

Document Data Extraction Using Forms AI

Introduction

Document processing has always been complicated because of the nature of the documents. The documents we process have their structure and way of representing data. However, the UiPath Document Understanding has enabled many users to easily automate their hard and time-consuming documents. Out of the many features that UiPath Document Understanding provides, the Forms AI plays a significant role in automatically identifying the structure of the documents through its AI capabilities. The Forms AI can easily automate structured documents without spending a lot of time on template creation.

Requirements

Before getting started, you'll need the following

- Basic understanding of the UiPath Document Understanding Framework (<https://docs.uipath.com/document-understanding/docs/introduction>)
- Basic understanding of Studio Web/ Studio
- Already available (newly created cloud platform trial, or enterprise)

Building the Scenario

For us to explore this feature, let's build a simple scenario. Imagine that we are asked to analyze data from SEC Form 4 documents. Let's look at the following screenshot. The following screenshot is a sample Form 4 document. The document's structure mostly remains the same except for the rows in the tables. Let's see how Forms AI helps us quickly create a template for this.

| OMB APPROVAL | |
|--|-----------|
| OMB Number: | 3235-0287 |
| Estimated average burden hours per response: | 0.5 |

Check this box if no longer subject to Section 16. Form 4 or Form 5 obligations may continue. See Instruction 1(b).

STATEMENT OF CHANGES IN BENEFICIAL OWNERSHIP

Filed pursuant to Section 16(a) of the Securities Exchange Act of 1934 or Section 30(h) of the Investment Company Act of 1940

| | | |
|--|--|---|
| 1. Name and Address of Reporting Person ¹ <u>Baglino Andrew D</u> (Last) (First) (Middle) C/O TESLA, INC. 1 TESLA ROAD (Street) AUSTIN TX 78725 (City) (State) (Zip) | 2. Issuer Name and Ticker or Trading Symbol <u>Tesla, Inc. [TSLA]</u> | 5. Relationship of Reporting Person(s) to Issuer (Check all applicable) Director 10% Owner <input checked="" type="checkbox"/> Officer (give title below) Other (specify below) <u>SVP Powertrain and Energy Eng.</u> |
| | 3. Date of Earliest Transaction (Month/Day/Year) 05/02/2022 | |
| 4. If Amendment, Date of Original Filed (Month/Day/Year) | | |

Table I - Non-Derivative Securities Acquired, Disposed of, or Beneficially Owned

| 1. Title of Security (Instr. 3) | 2. Transaction Date (Month/Day/Year) | 2A. Deemed Execution Date, if any (Month/Day/Year) | 3. Transaction Code (Instr. 8) | | | 4. Securities Acquired (A) or Disposed Of (D) (Instr. 3, 4 and 5) | | 5. Amount of Securities Beneficially Owned Following Reported Transaction(s) (Instr. 3 and 4) | 6. Ownership Form: Direct (D) or Indirect (I) (Instr. 4) | 7. Nature of Indirect Beneficial Ownership (Instr. 4) |
|---------------------------------|--------------------------------------|--|--------------------------------|---|--------|---|--------------------------|---|--|---|
| | | | Code | V | Amount | (A) or (D) | Price | | | |
| Common Stock | 05/02/2022 | | M | | 5,000 | A | \$55.32 | 25,138 | D | |
| Common Stock | 05/02/2022 | | S | | 5,000 | D | \$875.227 ⁽¹⁾ | 20,138 | D | |

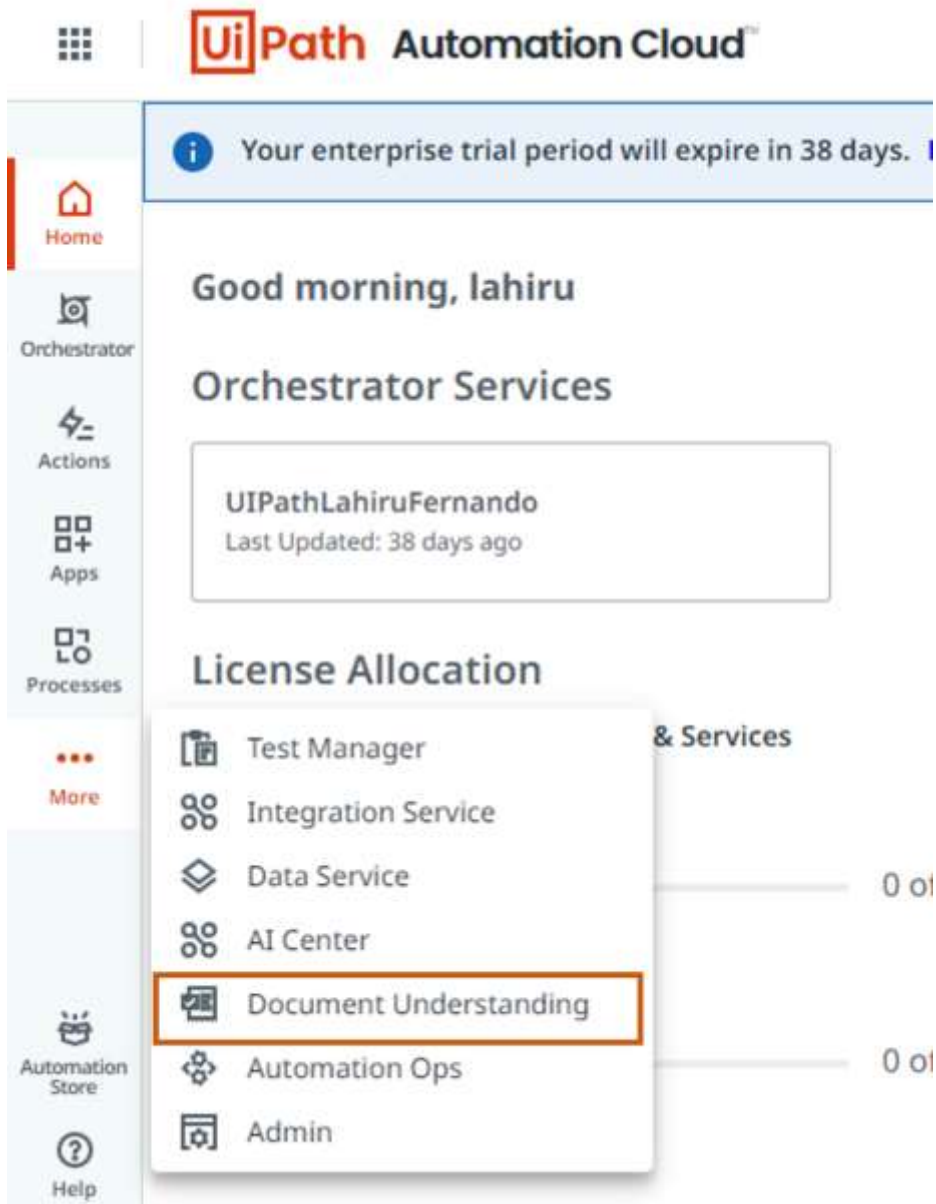
Table II - Derivative Securities Acquired, Disposed of, or Beneficially Owned (e.g., puts, calls, warrants, options, convertible securities)

