

CMPE 258 ASSIGNMENT #2

PART 1: AUTOML

IMAGE

1. Setting up project and environment

The screenshot shows the Google Cloud Platform dashboard for the project "My First Project". The left sidebar has "DASHBOARD" selected. The main area displays "Project info" with details like Project name (My First Project), Project ID (elite-truck-304201), and Project number (237151972897). Below this is a button to "ADD PEOPLE TO THIS PROJECT" and a link to "Go to project settings". To the right, there's a section for "API APIs" showing requests over time, followed by "Google Cloud Platform status" (All services normal) and "Billing" (Estimated charges USD \$0.00 for the period Feb 1 – 22, 2021). At the bottom, a "CLOUD SHELL" terminal window is open, showing a welcome message and a command prompt: "Welcome to Cloud Shell! Type "help" to get started. Your Cloud Platform project in this session is set to elite-truck-304201. Use "gcloud config set project [PROJECT_ID]" to change to a different project. somya_mishra@cloudshell:~ (elite-truck-304201)\$".

2. Creating an image classification dataset and importing data

The screenshot shows the "AI Platform (Unified)" section of the Google Cloud Platform interface. The left sidebar has "Datasets" selected. The main area shows a dataset named "mydataset" with a preview image "mydataset_icn". Below it are tabs for "IMPORT", "BROWSE", and "ANALYZE", with "IMPORT" currently selected. A section titled "Add images to your dataset" provides instructions and links to a "data guide". It asks to choose an import method: "Upload images" (recommended for no labels) or "Import files" (recommended for existing labels). Below this, there are three radio button options: "Upload images from your computer", "Upload import files from your computer", and "Select import files from Cloud Storage", with the third option selected. A callout box highlights the "Select import files from Cloud Storage" option. To the right, there's a diagram of clouds with labels "CUMULUS", "CIRRUS", and "STRATUS". A note explains that image classification models predict one or many labels for an image, such as identifying cloud types. Another note suggests using the Google Vision API for generic detection instead.

Select import files from Cloud Storage

Images referenced in the import files will be preprocessed and stored in a new Cloud Storage bucket ([charges apply](#))

Import file path *

 gs://elite-truck-304201/csv/all_data.csv [BROWSE](#) [?](#) Data split Automatic [?](#)[ADD ANOTHER FILE](#)

What happens next?

You'll be emailed after the images are imported and your dataset is ready

[CONTINUE](#)

AI Platform finished importing data into dataset "mydataset" [Inbox](#)

AI Platform <noreply-aiplatform@google.com> to me ▾ 2:02 AM (10 hours ago) [STAR](#) [REPLY](#) [MORE](#)

Hello AI Platform Customer,

AI Platform finished importing data into dataset "mydataset".
Additional Details:
Operation State: Succeeded
Resource Name:
projects/237151972897/locations/us-central1/datasets/4038127976821293056

To continue your progress, go back to your dataset using
<https://console.cloud.google.com/aiplatform/locations/us-central1/datasets/4038127976821293056.annotationSetId=6131738853595152384/browse?project=elite-truck-304201>

Sincerely,
The Google Cloud AI Team

Google Cloud Platform My First Project Search products and resources

AI Platform (Unified) mydataset mydataset_icn [?](#)

	IMPORT	BROWSE	ANALYZE
Dashboard			
Datasets	All 3,667	Labeled 3,667	Unable to import data due to errors.
Labeling tasks		Unlabeled 0	DETAILS DISMISS
Notebooks			
Training	daisy 633		
Models	dandelion 898		
Endpoints	roses 641		
Batch predictions	sunflowers 697		
	tulips 798		
	ADD NEW LABEL		

Filter items [+](#) [Select all](#)

Items per page: 10 1 – 10 of many

Training jobs and models
Use this dataset to train a new machine learning model with AutoML or custom code [TRAIN NEW MODEL](#)

Labeling tasks
If your data still needs to be labeled, create a labeling task to have others label it for you [CREATE LABELING TASK](#)

3. Training an AutoML image classification model

Train new model

- 1 Choose training method**
- 2 Define your model**
- 3 Compute and pricing**

START TRAINING
CANCEL

Dataset *
mydataset (3667 images)

Annotation set *
mydataset_icn

Objective
Image classification (Single-label)

Please refer to the pricing guide for more details (and available deployment options) for each method.

AutoML
Train high-quality models with minimal effort and machine learning expertise. Just specify how long you want to train. [Learn more](#)

AutoML Edge
Train a model that can be exported for on-prem/on-device use. Typically has lower accuracy. [Learn more](#)

Custom training (advanced)
Run your TensorFlow, scikit-learn, and XGBoost training applications in the cloud. Train with one of Google Cloud's pre-built containers or use your own. [Learn more](#)

CONTINUE

Train new model

- 1 Choose training method**
- 2 Define your model**
- 3 Compute and pricing**

START TRAINING
CANCEL

Model name *
mydataset_2021

ADVANCED OPTIONS

CONTINUE

Training
PREVIEW
CREATE
 REFRESH

TRAINING PIPELINE
CUSTOM JOB
HYPERPARAMETER TUNING

Training pipelines are the primary model training workflow in AI Platform (Unified). You can use training pipelines to create an AutoML-trained model or a custom-trained model. For custom-trained models, training pipelines orchestrate custom training jobs and hyperparameter tuning with additional steps like adding a dataset or uploading the model to AI Platform for prediction serving. [Learn More](#)

Region
us-central1 (Iowa)

Filter training pipelines...

