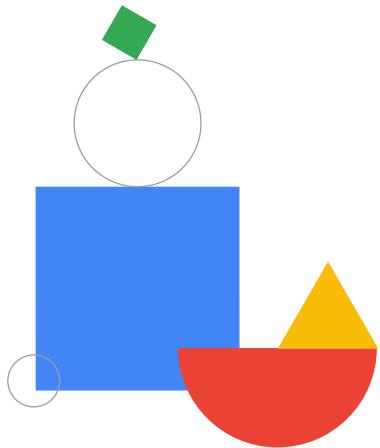
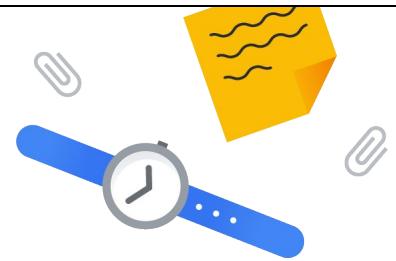


Prebuilt ML Model APIs for Unstructured Data



This module focuses on ready to use ML APIs and how to use them on unstructured data. When we say unstructured data, we are referring to the data that comes in the form of audio, video, images, and freeform text.



Module agenda

01 Unstructured Data is Hard

02 ML APIs for Enriching Data



Google Cloud

We'll start off by describing why unstructured data is so hard to work with. Then, we'll discuss some of the products available on Google Cloud for applying machine learning to unstructured data.



01

Unstructured Data is Hard

Let's look at why unstructured data is so hard to work with.

How do you extract anything useful out of this?



or



Google Cloud

As you can see on this slide, two images are shown. One, containing a newspaper page, and another containing a sporting event. There's a lot going on in these images, and presumably a lot of useful information can be extracted from each one.

For example, what language is the newspaper clip written in?

What does the article say?

In what year was it published?

What sport is being played in the image on the right?

What's the flag being waved?

Probably the important question is, how can we extract this metadata? Do we have such technology? In short the answer is yes. We are going to talk about it in this module.

Examples of real-world use cases of unstructured data



Custom image model to price cars



Build off NLP API to route customer emails



Use Vision API as-is to find text in memes



Use Dialogflow to create a new shopping experience

Google Cloud

Uniqlo designed a shopping chatbot using Dialogflow, a Google Cloud AI offering.

Dialogflow is a natural language understanding platform that makes it easy to design and integrate a conversational user interface into mobile apps, web applications, devices, bots, interactive voice response systems, and so on. Using Dialogflow, it is possible to provide new and engaging ways for users to interact with your organization.

Let's look at some other use cases for ML in business.

[https://youtu.be/BwWg_HVfsM?t=4m41s]

Clouds or snow-capped mountains?



Google Cloud

Take the example of Airbus. Airbus uses machine learning to differentiate between clouds and snow cover on satellite images.

If you're stumped like I am, the clouds are in the upper-right part of the right image highlighted in red. The rest is snow.

[<https://cloud.google.com/blog/products/gcp/google-cloud-machine-learning-now-open-to-all-with-new-professional-services-and-education-programs>]

Empty or full?



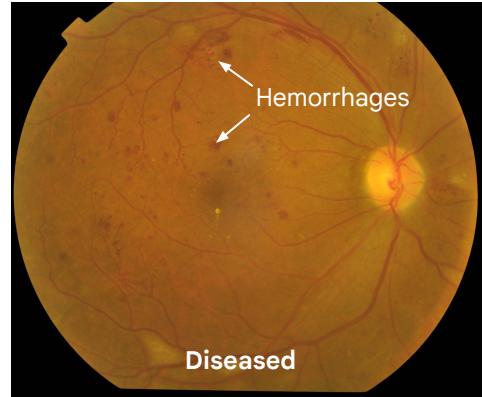
Google Cloud

You might be an economic forecast firm looking to track the global fleet of container ships via satellite imagery. Knowing the amount of cargo being carried might help improve your economic forecast days or months ahead of the official numbers.

