

Document AI

Using Machine Learning to Automate Document Processing

Unleash the value of unstructured document data or speed up manual document processing tasks with the help of Google AI. We will help build an end-to-end, production-capable document processing solution with Google's industry-leading Document AI tools, customized to the mission use case.

Mission Challenges

Most interactions begin, involve, or end with a document. However, approximately 80% of enterprise data is unstructured which historically has made it expensive and difficult to harness that data. The inability to understand unstructured data can decrease operational efficiency, impact decision making, and even add to compliance workloads. Commanders today need the ability to quickly and efficiently process, and gain insights from, their rapidly growing unstructured datasets.

Document Workflows	Unstructured Data	Free Form Text
RPA vendors estimate that ~50% of their workflows begin with a document	Approximately 80% of enterprise data is unstructured including machine and human generated	70% is free-form text such as written documents and emails

Solution Overview

Google's mission is "to organize the world's information and make it universally accessible and useful". This has led to creation of a comprehensive set of technologies to read (Optical Character Recognition), understand (Natural Language Processing) and make useful (data warehousing, analytics, and visualization) documents, forms, and handwritten text.

Google's Document AI technologies provide OCR (optical character recognition) capabilities that deliver unprecedented accuracy by leveraging advanced deep-learning neural network algorithms. Document AI has support for 200 languages and handwriting recognition of 50 languages. In addition, Google Cloud provides the ability to build automated data pipelines to upload, process, and store the structured data from documents and forms as a holistic solution that can integrate with existing workflows. Document AI solutions can be deployed in weeks versus months or years.

Document AI enables the DoD to increase operational efficiency, reduce document processing man-hours, improve analyst and user experience, and enable commanders to better understand their unstructured datasets.

Document AI Solution

There are three key components in a Google Cloud Document AI solution:

<u>Document Repository</u>	<u>Entity Extraction and OCR</u>	<u>Data Warehouse</u>
Store scanned or digital documents in one or more Google Cloud Storage (GCS) buckets.	Perform OCR and entity extraction on the documents and forms. Google Cloud provides both pre-trained and custom-trained ML/AI models to be able to do entity extraction, document classification, and sentiment analysis. (Figure 2)	Store the newly structured data in a data warehouse . BigQuery supports built-in ML/AI data models as well as provides built-in data visualization which allows new insights to be derived directly from the data.

Figure 1 depicts a sample architecture of using Document AI to do document processing.