Name	ID	Job type	Model type	Status	Created	Elapsed time
mydataset_2021	5647355603048202240	Training pipeline	Image classification (Single-label)	Pending	Feb 22, 2021, 12:42:17 PM	36 sec

My First Project ▾ Search products and resources

Training PREVIEW + CREATE REFRESH

TRAINING PIPELINE CUSTOM JOB HYPERPARAMETER TUNING

Training pipelines are the primary model training workflow in AI Platform (Unified). You can use training pipelines to create an AutoML-trained model or a custom-trained model. For custom-trained models, training pipelines orchestrate custom training jobs and hyperparameter tuning with additional steps like adding a dataset or uploading the model to AI Platform for prediction serving. [Learn More](#)

Region
us-central1 (Iowa) ?

Filter training pipelines...

Name	ID	Job type	Model type	Status	Created	Elapsed time
mydataset_2021	5647355603048202240	Training pipeline	Image classification (Single-label)	Succeeded	Feb 22, 2021, 12:42:17 PM	24 min 5 sec

My First Project ▾ Search products and resources

Models PREVIEW + CREATE IMPORT REFRESH

Models are built from your datasets or unmanaged data sources. There are many different types of machine learning models available on AI Platform, depending on your use case and level of experience with machine learning. [Learn more](#)

Region
us-central1 (Iowa) ?

Filter models...

Name	ID	Data	Endpoints	Region	Type	Created	Notifications	Metadata
mydataset_2021	1836078865269653504	mydataset_icn	0	us-central1	Image classification	Feb 22, 2021, 12:42:17 PM		

Google Cloud Platform **My First Project** ▾ Search products and resources

AI Platform (Unified) mydataset_2021 VIEW DATASET

EVALUATE DEPLOY & TEST BATCH PREDICTIONS MODEL PROPERTIES

Filter labels Confidence threshold 0.5

All labels	0
sunflowers	1
dandelion	0.99843
daisy	0.99783
tulips	0.99675
roses	0.99109

All labels

Average precision	0.997
Precision	97.5%
Recall	96.7%
Created	Feb 22, 2021, 1:08:23 PM
Total images	3,667
Training images	2,933
Validation images	367
Test images	367

Use the slider to see which score threshold works best for your model on the precision-recall tradeoff curve. [Learn more about these metrics and graphs](#)

The figure displays two performance plots for the model. The left plot is a Precision-Recall curve with 'Precision' on the y-axis (0% to 100%) and 'Recall' on the x-axis (0.0 to 1.0). The right plot is an ROC curve with 'Recall' on the y-axis (0% to 100%) and 'Confidence threshold' on the x-axis (0.0 to 1.0). Both plots show a single blue line representing the model's performance, with a red circle highlighting a specific point on the ROC curve.

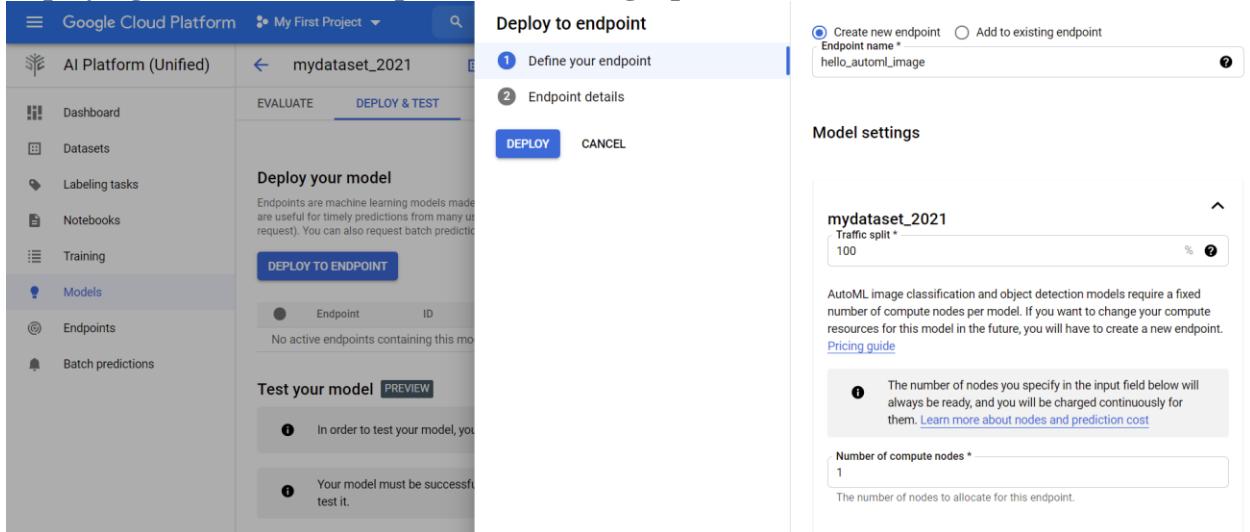
Confusion matrix

Item counts 

This table shows how often the model classified each label correctly (in blue), and which labels were most often confused for that label (in gray). Note that this table is limited to the 10 most confused labels. You can download the entire confusion matrix as a CSV file.

