ML APIs and Cloud AutoML

Pre-built models are offered as services. In many cases these building blocks can be used to create the application you want without the expense or complexity of creating your own models.

Cloud Speech-to-Text converts audio to text for data processing. Cloud Natural Language API recognizes parts of speech called entities and sentiment. Cloud Translation converts text in one language to another. Dialogflow Enterprise Edition is used to build chatbots to conduct conversations. Cloud Text-to-Speech converts text into high quality voice audio. Cloud Vision API is for working with and recognizing content in still images. And Cloud Video Intelligence API is for recognizing motion and action in video.

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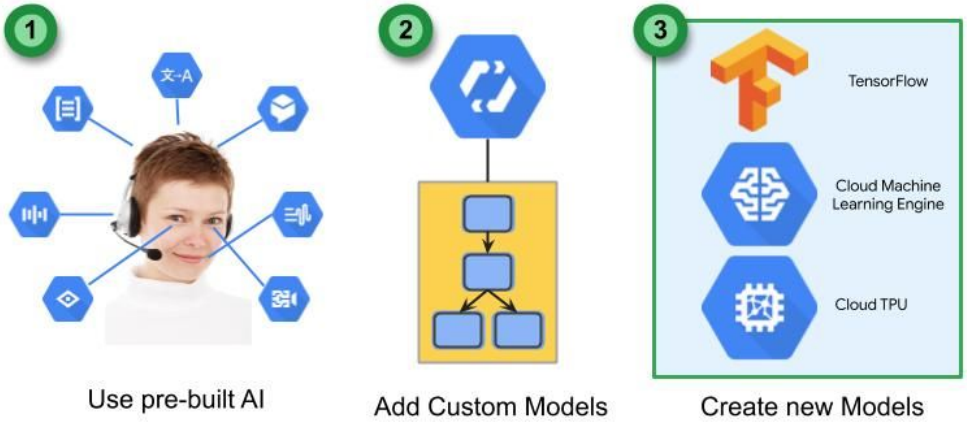
Artificial Intelligence application strategy



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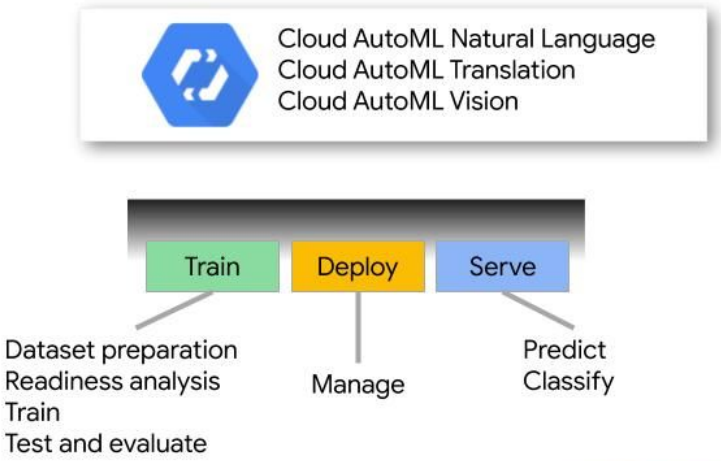
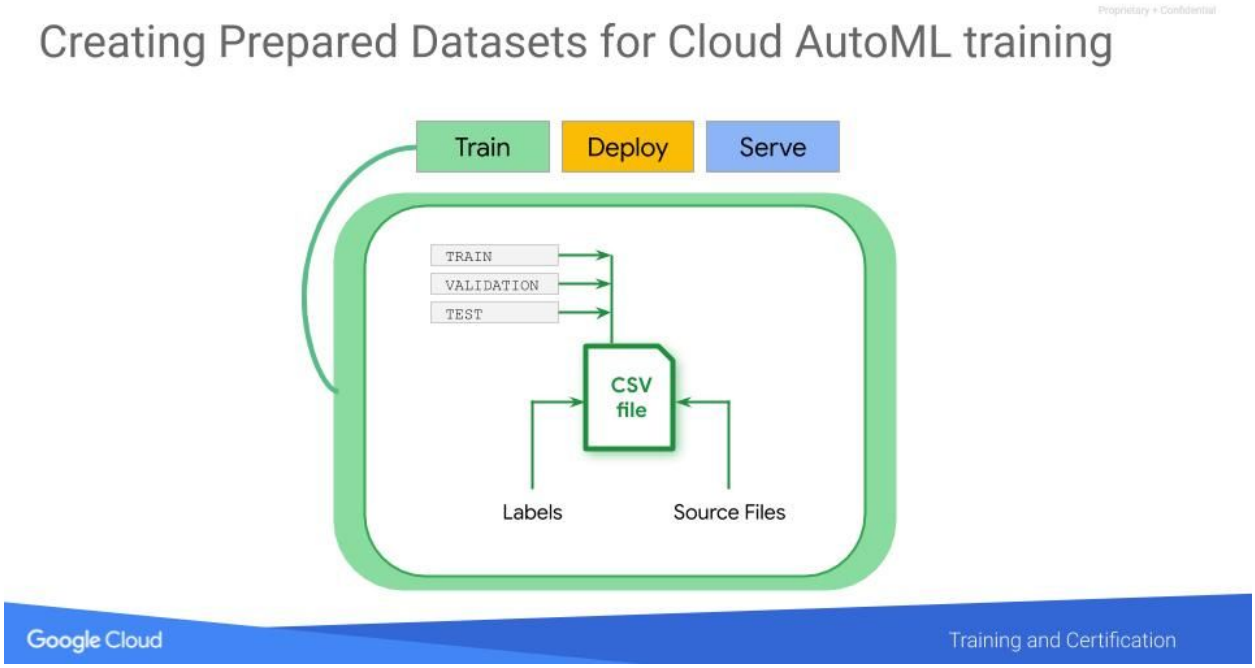
Cloud AutoML Overview