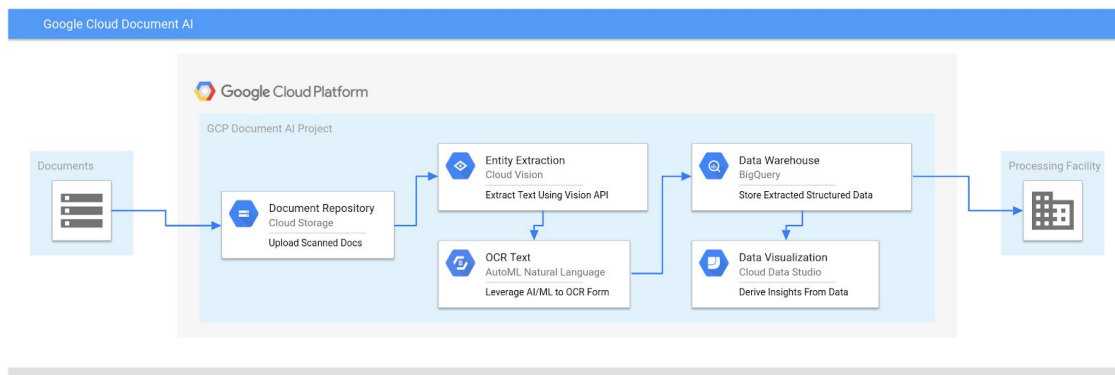


Figure 1. Sample Document AI Architecture

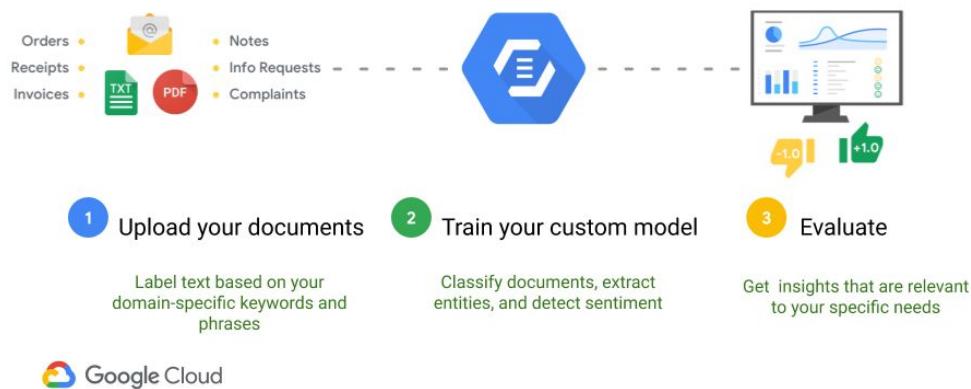


Figure 2. High-level process for performing Machine Learning on a document leveraging Google Cloud AutoML for custom-trained models

Sample Implementation of Document AI

Document AI can be used to solve numerous unstructured document processing requirements. One clear example of how Document AI can be used is to ingest, OCR, extract, understand, and store intelligence reports that otherwise would live in unstructured document repositories. *Figure 3* shows the life cycle of a report and how Google Cloud Document AI would be able to process and analyze the document leveraging ML/AI technology.

Life of a document

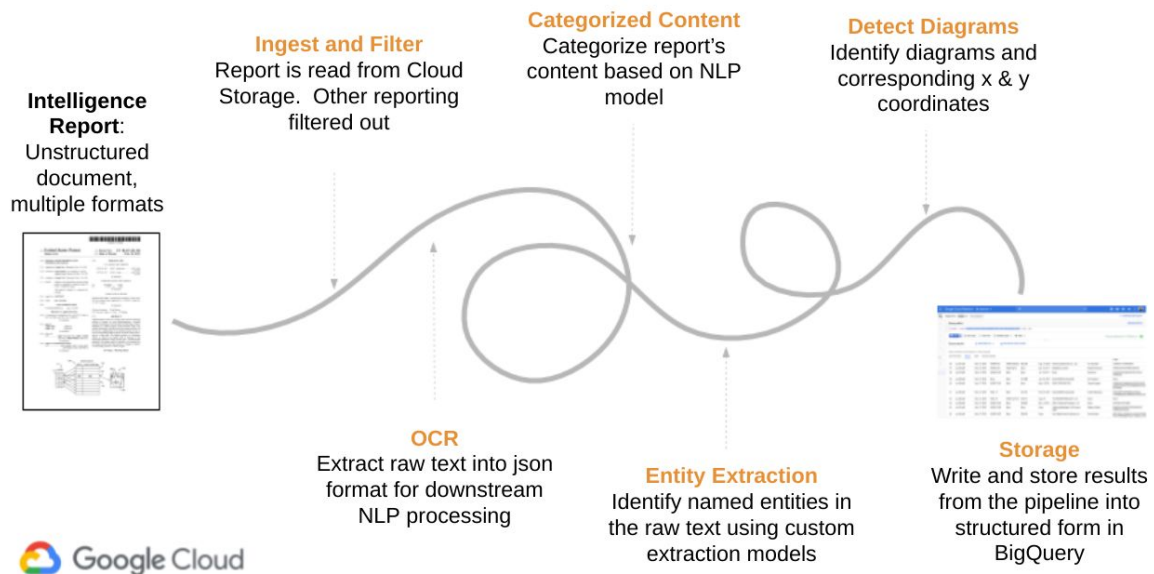


Figure 3. Sample Document AI Workflow

Document AI solution begins with ingesting the documents and performing OCR. After ingesting the documents, Document AI is able to utilize Natural Language Processing (NLP) technology to categorize the content using trained NLP models. Document AI will then extract the desired text entities and diagrams.