True label	Predicted label					
	tulips	dandelion	sunflowers	daisy	roses	
tulips	96%	1%	—	—	3%	
dandelion	—	99%	—	1%	—	
sunflowers	1%	1%	97%	—	—	
daisy	—	2%	—	97%	2%	
roses	2%	2%	—	2%	95%	

4. Deploying a model to an endpoint and sending a prediction



The screenshot shows the Google Cloud Platform AI Platform (Unified) interface. On the left, the sidebar includes options like Dashboard, Datasets, Labeling tasks, Notebooks, Training, Models (which is selected), Endpoints, and Batch predictions. The main area shows a project named "My First Project" with a sub-project "mydataset_2021". The "DEPLOY & TEST" tab is active. A modal window titled "Deploy to endpoint" is open, showing two steps: "Define your endpoint" (selected) and "Endpoint details". Under "Define your endpoint", there's a radio button for "Create new endpoint" (selected) and an input field "Endpoint name" with the value "hello_automl_image". Below this, there's a "Model settings" section for "mydataset_2021" with a "Traffic split" of 100. It notes that AutoML image classification and object detection models require a fixed number of compute nodes per model. A "Pricing guide" link is provided. The "Number of compute nodes" is set to 1. A note states that the number of nodes specified will always be ready and continuously charged. The "Test your model" section shows a preview button and two informational messages: one about testing requirements and another about successful testing.

← mydataset_2021 [VIEW DATASET](#)

EVALUATE**DEPLOY & TEST**BATCH PREDICTIONSMODEL PROPERTIES

Deploy your model

Endpoints are machine learning models made available for online prediction requests. Endpoints are useful for timely predictions from many users (for example, in response to an application request). You can also request batch predictions if you don't need immediate results.

DEPLOY TO ENDPOINT

Endpoint	ID	Models	Region	Last updated	API	Notification	Metadata	Encryption
hello_automl_image	7757274436285235200	1	us-central1	Feb 22, 2021, 2:38:58 PM	Sample request			Google-managed key

Test your model PREVIEW

! Your model must be successfully deployed to an endpoint before you can test it.

← mydataset_2021 [VIEW DATASET](#)

EVALUATE**DEPLOY & TEST**BATCH PREDICTIONSMODEL PROPERTIES

Deploy your model

Endpoints are machine learning models made available for online prediction requests. Endpoints are useful for timely predictions from many users (for example, in response to an application request). You can also request batch predictions if you don't need immediate results.

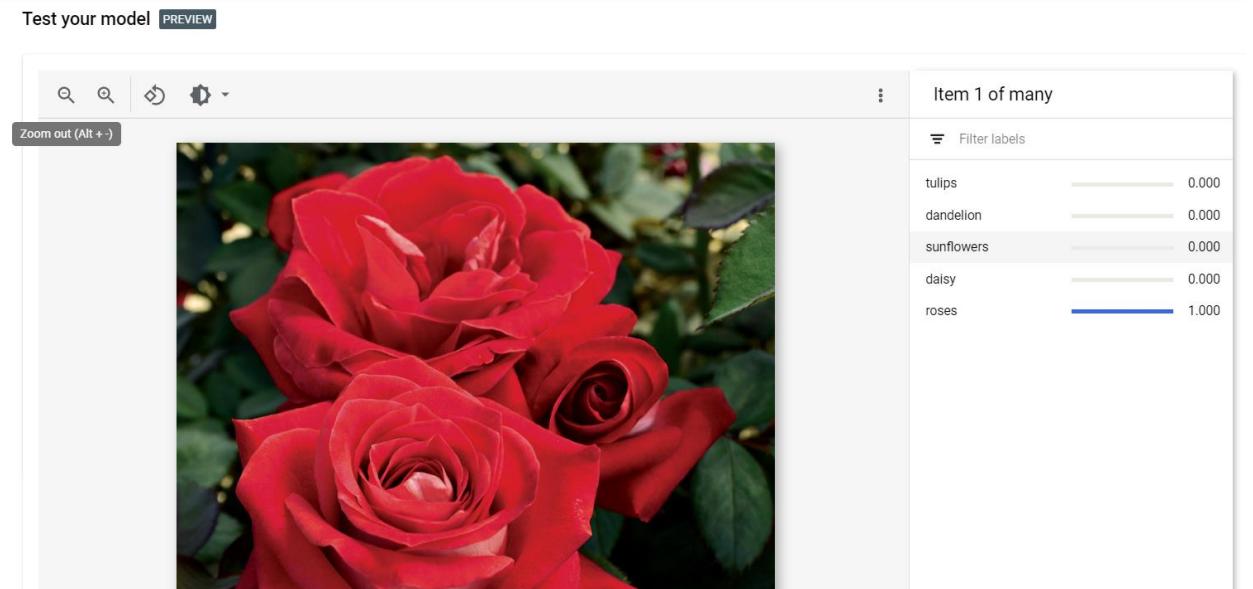
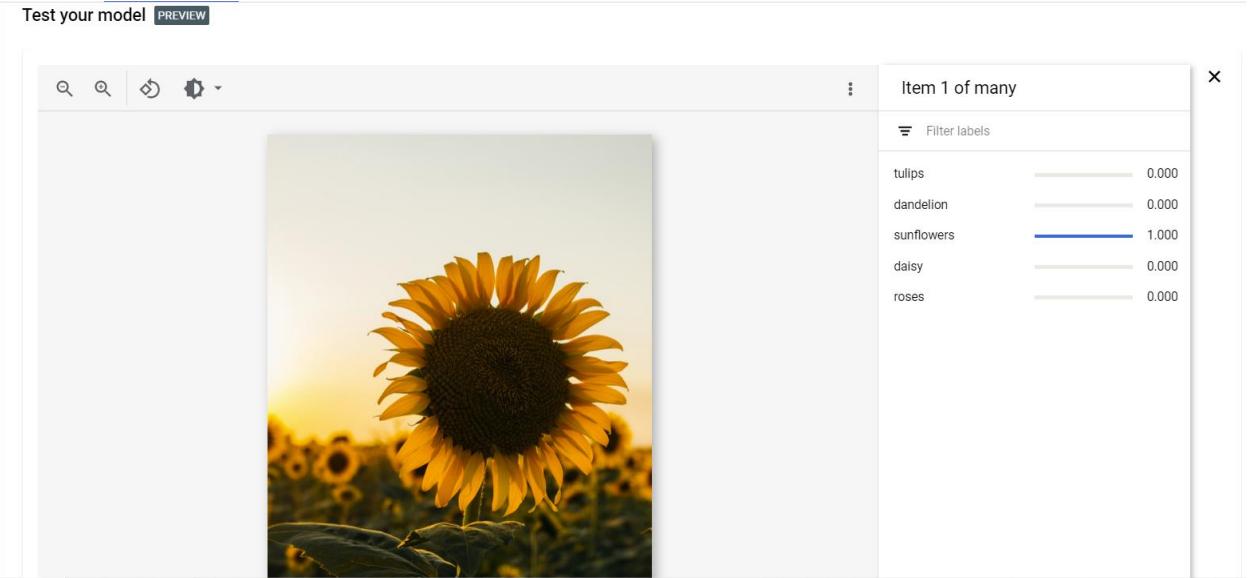
DEPLOY TO ENDPOINT