| 1. Title of Derivative Security (Instr. 3) | 2. Conversion or Exercise Price of Derivative | 3. Transaction Date (Month/Day/Year) | 3A. Deemed Execution Date, if any (Month/Day/Year) | 4. Transaction Code (Instr. 8) | 5. Number of Derivative Securities Acquired | 6. Date Exercisable and Expiration Date (Month/Day/Year) | 7. Title and Amount of Securities Underlying Derivative Security (Instr. 3 and 4) | 8. Price of Derivative Security (Instr. 5) | 9. Number of derivative Securities Beneficially Owned | 10. Ownership Form: Direct (D) or Indirect (I) | 11. Nature of Indirect Beneficial Ownership (Instr. 4) |
|--|---|--------------------------------------|--|--------------------------------|---|--|---|--|---|--|--|
|--|---|--------------------------------------|--|--------------------------------|---|--|---|--|---|--|--|

Form4-sample

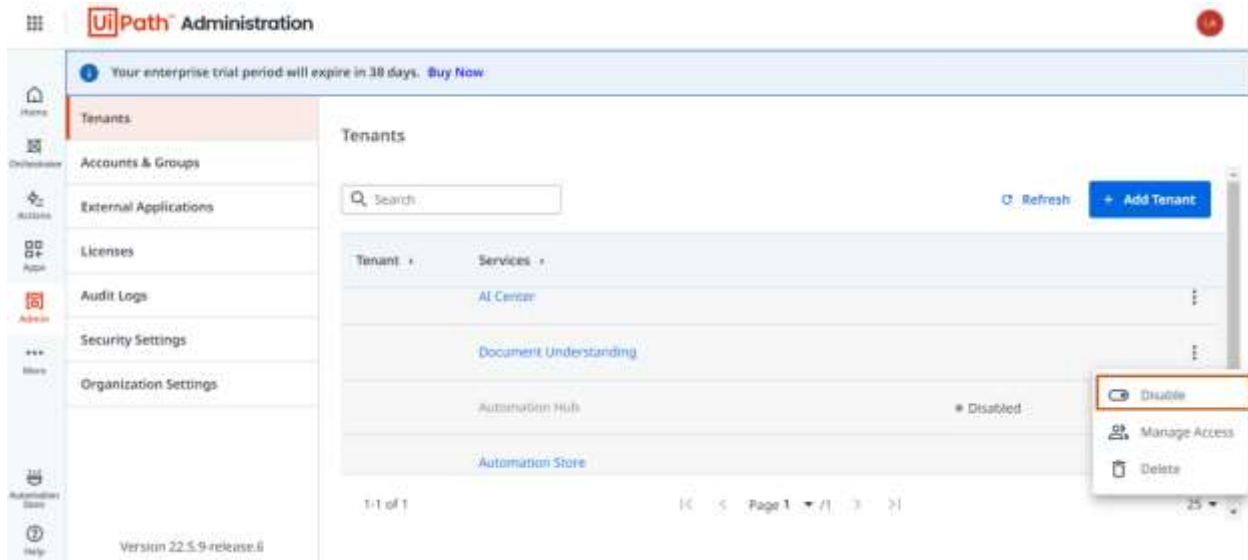
Enabling Document Understanding for Your Tenant

Today, Forms AI comes in as a part of the cloud offering under the Document Understanding section. Once you log in to the cloud platform, you can see the Document Understanding section on your navigation panel on the left side.



Navigate-document-understanding

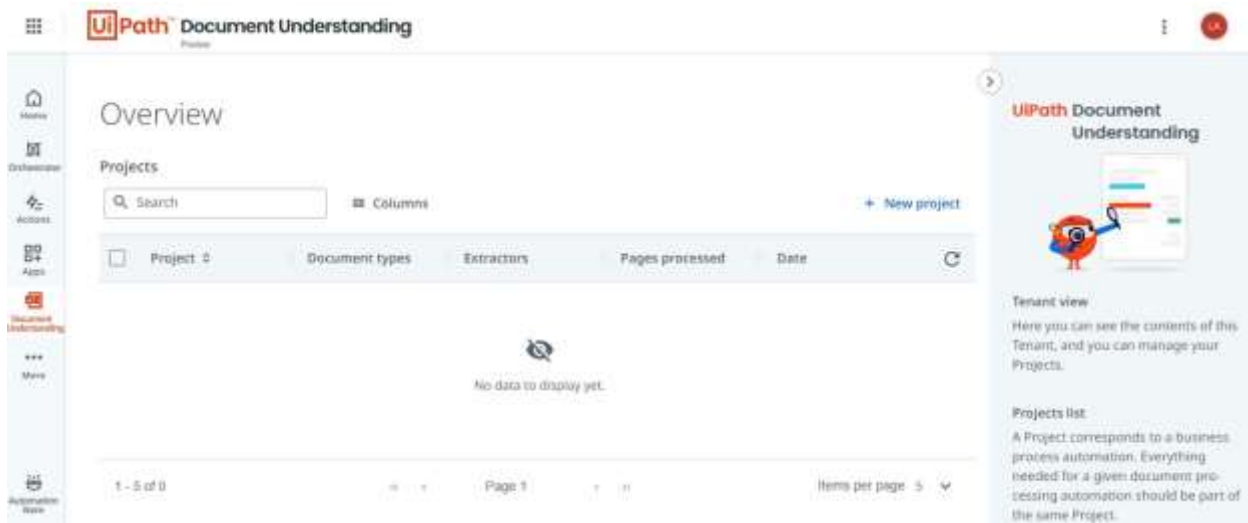
If you don't have this option available, you can enable it in the Admin panel under Tenant settings.