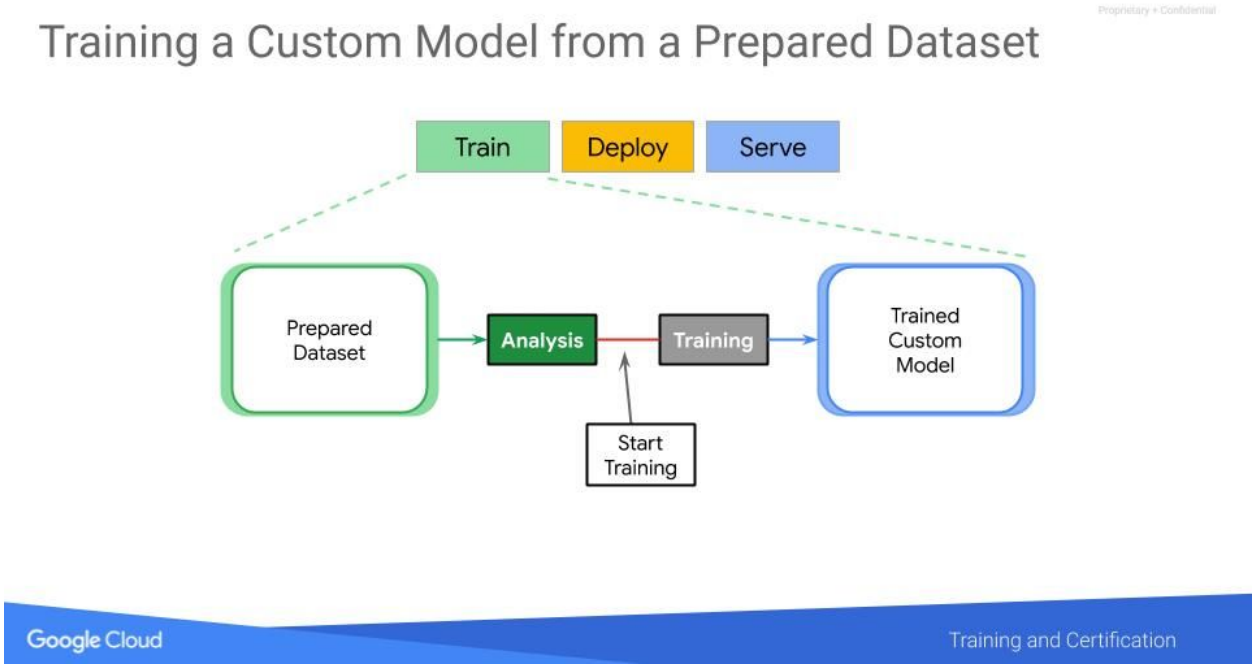
Cloud AutoML uses a Prepared Dataset to train a Custom Model. You can make small Prepared Datasets for experimentation directly in the Web UI but it is more common to assemble the information in a CSV (comma separated value) file. The CSV file must be UTF-8 encoded and located in the same Cloud Storage bucket with the source files. You can also create and manage Prepared Datasets programmatically in Python, Java, or Node.js