Endpoint	ID	Models	Region	Last updated	API	Notification	Metadata	Encryption
hello_automl_image	7757274436285235200	1	us-central1	Feb 22, 2021, 2:38:58 PM	Sample request			Google-managed key

Test your model PREVIEW

UPLOAD IMAGE

5. Results



TEXT

1. Setting up project and environment

The screenshot shows the Google Cloud Platform dashboard. In the Project info section, the project name is 'My Project 36783' and the Project ID is 'marine-balm-306002'. The API APIs section shows requests per second. The Google Cloud Platform status indicates all services are normal. The Billing section shows estimated charges of USD \$0.00 for the period Feb 1 – 25, 2021. A terminal window at the bottom displays command-line output related to setting up a bucket and training a machine learning model.

```
Welcome to Cloud Shell! Type "help" to get started.  
You are currently in project "My Project 36783", which corresponds to marine-balm-306002.  
Use "gcloud config set project [PROJECT_ID]" to change to a different project.  
somya_mishra@cloudshell:~ (marine-balm-306002)$ export PROJECT_ID=marine-balm-306002  
somya_mishra@cloudshell:~ (marine-balm-306002)$ export BUCKET=$(PROJECT_ID)-lcm  
somya_mishra@cloudshell:~ (marine-balm-306002)$ gsutil mb -p ${PROJECT_ID} -l us-central1 gs://$(BUCKET)/  
Creating gs://marine-balm-306002-lcm/...  
Serving requests from the cloud Storage bucket named 'marine-balm-306002-lcm' already exists. Try another name. Bucket names must be globally unique across all Google Cloud projects, including those outside of your organization.  
somya_mishra@cloudshell:~ (marine-balm-306002)$ gsutil -m cp -R gs://cloud-ml-data/NL-classification/happiness.csv gs://$(BUCKET)/text/  
Copying gs://cloud-ml-data/NL-classification/happiness.csv [Content-Type=text/csv]...  
/ 1/1 files|[ 1.3 MiB/ 1.3 MiB] 100% Done  
Operation completed over 1 objects/1.3 MiB.  
somya_mishra@cloudshell:~ (marine-balm-306002)$
```

2. Creating dataset and importing documents

The screenshot shows the 'Create dataset' interface. The dataset name is 'text_classification'. Under 'Select a data type and objective', the 'TEXT' tab is selected. There are four options: 'Text classification (Single-label)' (selected), 'Text classification (Multi-label)', 'Text entity extraction', and 'Text sentiment analysis'. The 'Text classification (Single-label)' option is described as predicting one correct label assigned to a document. The 'Text classification (Multi-label)' option is described as predicting all correct labels assigned to a document. The 'Text entity extraction' option is described as identifying entities within text items. The 'Text sentiment analysis' option is described as understanding overall sentiment expressed in text. A dropdown for 'Region' shows 'us-central1 (Iowa)'.

The screenshot shows the 'text_classification' dataset import progress. The status is 'Import in progress'. It notes that processing can take several minutes and users will be emailed once it's complete. A progress bar at the bottom indicates the status.

AI Platform finished importing data into dataset "text_classification" [Inbox](#)

AI Platform <noreply-aiplatform@google.com>
to me ▾
1:22 AM (3 minutes ago)

Hello AI Platform Customer,

AI Platform finished importing data into dataset "text_classification".
Additional Details:
Operation State: Succeeded
Resource Name:
projects/704844093114/locations/us-central1/datasets/7228646837836578816

To continue your progress, go back to your dataset using
<https://console.cloud.google.com/ai/platform/locations/us-central1/datasets/7228646837836578816.annotationSetId=4807117613194805248/browse?project=marine-balm-306002>

Sincerely,
The Google Cloud AI Team

My Project 36783 ▾ Search products and resources

text_classification text_classification_tcn ?