Enable-document-understanding

Step 1: Configuring Document Understanding Project

AS the first step, let's navigate to the Document Understanding solution and start creating our first project. Once you are in, you will see a screen similar to the following screenshot.

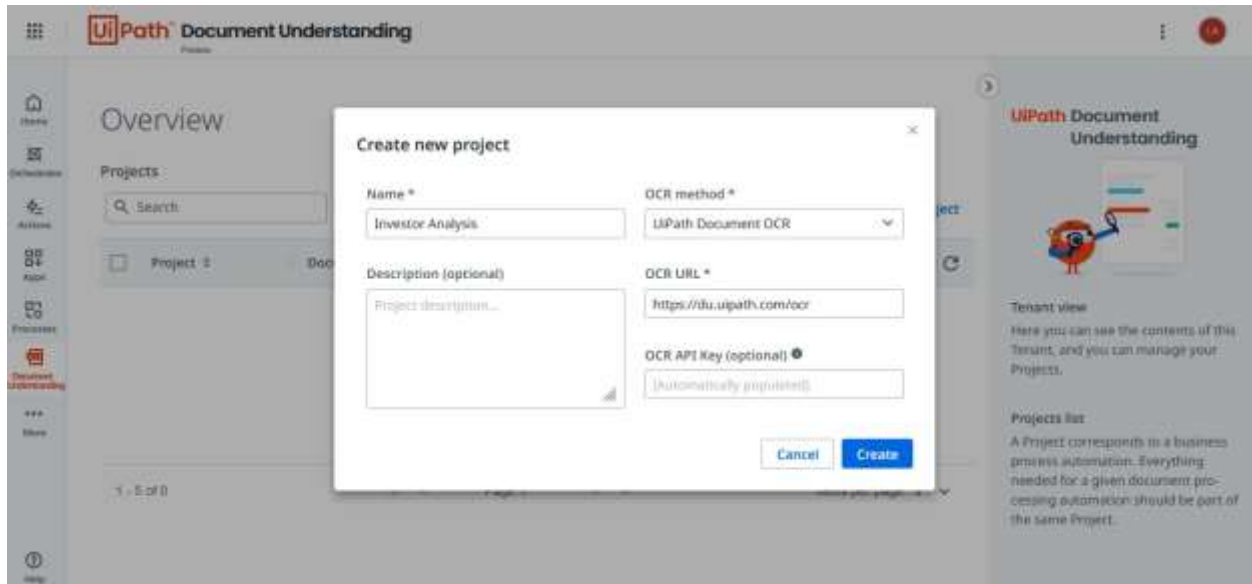


Du-overview-screen

Step 1.1: Creating DU Project

Like any other platform, we first need to create a project. The projects we create here help us group the models we build according to our business requirements. Click on the **New Project** button and provide a

name for your project to create one. In the project creation screen, you will see other configuration options for the OCR. We can keep those options as it is in case we are using the UiPath Document OCR. However, you may need to change those properties to use a different OCR engine.