The first column in the CSV file is optional. It assigns the data in each row into one of three groups, TRAIN, VALIDATION, or TEST. If you leave out this column, the rows will automatically be assigned with 80% going to TRAIN, and 10% each to VALIDATION and TEST.

The next column in the CSV file identifies source files that are hosted in Cloud Storage. These are paths beginning with "gs://…"
The source file format depends on the kind of model you are training but can also be compressed ZIP files.

Subsequent columns specify labels. The labels are alphanumeric and can contain underscores, but not special characters.
The CSV file should not contain duplicate lines and may not contain blank lines or unicode characters.
Currently, the CSV file and all the Source Files must be in a Cloud Storage bucket in the project where AutoML runs.

Prepared Datasets do not expire. You may accumulate many Prepared Datasets in a project. You can list and delete those you don't need.



Cloud AutoML performs basic checks and a preliminary analysis of the Prepared Dataset to determine if there is enough information and if it is properly organized.
If the the Prepared Dataset is not ready, you will need to add more rows or more labels to the CSV file. When it is ready, you can start training.

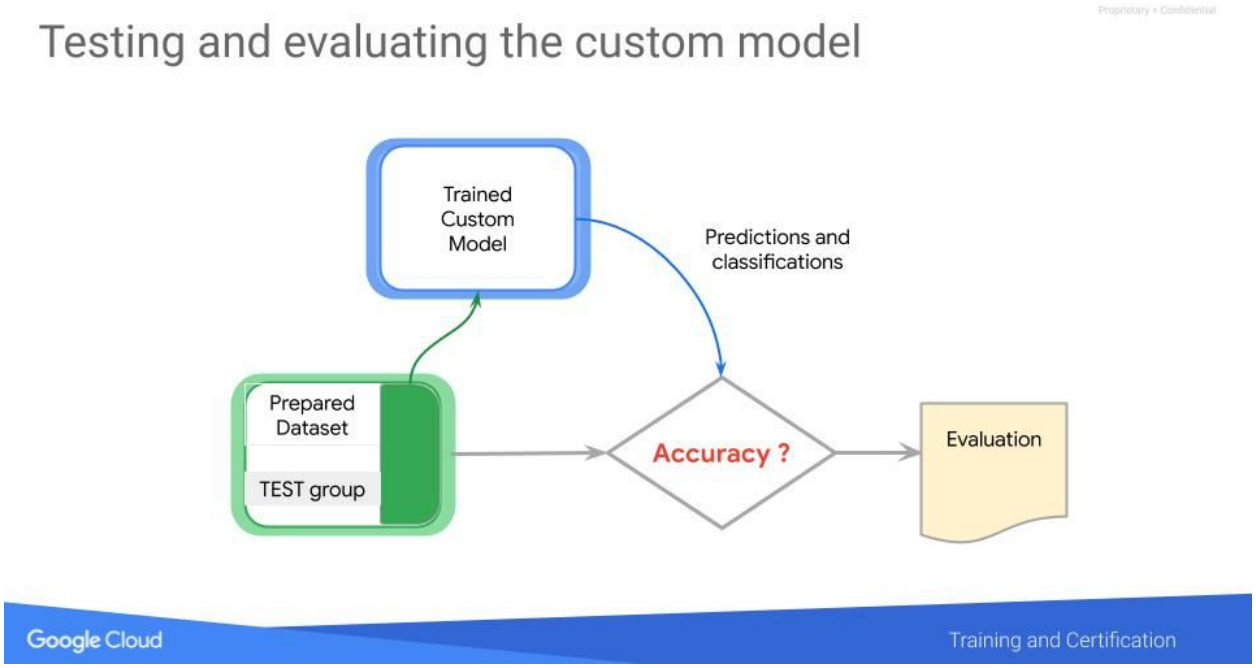
Training can take from ten minutes to several hours depending on the kind of model. You can check the status while it is running. Import and training tasks can be canceled.