BROWSE IMPORT ANALYZE

All 11,947 Labeled 11,947 Unlabeled 0

Filter labels +

	Labels
<input type="checkbox"/>	Text
<input checked="" type="checkbox"/>	My eldest son who is 27 just got word he has a new job after finishing his bache...
<input type="checkbox"/>	I visited my best friend at her school on St. Patrick's day.
<input type="checkbox"/>	My mom cooked some delicious rice for me with curd.
<input type="checkbox"/>	Today I make Eye contact with my crush. She Also look into my Eyes For a Seco...
<input type="checkbox"/>	I was dropping off my son for a sleepover. He was really excited to go. I droppe...
<input type="checkbox"/>	Dinner tonight was really good.
<input type="checkbox"/>	I WENT TO MEENAKSHI AMMAN TEMPLE WITH MY FAMILY MEMBERS.
<input type="checkbox"/>	I got the test results back from my father's echo and neck arteries taken at the ...
<input type="checkbox"/>	I was selected as the winner for a random lottery drawing from an mturk hit. It ...
<input type="checkbox"/>	My brother told me he got into med school!

Items per page: 10 ▾ 1 – 10 of many < >

Training jobs and models
Use this dataset to train a new machine learning model with AutoML or custom code

TRAIN NEW MODEL

Labeling tasks
If your data still needs to be labeled, create a labeling task to have others label it for you

CREATE LABELING TASK

3. Training AutoML text classification model

Train new model

1 Choose training method

2 Define your model

START TRAINING

CANCEL

Dataset *
text_classification (11947 text items)

Annotation set *
text_classification_tcn

Objective
Text classification (Single-label)

Please refer to the pricing guide for more details (and available deployment options) for each method.

AutoML

Train high-quality models with minimal effort and machine learning expertise. AutoML training automatically ends when your model stops improving. [Learn more](#)

Custom training (advanced)

Run your TensorFlow, scikit-learn, and XGBoost training applications in the cloud. Train with one of Google Cloud's pre-built containers or use your own. [Learn more](#)

CONTINUE

Google Cloud Platform My Project 36783 Search products and resources REFRESH

AI Platform (Unified)

Training PREVIEW + CREATE

TRAINING PIPELINE CUSTOM JOB HYPERPARAMETER TUNING

Training pipelines are the primary model training workflow in AI Platform (Unified). You can use training pipelines to create an AutoML-trained model or a custom-trained model. For custom-trained models, training pipelines orchestrate custom training jobs and hyperparameter tuning with additional steps like adding a dataset or uploading the model to AI Platform for prediction serving. [Learn More](#)

Region: us-central1 (Iowa) Filter training pipelines...

Name	ID	Job type	Model type	Status	Created	Elapsed time
text_classification_202122692416	5471293005115686912	Training pipeline	Text classification (Single-label)	Running	Feb 26, 2021, 1:25:42 AM	1 min 34 sec

Training PREVIEW + CREATE

TRAINING PIPELINE CUSTOM JOB HYPERPARAMETER TUNING

Training pipelines are the primary model training workflow in AI Platform (Unified). You can use training pipelines to create an AutoML-trained model or a custom-trained model. For custom-trained models, training pipelines orchestrate custom training jobs and hyperparameter tuning with additional steps like adding a dataset or uploading the model to AI Platform for prediction serving. [Learn More](#)

Region: us-central1 (Iowa) Filter training pipelines...

Name	ID	Job type	Model type	Status	Created	Elapsed time
text_classification_202122692416	5471293005115686912	Training pipeline	Text classification (Single-label)	Succeeded	Feb 26, 2021, 1:25:42 AM	4 hr 29 min

My Project 36783 Search products and resources REFRESH

text_classification_202122692416 VIEW DATASET

EVALUATE DEPLOY & TEST BATCH PREDICTIONS MODEL PROPERTIES

All labels Confidence threshold 0.5

All labels	0
affection	0.99248
bonding	0.97073
achievement	0.95239
nature	0.91473
exercise	0.90865
enjoy_the_moment	0.86275
leisure	0.84113

All labels

Average precision: 0.959
Precision: 91.4%
Recall: 85.8%
Created: Feb 26, 2021, 5:55:12 AM
Total items: 11,947
Training items: 9,555
Validation items: 1,207
Test items: 1,185

Precision Recall

Confidence threshold: 0.5

Use the slider to see which score threshold works best for your model on the precision-recall tradeoff curve. [Learn more about these metrics and graphs](#)

Confusion matrix

Item counts [Download](#)

This table shows how often the model classified each label correctly (in blue), and which labels were most often confused for that label (in gray). Note that this table is limited to the 10 most confused labels. You can download the entire confusion matrix as a CSV file.

True label	Predicted label							
	exercise	achievement	leisure	bonding	enjoy_the_moment	nature	affection	
exercise	80%	15%	—	—	—	5%	—	
achievement	0%	91%	1%	1%	2%	1%	4%	
leisure	—	16%	67%	1%	13%	—	3%	
bonding	—	4%	—	90%	1%	—	5%	
enjoy_the_moment	1%	21%	2%	1%	71%	—	4%	
nature	—	12%	—	4%	—	81%	4%	
affection	—	2%	—	—	1%	—	97%	

4. Deploying model to an endpoint and making a prediction

The screenshot shows the Azure Machine Learning studio interface. On the left, there's a navigation bar with 'My Project 36783' and a search bar. Below it, a model named 'text_classification_202122692416' is selected. The main area has tabs for 'EVALUATE', 'DEPLOY & TEST' (which is currently active), and 'BATCH PREDICTIONS'. In the center, a 'Deploy to endpoint' dialog is open. Step 1 'Define your endpoint' shows a radio button for 'Create new endpoint' with 'Endpoint name * hello_automl_text'. Step 2 'Endpoint details' is partially visible. To the right, 'Model settings' are configured for the endpoint, including traffic split (100%), logging settings (enable access logging), and a note about NLP scaling. At the bottom right of the dialog are 'CANCEL' and 'DONE' buttons.