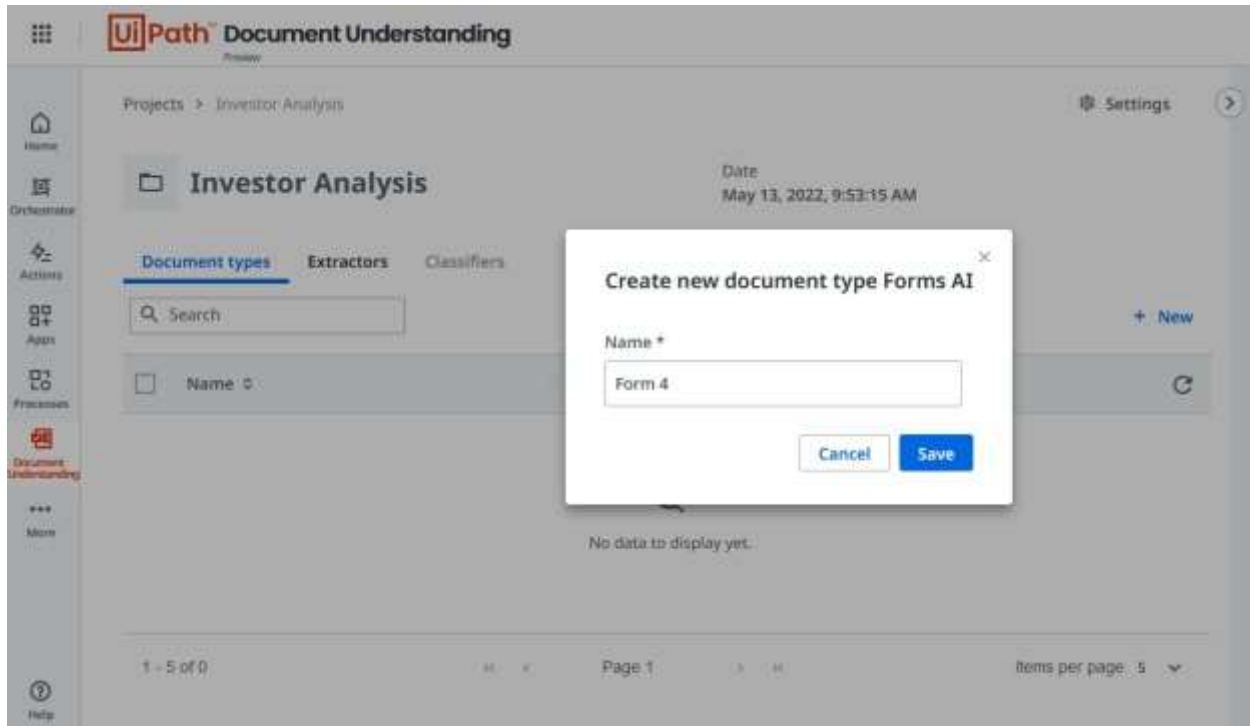


Du-create-project

Once the project is created, it will be shown under the Overview section. Navigate into the project by clicking on the project name to configure other options.

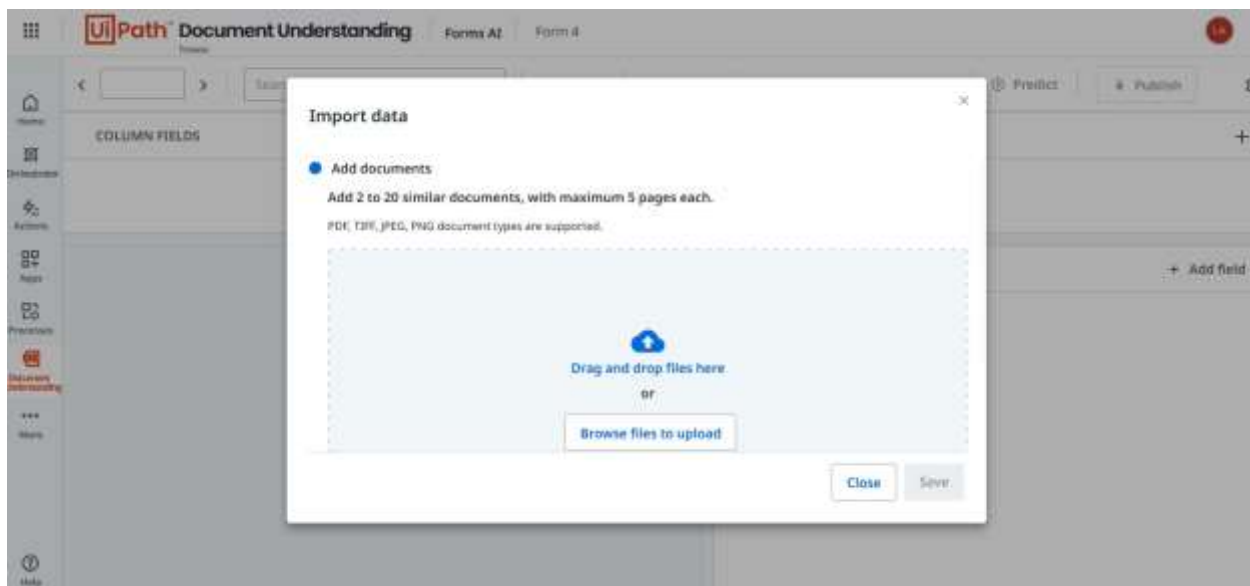
Step 1.2: Creating Forms

Click on the **New** button to create a new document type to use Forms AI. Provide a name for the document type and click on the **Save** button to set up the document type.



Creating-document-type

Once you click on the Save button, you will automatically get redirected to importing documents screen. The Document Collection screen is very similar to the Document Manager, previously known as Data Manager. Your screen would look similar to the following.



Initiate-document-manager

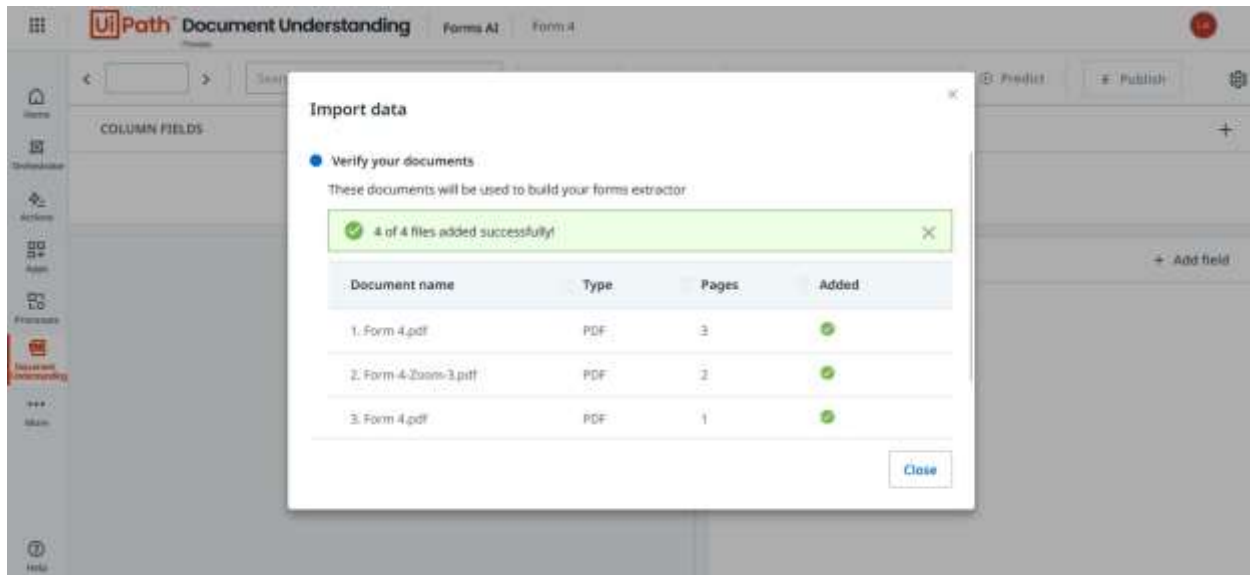
Step 1.3: Upload documents into the Collection

Now, we need to drag and drop all the documents to build our Forms AI model.