Diagnosing Diabetic Retinopathy



Healthy



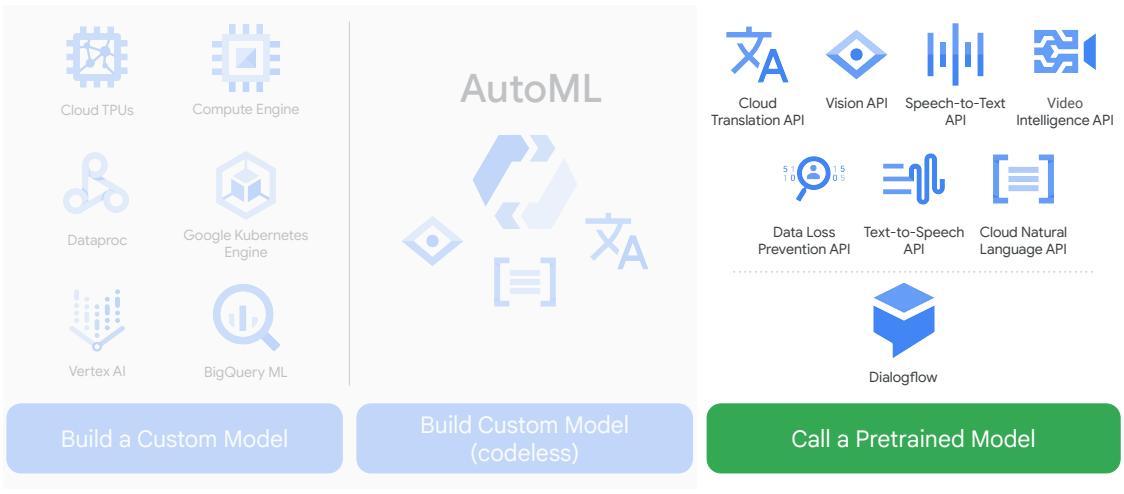
Diseased

Google Cloud

Medical images are ripe for innovation. For example, you could diagnose [medical conditions](#) like Diabetic Retinopathy earlier when it's easier to treat and prevent blindness. How can you map from images like this to a determination using machine learning? Adding to the complexity, keep in mind that medical images are usually extremely high resolution, so processing them takes a lot of compute resources.

[<https://ai.googleblog.com/2016/11/deep-learning-for-detection-of-diabetic.html>]

For common ML tasks, consider pretrained APIs



Google Cloud

These products, like the Vision API and Dialogflow, are based on both Google's data and models. You don't have to worry about training models with your data. You simply pass the products your data via an API, and they will return predictions. It's really hard to train models on unstructured data. Consequently, developing something like a vision recognition model is out of reach for most organizations. The primary downside is if your unstructured data is not within the scope of the data used to train Google's pre-trained models, the APIs won't give you good results.

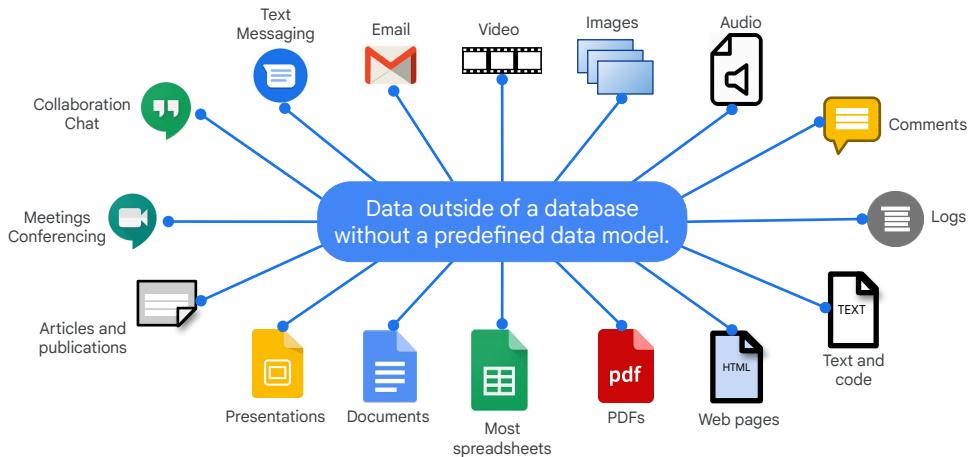


ML APIs for Enriching Data

Google Cloud

Let's take a closer look at the actual APIs Google offers to make sense of your unstructured data.