5. Results

Test your model [PREVIEW](#)

I want to relax at the beach

PREDICT

Filter labels

affection	<div style="width: 20px;"></div>	0.002
achievement	<div style="width: 5px;"></div>	0.038
enjoy_the_moment	<div style="width: 100px;"></div>	0.171
bonding	<div style="width: 20px;"></div>	0.001
leisure	<div style="width: 80px;"></div>	0.781
nature	<div style="width: 20px;"></div>	0.005
exercise	<div style="width: 20px;"></div>	0.003

VIDEO

1. Setting up project and environment

The screenshot shows the Google Cloud Platform dashboard for 'My Project 45598'. On the left, the 'Project info' section displays the project name ('My Project 45598'), project ID ('prime-imagery-306123'), and project number ('204500057319'). Below it is a button to 'ADD PEOPLE TO THIS PROJECT'. In the center, the 'API APIs' section shows 'Requests (requests/sec)' from 0.2 to 1.0, with a note that 'No data is available for the selected time frame.' On the right, the 'Google Cloud Platform status' section shows 'All services normal' and a link to 'Go to Cloud status dashboard'. Below that is the 'Billing' section, which indicates 'Estimated charges USD \$0.00' for the billing period Feb 1 – 26, 2021.

2. Creating dataset and importing videos

The screenshot shows the 'video-dataset' creation interface. Under 'Import', the user has selected 'Select import files from Cloud Storage'. The 'Import file path' field contains 'gs:// automl-video-demo-data/hmdb_split1_5cl' with a 'BROWSE' button. A 'Data split' dropdown is set to 'Automatic'. To the right, there's a diagram illustrating video classification: a central video player with a play button is connected to two smaller boxes below it. One box contains a football icon labeled 'GAME', and the other contains a soda can icon labeled 'COMMERCIAL'. A text overlay explains: 'Video classification models let you predict labels for video segments. If you want to recognize a vast number of objects, places, and actions in your videos with Google's pre-trained models, try the Video Intelligence API.' A 'Learn more' link is provided.

The screenshot shows the 'video-dataset' creation interface again, but now under the 'ANALYZE' tab. It displays the message 'Import in progress' and 'This can take several minutes or more. You will be emailed once processing completes.' A horizontal progress bar at the bottom is mostly blue, indicating significant progress.

3. Training AutoML video classification model

Train new model

1 Choose training method

2 Define your model

START TRAINING **CANCEL**

Dataset
video-dataset

Annotation set
video-dataset_vcn

Objective
Video classification

Please refer to the pricing guide for more details (and available deployment options) for each method.

Node hours will be calculated when training begins. You will receive an email with node hours estimation. You can choose to cancel training at any time.

AutoML
Train high-quality models with minimal effort and machine learning expertise. AutoML training automatically ends when your model stop improving. [Learn more](#)

AutoML Edge
Train a model that can be exported for on-prem/on-device use. Typically has lower accuracy. [Learn more](#)

Custom training (advanced)
Run your TensorFlow, scikit-learn, and XGBoost training applications in the cloud. Train with one of Google Cloud's pre-built containers or use your own. [Learn more](#)

CONTINUE

Train new model

1 Choose training method

2 Define your model

Model name * video-dataset_202122702850

ADVANCED OPTIONS

START TRAINING CANCEL



>|

Training jobs and models

video-dataset_202122702850
Training model...

TRAIN NEW MODEL

My Project 45598 ▾ Search products and resources

Training PREVIEW + CREATE REFRESH

TRAINING PIPELINE CUSTOM JOB HYPERPARAMETER TUNING

Training pipelines are the primary model training workflow in AI Platform (Unified). You can use training pipelines to create an AutoML-trained model or a custom-trained model. For custom-trained models, training pipelines orchestrate custom training jobs and hyperparameter tuning with additional steps like adding a dataset or uploading the model to AI Platform for prediction serving. [Learn More](#)

Region us-central1 (Iowa) ?

Filter training pipelines...

Name	ID	Job type	Model type	Status	Created	Elapsed time
video-dataset_202122702850	8806771479136960512	Training pipeline	Video classification	Running	Feb 26, 2021, 4:29:58 PM	2 min 32 sec

Training PREVIEW + CREATE REFRESH

TRAINING PIPELINE CUSTOM JOB HYPERPARAMETER TUNING

Training pipelines are the primary model training workflow in AI Platform (Unified). You can use training pipelines to create an AutoML-trained model or a custom-trained model. For custom-trained models, training pipelines orchestrate custom training jobs and hyperparameter tuning with additional steps like adding a dataset or uploading the model to AI Platform for prediction serving. [Learn More](#)

Region us-central1 (Iowa) ?

Filter training pipelines...

Name	ID	Job type	Model type	Status	Created	Elapsed time
video-dataset_202122702850	8806771479136960512	Training pipeline	Video classification	Succeeded	Feb 26, 2021, 4:29:58 PM	2 hr 9 min

My Project 45598 ▾ Search products and resources

◀ video-dataset_202122702850 VIEW DATASET

EVALUATE TEST BATCH PREDICTIONS MODEL PROPERTIES

Filter labels

Confidence threshold ? 0.5

All labels

All labels	0
golf	1
cartwheel	1
ride_horse	1
kick_ball	1
pullup	1

Average precision 1
Precision 100%
Recall 100%
Created Feb 26, 2021, 6:39:17 PM
Training videos 400
Test videos 100

Use the slider to see which confidence threshold works best for your model on the precision-recall tradeoff curve. [Learn more about these metrics and graphs](#)

Precision

Recall

Confidence threshold

Recall

Precision

Confusion matrix

Item counts [Download](#)

This table shows how often the model classified each label correctly (in blue), and which labels were most often confused for that label (in gray). Note that this table is limited to the 10 most confused labels. You can download the entire confusion matrix as a CSV file.