Important note: You must upload only similar documents for each model you build.

Drag and drop the files and click on the **Save** button to complete your upload.

Once the files are uploaded successfully, click on the **Close** button to continue with form creation.



File-upload-status

As you see by now, the template has automatically got created for you in the Collection. Furthermore, the data from the first document is also auto extracted into their respective fields. All you have to do now is, remove the unwanted fields and complete the template structure. The following screenshot shows the first extraction.

Note: You could see the progress of the file import through the upload progress indicator, as well as errors, or logs, if you click on the Import button again for another import.

The screenshot shows the UiPath Document Understanding interface. At the top, there's a search bar and navigation buttons: Delete, Import, Predict, and Publish. Below that, a 'COLUMN FIELDS' section is visible. The main area displays a preview of a SEC Form 4 document. The document is titled 'STATEMENT OF CHANGES IN BENEFICIAL OWNERSHIP' and includes sections for 'FORM 4', 'SEC FILING INFO', and 'TABLE 1 - BENEFICIAL OWNERSHIP ACQUISITION, DISPOSITION, OR SIGNIFICANT CHANGE'. A 'FIELDS' panel on the right lists extracted fields: 'omb-number' (3235-0267), 'hours-per-response' (Estimated average burden 0.5), 'check-this-box-if-no' (checkbox), and 'name-and-address-of' (DENHOLM ROBYN M).

Automatic-initial-prediction

Step 1.4: Configuring the Form

Automatic form generation works for regular fields. However, we need to configure the table (line items) manually on the first few documents so it can predict the rest automatically. You can also try renaming the regular fields by clicking on the edit icon that appear once you hover the mouse over any field. In addition, ensure you check each field for its Content Type and provide the appropriate Content-Type to suite the data. For example, if the field contains a date, set the Content-Type as "Date" to format the value in the standard date format "yyyy-mm-dd"

Important point: Remember to use lowercase letters, no spaces, and use dash "-" or underscore "_" when renaming your fields. Use of numbers are allowed, but ensure you do the renaming in a meaningful way.

In addition, if any of the regular fields have not extracted its respective value, you can highlight the value on the document, and press the shortcut key specified next to the field name to assign the value to the field.

Adding New Regular Fields

Adding new fields and assigning values to them is very easy. Let's first try with regular fields.

1. Click on the **Add Field** button under regular fields to create a new field
2. Provide the column name to create the field

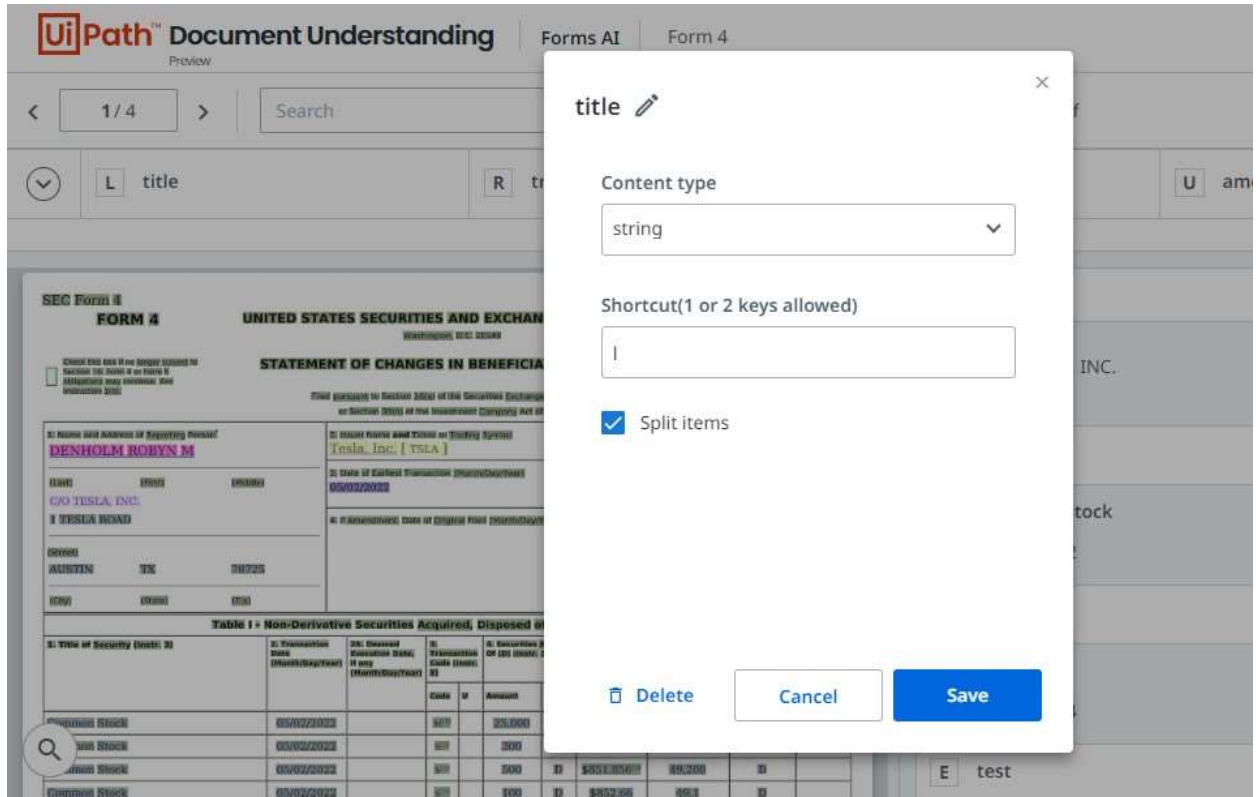
3. Locate the field in the designer, and click on the **Edit** option if you want to change the data type of the field or the shortcut key.