Most business data is unstructured data, and mainly text



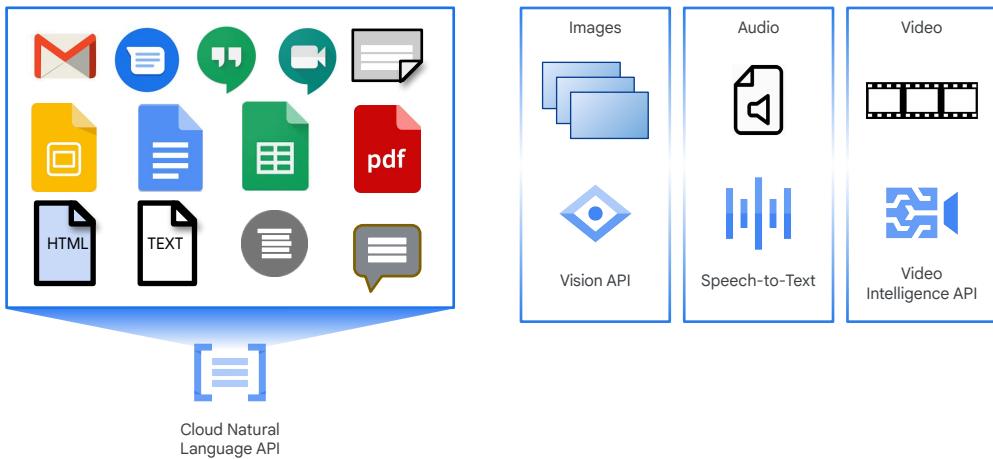
Google Cloud

We know that in a typical business scenario, a company ends up using data that is being generated from multiple sources. Typical examples of widely used data are relational databases, inventory systems, ERP systems like SAP, and spreadsheets.

These data sources use strict data formatting rules and host data accordingly. Hence the data is known as structured data. Apart from these, a lot of data is generated from a variety of other sources in the form of email, audio, video, images, texts, social media likes, and comments. All these types of data are typically free from strict formatting and hence known as unstructured data.

As a business, a prominent and important question is how to process unstructured data, which typically constitutes nearly 90% of a business's data. Unstructured data has tremendous potential to provide detailed insights which can benefit the business. In this section, we will see which AI technologies can be used to process this unstructured data to have business impact.

You process unstructured data by labeling it with AI



Google Cloud

In this module we're going to concentrate on the Cloud Natural Language API for processing unstructured data in the form of text. However, keep in mind that there are equivalent APIs for image, video, and audio data. Again, when we say that we're "enriching" unstructured data we're saying that we're applying labels to it. We're providing labels for questions like, "What is the subject of this email?" and "Does this comment have positive or negative sentiment?"

Syntactic analysis provides linguistic information



Google Cloud

The Cloud Natural Language API provides many features with which text analytics can be performed. The first feature is syntactic analysis. Syntactic analysis first breaks up text into a series of tokens, which are generally words and sentences, and provides information about the token's internal structure and its role in the sentence. It can label a token as a noun or verb, singular or plural, first person or second person, masculine, feminine, or gender neutral, and provides grammatical information such as case, tense, mood and voice.

At the time of this writing the Cloud Natural Language API supports 10 languages. See online documentation for current language support.