The TRAIN group of data is used to train the Custom Model. The source files have already been associated with the correct labels in the Prepared Dataset, so Cloud AutoML uses a supervised learning method to train the Custom Model. Part of the process uses the VALIDATION group data to verify how well the model works at classifying and predicting.

Supervised learning works on correctable error. Cloud AutoML constructs an algorithm that guesses the labels for source data. When the guess is right, it strengthens the algorithm. When the guess is wrong, the error is used to correct the algorithm. And this is how learning occurs. One full run through all the TRAIN group data is called an epoch. Total error is tracked and minimized through multiple epochs to create the best model possible from the training data provided.

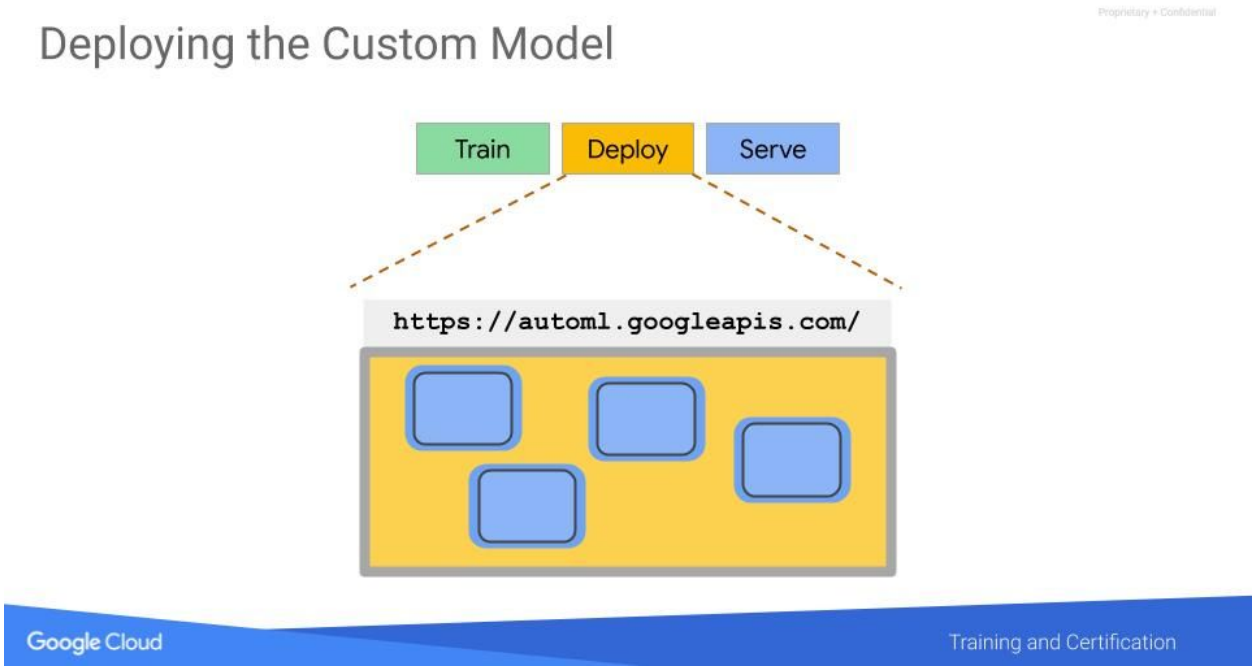
The result is a trained Custom Model.

The custom model works well with the training data. But is it good at categorizing new instances of data it has not seen before?



Data from the TEST group is used to evaluate the Custom Model and to remove bias from the evaluation. The predictions and classifications are compared with the labels in the Prepared Dataset.

The evaluation report provides indicators that are specific to the kind of model and help understand how effective the model is at predicting and classifying.