Adding New Column Fields

Lets try adding the table columns for the first table. Previously, we could not handle dynamic rows when creating templates. However, we can create a model that can handle dynamic rows irrespective of the number of rows we have in the table with this option. It is important to note that all or most of the values we extract should be present in all the documents we use for training. For example, if one document has six rows and another has three, all rows should be captured to train the model to handle dynamic rows. Let's follow the following steps.

1. Click on the "+" icon under the **Columns** section of the form to create a new field
2. Provide a column name. in our scenario, we will create three fields with the name "title", "transaction-date", and "amount"
3. We have an additional property in column fields that we can use to detect individual rows when predicting. Let's configure the first column with this property. Click on the **Edit** button to access the configuration screen.

4. Enable the "Split Items" checkbox to enable line breaking as shown in the following screenshot. This option is mostly used when the line item contains multiple lines of text.



Splitting-row-items

5. Highlight all the elements in the first row of the table
6. Keep doing the same thing for all the rows individually
7. Highlight all the items that belong to the first column and click on the shortcut key to add them as individual rows to the column. Continue doing that for the remaining columns to have all the items in the table. The following screenshot shows the first configuration.

The screenshot displays the UiPath Document Understanding interface. At the top, it shows the 'UiPath Document Understanding' logo, 'Forms AI', and 'Form 4'. Below this is a navigation bar with a search box, 'Delete', 'Import', and 'Predict' buttons. The main area is divided into three columns: 'title', 'transaction-date', and 'amount'. Two rows are visible: 'Common Stock' with a transaction date of '05/02/2022' and an amount of '30,000', and another 'Common Stock' entry with a transaction date of '05/02/2022' and an amount of '49,700'. On the right side, a 'FIELDS' panel lists extracted data points: 'omb-number' (3235-0287), 'reporting-person' (DENHOLM ROBYN M), 'issuer-name' (Tesla, Inc. [TSLA]), and 'date-of-earliest'.

Template-after-configuration

All you need to do now is navigate to other documents and hit the **Predict** button to auto-generate the form for those.

Important note: Ensure all the values of interest are present in each document used for training so that the model can learn from all variations, especially in tables.

Step 1.5: Publishing the Model as an Extractor

This step is straightforward. Once everything is configured, just hit the Publish button to get the model published to the Document Understanding solution. You will be asked to provide a name for the Extractor. Ensure to give a meaningful name for it. Once the publishing is complete, you should be able to see the model with the status "Available," as shown in the following screenshot.

Remember that you will need an endpoint (URL) to access the Extractor you created from the UiPath workflow. You can copy the endpoint right after you publish or click on the three dots next to the Extractor

on the Extractors page.



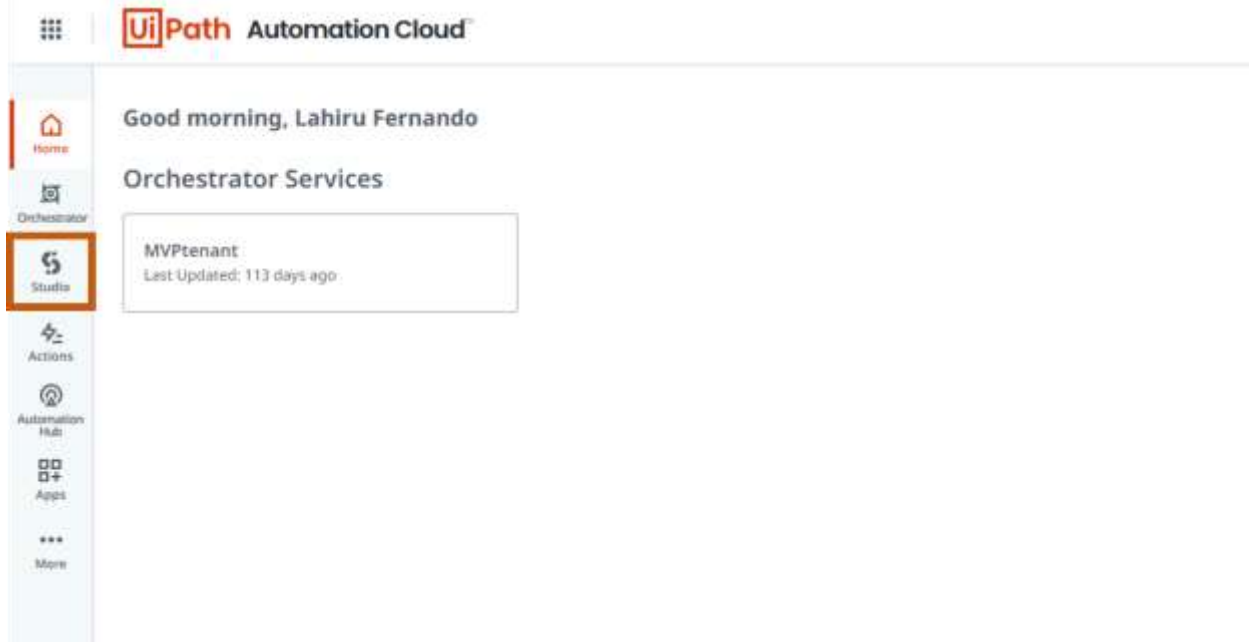
Copy-extractor-endpoint

Step 2: Building the Workflow

UiPath Studio Web provides an easy-to-use interface to create a simple Document Understanding workflow to process the documents. Before starting the development, let's upload the files we need to process into a folder in OneDrive.