True label	Predicted label				
	cartwheel	golf	ride_horse	kick_ball	pullup
cartwheel	100%	—	—	—	—
golf	—	100%	—	—	—
ride_horse	—	—	100%	—	—
kick_ball	—	—	—	100%	—
pullup	—	—	—	—	100%

4. Using a model to make a batch prediction

New batch prediction

Batch prediction name *

hello-video-batch

Model name

video-dataset_202122702850

File on Cloud Storage (JSONL)

Your file should contain a list of gs:// paths to the videos you want to make predictions on. [More info on data formats](#)

Source path *

gs:// automl-video-demo-data/hmdb_split1_predict.jsonl

BROWSE

Select a Cloud Storage location

Prediction results will be stored in the selected Cloud Storage bucket

Output format

JSONL

Destination path *

gs:// cloud-ai-platform-8215e181-ac31-4f08-8288-1f116c5aa429/d

BROWSE

Destination bucket must be standard storage class and located in us-central1 (single region only)

▼ ADVANCED OPTIONS

CREATE

CANCEL

AI Platform finished batch prediction using model "hello-video-batch" [Inbox](#)

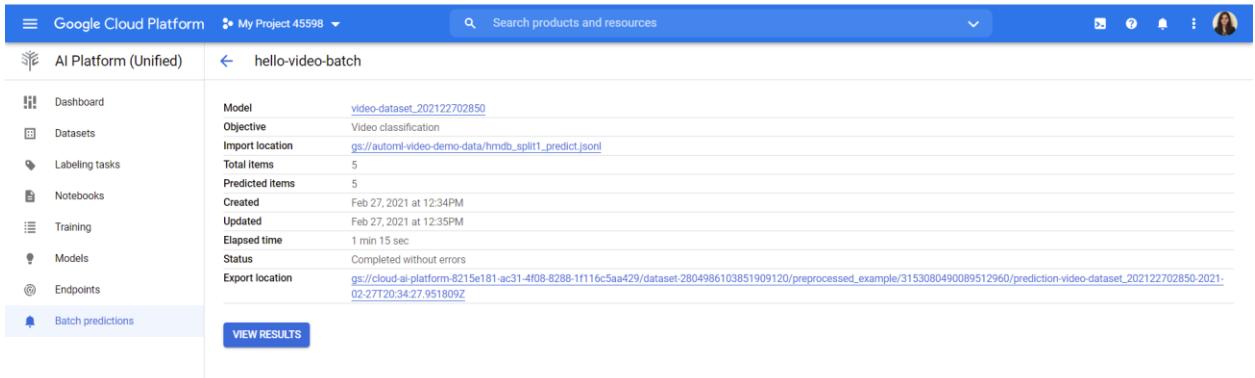
 **AI Platform** <noreply-aiplatform@google.com>
to me ▾ 12:35 PM (0 minutes ago) 

Hello AI Platform Customer,

AI Platform finished batch prediction using model "hello-video-batch".
Additional Details:
Operation State: Succeeded
Resource Name:
[projects/20450057319/locations/us-central1/batchPredictionJobs/2681875985913085952](https://console.cloud.google.com/ai/platform/locations/us-central1/models/1264543925058666496/batch-predictions?project=prime-imagery-306123)

To continue your progress, go back to your predictions using
<https://console.cloud.google.com/ai/platform/locations/us-central1/models/1264543925058666496/batch-predictions?project=prime-imagery-306123>