After Document AI processes the document, it stores the structured data inside a data warehouse such as Google BigQuery. Now that the datasets are structured, it is much easier to draw insights from this data. For instance, it would be easy to view intelligence trends across years, areas of operation, or even specific ISR efforts. BigQuery has built-in support for data visualization as well as built-in ML/AI models that can be used to help discover and analyze these types of insights from the data.

This is just one example of the way Google Cloud Document AI can be used to efficiently bring structure to unstructured data and leverage the data to draw new insights to inform analysts and commanders. One of the biggest benefits of Document AI is the fact that both pre-trained and custom-trained AI/ML models are available depending on the type of document processing that is required.

Google Cloud Professional Services Offerings

Google Cloud's Professional Services Organization (PSO) is able to work directly with programs and commands to help design, build, and deploy a customized Document AI solution to allow users to unlock the value of the unstructured data and effectively process documents and forms.

Key activities	Deliverables	Engagement Details
<ul style="list-style-type: none"> ● Assess the performance of DAI on your use case <ul style="list-style-type: none"> ○ Work with your subject matter experts to understand use cases and frame mission challenges as an ML project. ○ Define performance metrics to check the value of a production-capable DAI solution, and ○ Evaluate capabilities to fulfill an organization's needs ● Design and build a production-capable DAI solution <ul style="list-style-type: none"> ○ Develop an end-to-end, production-capable DAI pipeline for the document processing requirements ● Test and improve the DAI solution <ul style="list-style-type: none"> ○ Measure performance of the DAI pipeline to ensure that it fulfills requirements, and iterate on the pipeline until requirements are met ● Project management activities <ul style="list-style-type: none"> ○ Requirements gathering and tracking, work planning, progress measurement against timelines, risk analysis and mitigation, regular updates, and stakeholder alignment ● Planning review and technical guidance <ul style="list-style-type: none"> ○ Provide guidelines on methodology and technical best practices for integrating the DAI solution into the command's environment 	<ul style="list-style-type: none"> ● Program charter - Goals agreed on with key stakeholders, solution requirements documented, and a high-level project plan developed ● Technical Design Document - Detailed technical architecture and requirements for an end-to-end Document AI solution on Google Cloud that includes input/output schema, data preprocessing, evaluation methodology, and test plans ● Machine learning model - A trained machine learning model on GCP based on your data ● Prod-capable ML pipeline - Custom code for an end-to-end production-capable DAI solution ● Deployment Documentation - A full technical write up of the DAI solution, including instructions to deploy the solution ● Program closure summary - Documentation, a summary of the project and solution build, and a final presentation for your stakeholders 	<ul style="list-style-type: none"> ● Prerequisites: A clear use case for a Document AI Google Cloud project with appropriate training data in Google Cloud for ML models ● Up to 48 days engagement (96 FTE days) within a 15-week period for your project: <ul style="list-style-type: none"> ○ Phase 1: Up to 16 days engagement (32 FTE days) within a 5-week period ○ Phase 2: Up to 32 days engagement (64 FTE days) within a 10-week period ● Phase 1 prototypes your use case with DAI to obtain performance metrics; phase 2 builds the production capable pipeline ● The typical team consists of cloud consultants, machine learning or AI engineers, application development engineers, and subject matter experts ● Project scope, resourcing, assumptions, and dependencies will be in the project charter ● Depending on the PSO and GCP resources needed, a DAI solution costs \$250k-\$750k

Let's connect to discuss how Google Cloud Document AI can help your organization!

For more information visit <https://cloud.google.com/solutions/government>