Step 2.1: Accessing Studio Web

Access Studio Web as shown in the following screenshot.

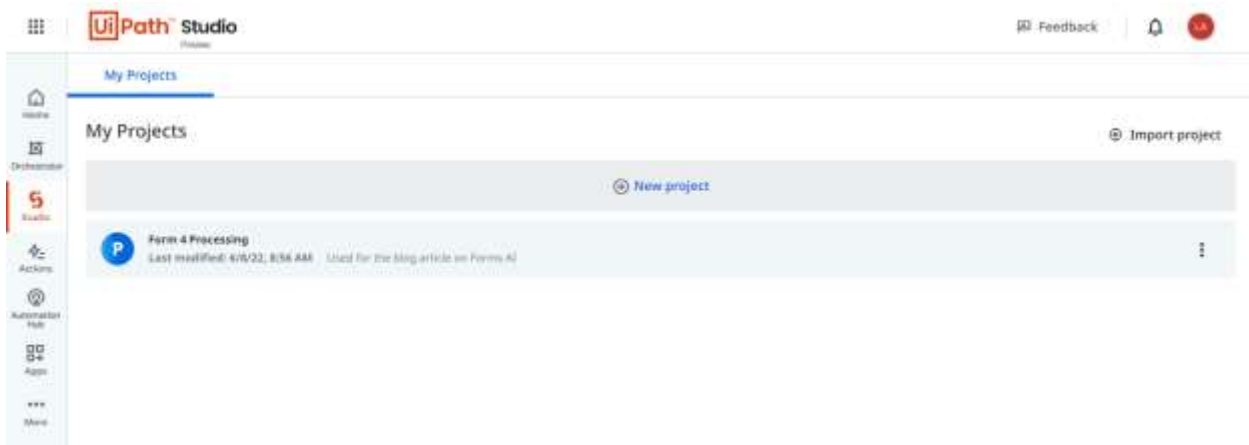


Studio-web-access

Step 2.2: Creating Studio Web Workflow

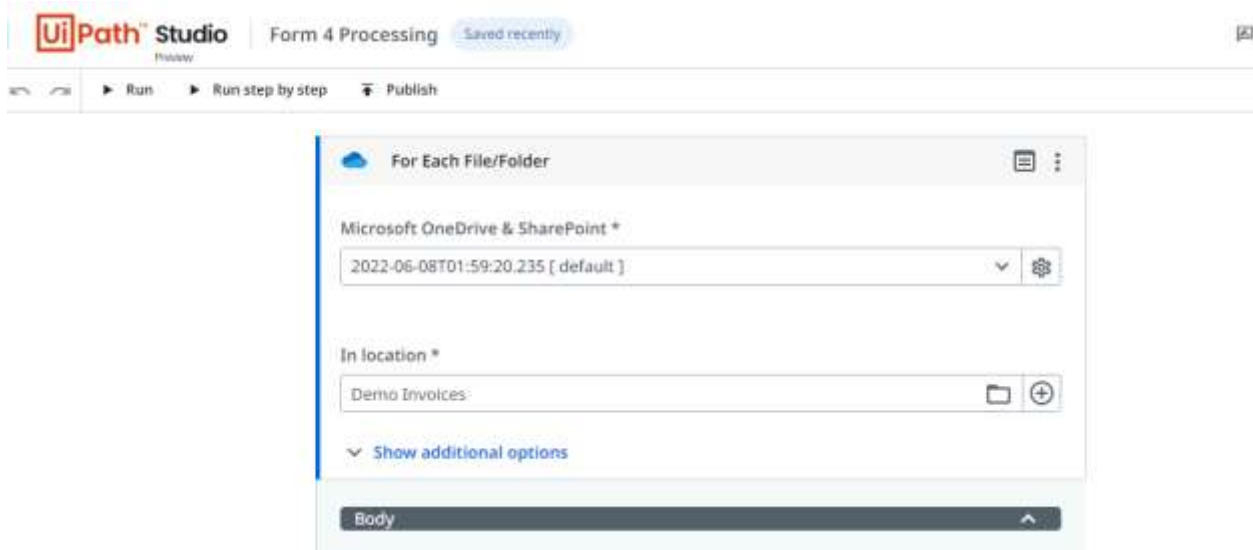
Once you are in Studio Web, the first thing to do is create a new project.

Click on the **New Project**, provide a name, and create a project.