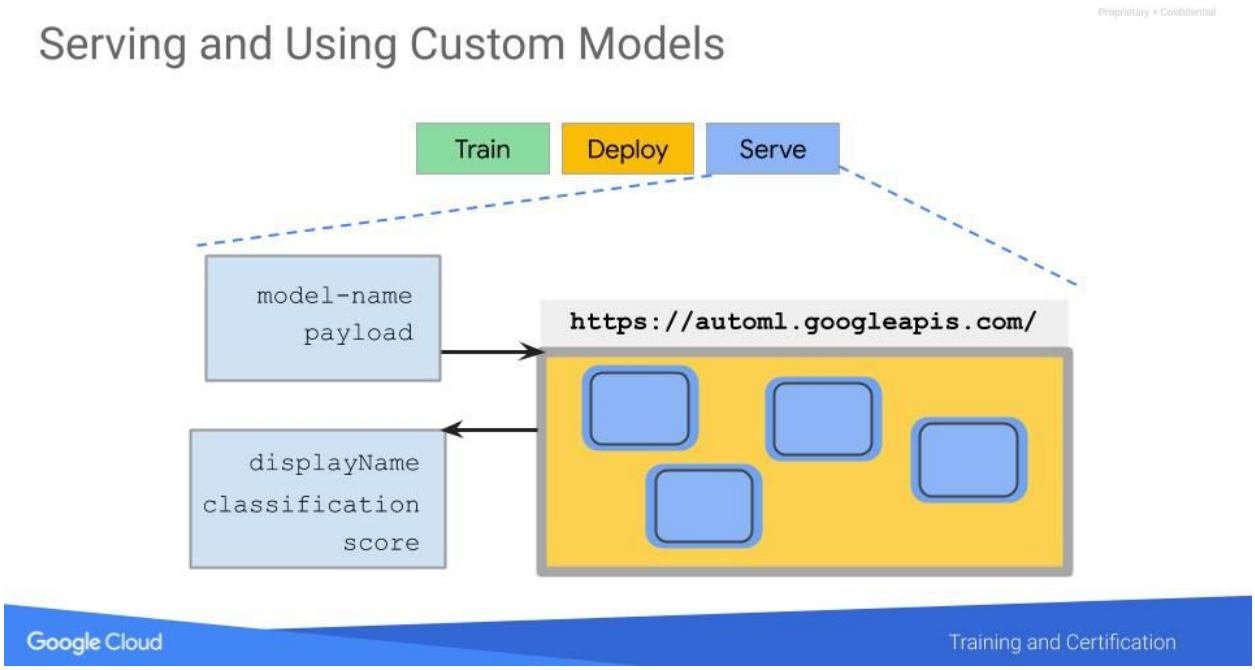
There is nothing you need to do to activate a model.
However, if it has been some time since you used a model, the system may need to "warm up" for a few minutes before the model becomes active.

Once it exists, if you have the project credentials and model-name you can access and use the Custom Model.

Each time you train with a Prepared Dataset it creates a new Custom Model.

You can list and delete unneeded models.

Custom Models are temporary. They are eventually deleted. And they cannot be exported or saved externally.
Models that are not used for prediction are automatically deleted after a period.
And models that are used are eventually deleted. So you will need to train a new Custom Model periodically to continue predicting and classifying.
How long models remain before they are deleted depends on the model type.



The primary classification interface is at the URI shown. You can make a classification using the Web UI, or from the command line using CURL to send a JSON-structured request. There are also client libraries for Python, Java, and Node.JS.

After you have set up authentication to use the REST API, you send a request with the model-name and the payload, which is the data you want classified.
The service returns JSON containing multiple fields called displayName. These are the labels that matched. Then it contains the keyword classification, followed by a score. The score is a confidence value, were 1.0 is absolute confidence, and lower fractional numbers represent lower confidence in the correctness of the classification.

Quotas apply for both model creation and service requests.

Cloud AutoML services

Cloud AutoML
Natural Language

Cloud AutoML
Translation

Cloud AutoML Vision

Cloud AutoML Natural Language classifies English content into custom categories.
Cloud AutoML Translation enables models that translate into words and phrases specific to your domain.
Cloud AutoML Vision classifies images according to your defined labels.

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