[<https://cloud.google.com/natural-language/docs/languages>]

Entity analysis recognizes many useful items



Locations and landmarks



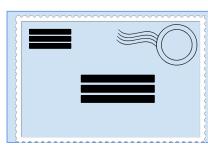
People



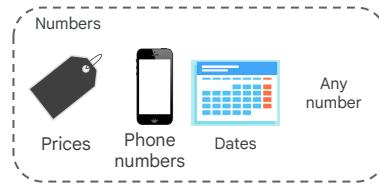
Artwork and works of art



Consumer products



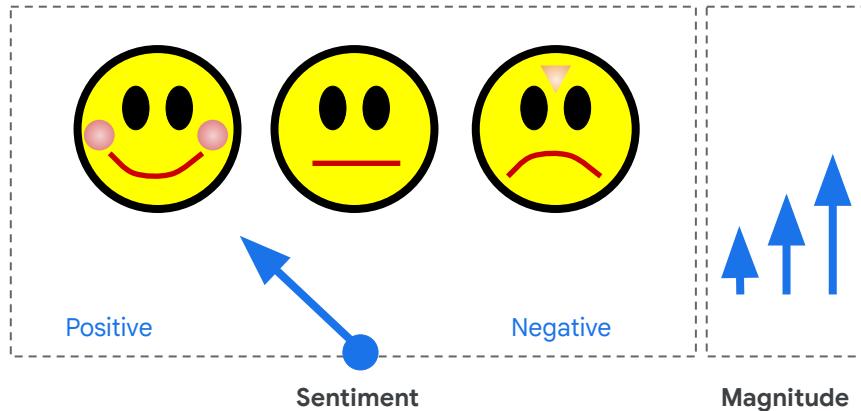
Addresses



Google Cloud

The Natural Language API also offers entity analysis for recognizing people, locations, organizations, events, artwork, consumer products, phone numbers, addresses, dates, and numbers.

Sentiment analysis labels feelings in text



Google Cloud

Sentiment analysis identifies the emotional opinion of a writer's attitude. It's presented as a numerical score and a magnitude for the intensity of the feeling. It does not identify specific emotions but groups them into generally positive or negative or neutral, so "sad" and "angry" are both negative, and "funny" and "happy" are both positive. Because these are continuous values, you should define your own thresholds that work for your application. For example, maybe below 10% magnitude is not a strong enough feeling, or between -1.0 and +1.0 does not clearly express an emotion.

Combined entity and sentiment analysis

Sentiment	Sample Values
Clearly Positive*	"score": 0.8, "magnitude": 3.0
Clearly Negative*	"score": -0.6, "magnitude": 4.0
Neutral	"score": 0.1, "magnitude": 0.0
Mixed	"score": 0.0, "magnitude": 4.0

Google Cloud

Entity Sentiment Analysis combines both entity analysis and sentiment analysis and attempts to determine the sentiment (positive or negative) expressed about entities within the text. Entity sentiment is represented by numerical score and magnitude values and is determined for each mention of an entity. Those scores are then aggregated into an overall sentiment score and magnitude for an entity.

Content classification



Sports



Foods



Literature

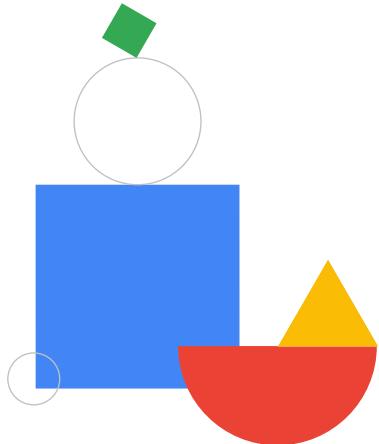
600+ Categories

Google Cloud

At the time of this writing, content can be classified into 620 categories.

Lab Intro

Using the Natural Language API
to Classify Unstructured Text



Google Cloud

It's time to try the Cloud Natural Language API for yourself. In this lab, you will use the Natural Language API to better understand a set of news articles by performing content classification on them.

To summarize what we have learned, unstructured data has a lot of intrinsic value. However, to extract that value, you need to apply some kind of machine learning to the unstructured data. Training such models is extremely difficult and outside the capabilities of most businesses.

Fortunately, Google Cloud offers many APIs to help extract meaning from your unstructured data. Before applying these APIs to your data, make sure your data is within the scope of the type of data intended to be consumed by the APIs.