in the table.

Selection marks are extracted with their bounding box, a confidence indicator, and whether they're selected or not.

## Learn more

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- [Language support for Azure Document Intelligence](#)
- [Azure Document Intelligence read model](#)
- [Azure Document Intelligence general document model](#)
- [Azure Document Intelligence layout model](#)

## 4. Use financial, ID, and tax models

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<https://learn.microsoft.com/en-us/training/modules/use-prebuilt-form-recognizer-models/4-use-financial-id-tax-models>

# Use financial, ID, and tax models

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Azure Document Intelligence includes some prebuilt models that are trained on common form types. You can use these models to obtain the values of common fields from invoices, receipts, business cards, and more.

In your polling company, invoices and receipts are often submitted as photos or scans of the paper documents. Sometimes the scan is poor and the paper is creased or damaged. You want to know if Azure Document Intelligence can get this information into your databases more efficiently than manual data entry.

Here, you'll learn about the prebuilt models that handle financial, identity, and tax documents.

## Using the invoice model

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Your business both issues invoices and receives them from partner organization. There might be many different formats on paper or in digitized forms and some will have been scanned poorly at odd angles or from creased paper.

The invoice model in Azure Document Intelligence can handle these challenges and uses the features of the read model to extract text from invoice scans. In addition, it extracts specific fields that are commonly used on invoices including:

- Customer name and reference ID
- Purchase order number
- Invoice and due dates
- Details about the vendor, such as name, tax ID, physical address.
- Similar details about the customer.

- Billing and shipping addresses.
- Amounts such as total tax, invoice total, and amount due.

Invoices also feature lines, usually in a table, each of which is one purchased item. For each line, the invoice model identifies details including:

- The description and product code of the product or service invoiced.
- Amounts such as the unit price, the quantity of items, the tax incurred, and the line total.

## Using the receipt model

Receipts have similar fields and structures to invoices, but they record amounts paid instead of amounts charged. Azure Document Intelligence faces the same challenges of poor scanning or digitization but can reliably identify fields including:

- Merchant details such a name, phone number, and address.
- Amounts such as receipt total, tax, and tip.
- The date and time of the transaction.

As for invoices, receipts often include a table of items, each of which is a product or service purchased. For each of these lines, the model recognizes:

- The name of the item.
- The quantity of the item purchased.
- The unit price of the item.
- The total price for that quantity.

### Note

In Azure Document Intelligence v3.0 and later, the receipt model supports single-page hotel receipt processing. If a receipt is classified as a hotel receipt, the model extracts extra relevant fields such as arrival and departure dates.

## Using the ID document model

The ID document model is trained to analyze two types of identity document:

- United States drivers licenses.
- International passports.

### Note

Only the biographical pages of passports can be analyzed. Visas and other travel documents are not supported.

The ID document model can extract fields including:

- First and last names.
- Personal information such as sex, date of birth, and nationality.
- The country and region where the document was issued.
- Unique numbers such as the document number and machine readable zone.
- Endorsements, restrictions, and vehicle classifications.

#### Important

Since much of the data extracted by the ID document model is personal, it is of a sensitive nature and covered by data protection laws in most jurisdictions. Be sure that you have the permission of the individual to store their data and comply with all legal requirements in the way you handle this information.

## Using the business card model

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Business cards are a popular way to exchange contact information quickly and often include branding, unusual fonts, and graphic design elements. Fields that the business card model can extract include:

- First and last names.
- Postal addresses.
- Email and website addresses.
- Various telephone numbers.

## Using other prebuilt models

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Azure Document Intelligence offers several prebuilt models, with new models being released regularly. Before training a custom model, it's worth verifying if your use case can be analyzed accurately with one of these prebuilt models. Using a prebuilt model will benefit from rigorous testing, updated model versions, and reduced cost compared to a custom model.

## Learn more

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- [Azure Document Intelligence model overview](#)

## 5. Exercise - Analyze a document using Azure Document Intelligence

<https://learn.microsoft.com/en-us/training/modules/use-prebuilt-form-recognizer-models/5-exercise-analyze-document-use-form-recognizer>

# Exercise - Analyze a document using Azure Document Intelligence

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In this exercise, you use Azure Document Intelligence to analyze forms using a prebuilt model.

### Note

To complete this lab, you need an [Azure subscription](#) in which you have administrative access.

Launch the exercise and follow the instructions.

[Launch Exercise](#)

### Tip

After completing the exercise, if you've finished exploring Foundry Tools, delete the Azure resources that you created during the exercise.

## 6. Module assessment

# Module assessment

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## 7. Summary

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<https://learn.microsoft.com/en-us/training/modules/use-prebuilt-form-recognizer-models/7-summary>

# Summary

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There are many document types that are common to most business and Azure Document Intelligence includes prebuilt models to handle them. If you have a collection of such forms that you want to analyze, you can extract data by using these prebuilt models and you don't have to train your own models. You can get up and running very quickly by submitting photos and scans to the most appropriate prebuilt model.

Now that you've completed this module, you can:

- Identify business problems that you can solve by using prebuilt models in Azure Document Intelligence.
- Analyze forms by using the General Document, Read, and Layout models.
- Analyze forms by using financial, ID, and tax prebuilt models.

## Learn more

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- [What is Azure Document Intelligence?](#)

- [Azure Document Intelligence models](#)
- [Language support for Azure Document Intelligence](#)
- [Azure Document Intelligence read model](#)
- [Azure Document Intelligence general document model](#)
- [Azure Document Intelligence layout model](#)
- [Azure Document Intelligence invoice model](#)
- [Azure Document Intelligence receipt model](#)
- [Azure Document Intelligence ID document model](#)
- [Azure Document Intelligence business card model](#)
- [Azure Document Intelligence W-2 model](#)