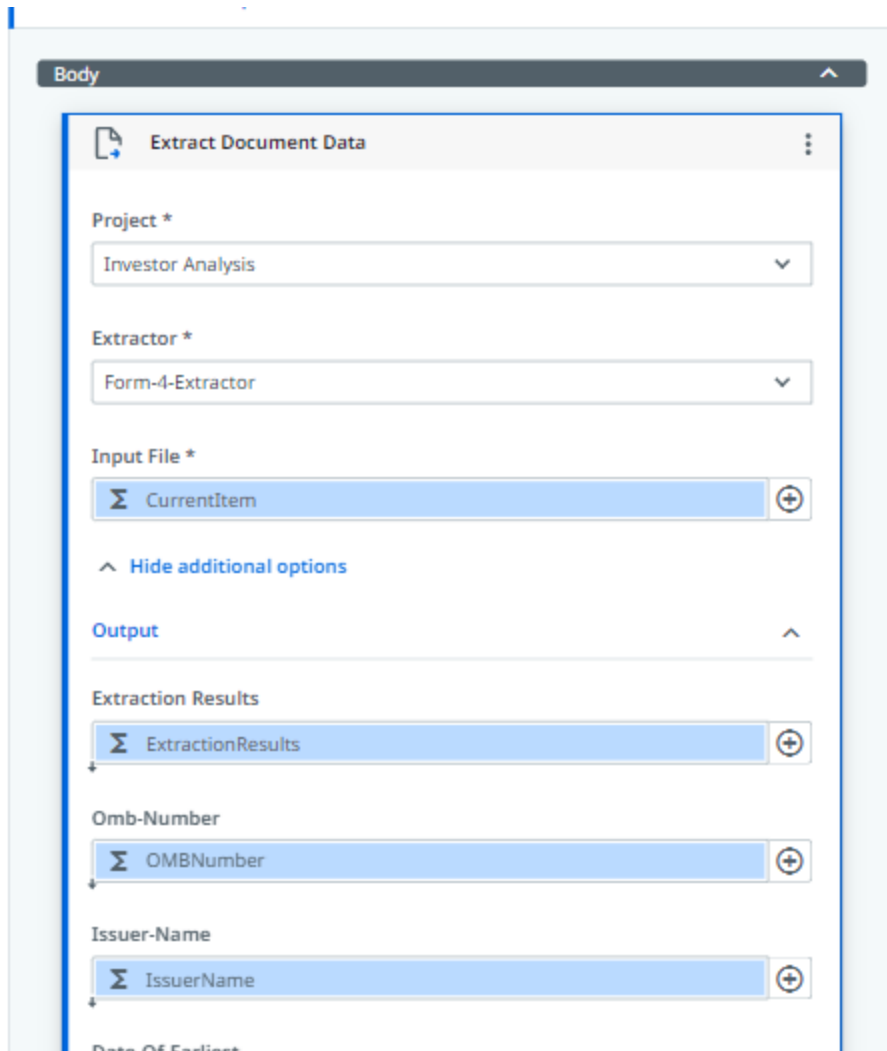
Create-web-project

1. Use **OneDrive For Each File/Folder** activity as shown below and configure it to point to your OneDrive



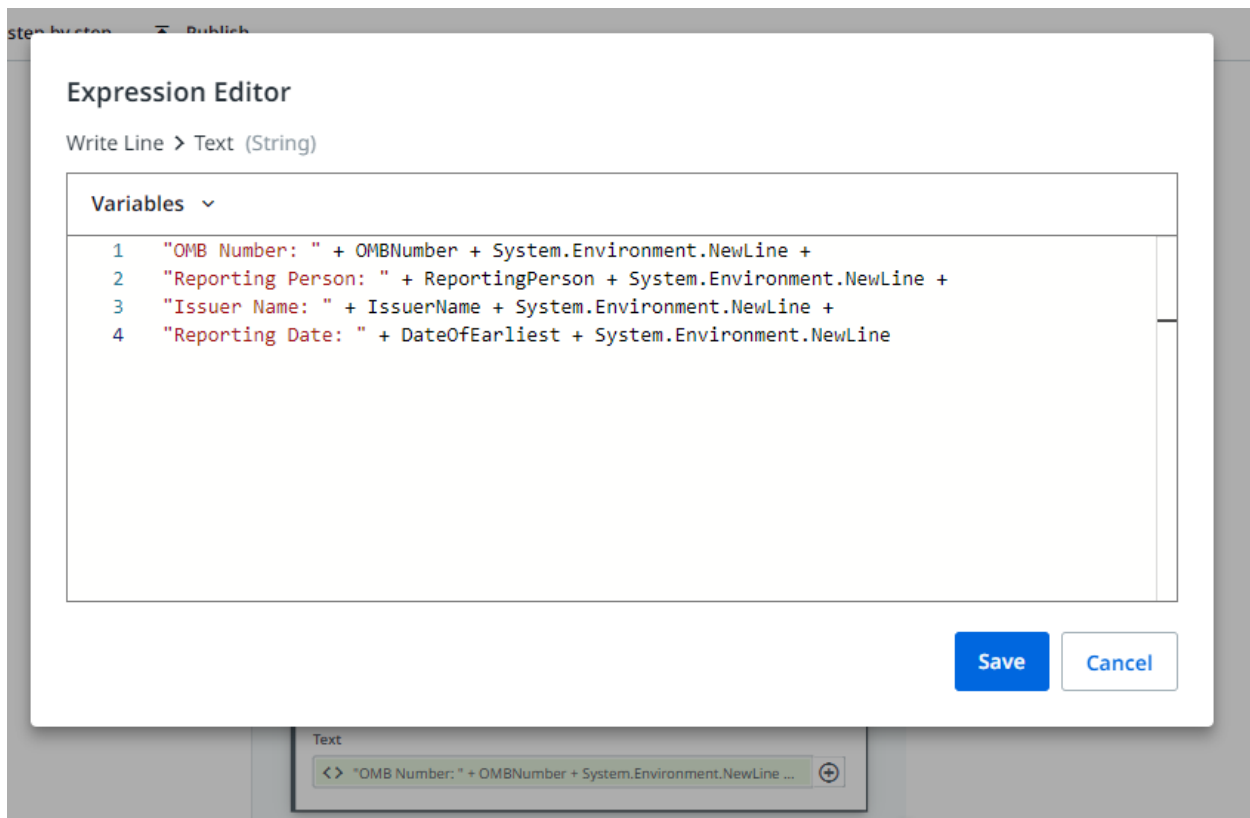
Configure-onedrive-looping

2. Within the body of the activity, place the **Extract Document Data** activity and configure it as shown in the following screenshot. You can create new Variables to hold the output values returned by the activity



Extract-document-data

3. Let's use a **Write Line** activity to look at the output. Configure the Write Line as below using the variable names you provided in the **Extract Document Data** activity



Display-extracted-data

4. Let's run the process by clicking on the **Run** button and examine the output generated on the console.

Conclusion

Processing structured documents require template creation, which consumes time and effort. Further, structured documents may also contain dynamic segments such as table rows, which may be challenging to create and extract. Forms AI provides seamless template creation and training models with a simple click of buttons for us to handle such scenarios easily. The Extractors made on Forms AI can easily plug into any Document Understanding workflow without any additional effort to extract the data.