Sincerely,
The Google Cloud AI Team

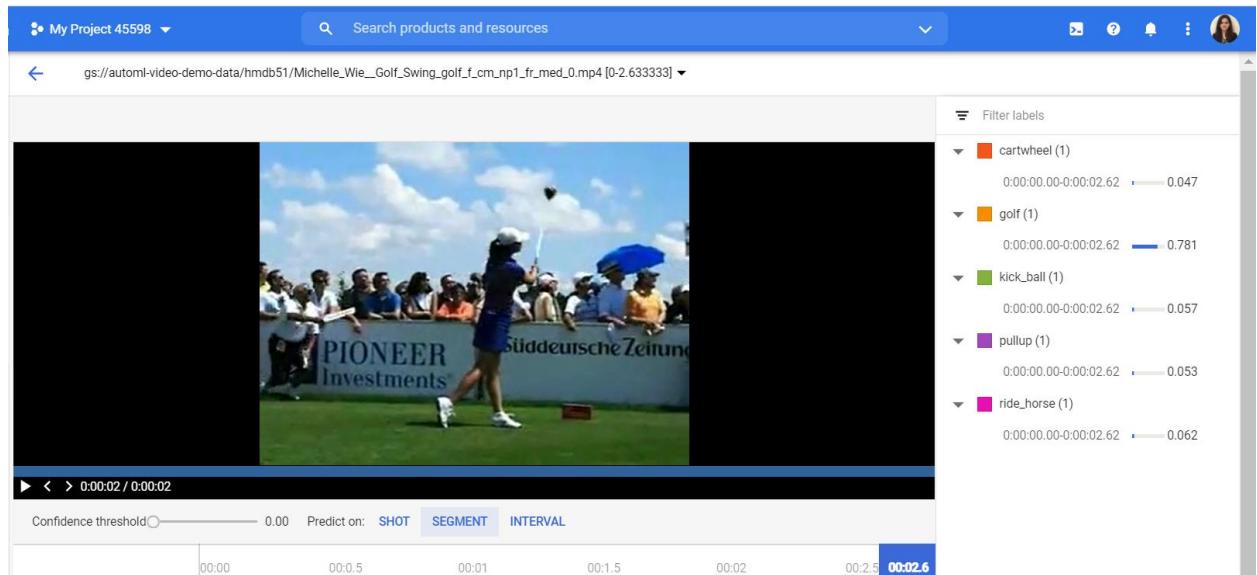


The screenshot shows the Google Cloud Platform interface for the AI Platform (Unified). The left sidebar lists various options: Dashboard, Datasets, Labeling tasks, Notebooks, Training, Models, Endpoints, and Batch predictions. The 'Batch predictions' option is currently selected, indicated by a blue background. The main content area displays the details of a completed batch prediction job for the model 'hello-video-batch'. The job summary includes:

Model	video-dataset_202122702850
Objective	Video classification
Import location	gs://automl-video-demo-data/hmdb_split1_predict.jsonl
Total items	5
Predicted items	5
Created	Feb 27, 2021 at 12:34PM
Updated	Feb 27, 2021 at 12:35PM
Elapsed time	1 min 15 sec
Status	Completed without errors
Export location	gs://cloud-ai-platform-8215e181-ac31-4f08-8288-1f116c5aa429/dataset-2804986103851909120/preprocessed_example/3153080490089512960/prediction-video-dataset_202122702850-2021-02-27T20:34:27.951809Z

A blue 'VIEW RESULTS' button is located at the bottom of the table.

5. Results



My Project 45598		Search products and resources																																																																		
Bucket details																																																																				
cloud-ai-platform-8215e181-ac31-4f08-8288-1f116c5aa429																																																																				
OBJECTS	CONFIGURATION	PERMISSIONS	RETENTION	LIFECYCLE																																																																
Buckets > cloud-ai-platform-8215e181-ac31-4f08-8288-1f116c5aa429 > dataset-2804986103851909120 > preprocessed_example > 3153080490089512960 > prediction-video-dataset_202122702850-2021-02-27T20:00:26Z	UPLOAD FILES	UPLOAD FOLDER	CREATE FOLDER	MANAGE HOLDS	DOWNLOAD	DELETE																																																														
Filter by name prefix only <input type="text"/> Filter objects and folders <table border="1"> <thead> <tr> <th>Name</th><th>Size</th><th>Type</th><th>Created time</th><th>Storage class</th><th>Last modified</th><th>Public access</th><th>Encryption</th><th>Retention expiration date</th> </tr> </thead> <tbody> <tr> <td>errors.jsonl</td><td>0 B</td><td>application/octet-stream</td><td>Feb 27, 2021, 1...</td><td>Regional</td><td>Feb 27, 20...</td><td>Not public</td><td>Google-managed key</td><td>—</td></tr> <tr> <td>predictions_00001.j</td><td>3.4 KB</td><td>application/octet-stream</td><td>Feb 27, 2021, 1...</td><td>Regional</td><td>Feb 27, 20...</td><td>Not public</td><td>Google-managed key</td><td>—</td></tr> <tr> <td>predictions_00002.j</td><td>2.6 KB</td><td>application/octet-stream</td><td>Feb 27, 2021, 1...</td><td>Regional</td><td>Feb 27, 20...</td><td>Not public</td><td>Google-managed key</td><td>—</td></tr> <tr> <td>predictions_00003.j</td><td>2.6 KB</td><td>application/octet-stream</td><td>Feb 27, 2021, 1...</td><td>Regional</td><td>Feb 27, 20...</td><td>Not public</td><td>Google-managed key</td><td>—</td></tr> <tr> <td>predictions_00004.j</td><td>3.4 KB</td><td>application/octet-stream</td><td>Feb 27, 2021, 1...</td><td>Regional</td><td>Feb 27, 20...</td><td>Not public</td><td>Google-managed key</td><td>—</td></tr> <tr> <td>predictions_00005.j</td><td>3.4 KB</td><td>application/octet-stream</td><td>Feb 27, 2021, 1...</td><td>Regional</td><td>Feb 27, 20...</td><td>Not public</td><td>Google-managed key</td><td>—</td></tr> </tbody> </table>						Name	Size	Type	Created time	Storage class	Last modified	Public access	Encryption	Retention expiration date	errors.jsonl	0 B	application/octet-stream	Feb 27, 2021, 1...	Regional	Feb 27, 20...	Not public	Google-managed key	—	predictions_00001.j	3.4 KB	application/octet-stream	Feb 27, 2021, 1...	Regional	Feb 27, 20...	Not public	Google-managed key	—	predictions_00002.j	2.6 KB	application/octet-stream	Feb 27, 2021, 1...	Regional	Feb 27, 20...	Not public	Google-managed key	—	predictions_00003.j	2.6 KB	application/octet-stream	Feb 27, 2021, 1...	Regional	Feb 27, 20...	Not public	Google-managed key	—	predictions_00004.j	3.4 KB	application/octet-stream	Feb 27, 2021, 1...	Regional	Feb 27, 20...	Not public	Google-managed key	—	predictions_00005.j	3.4 KB	application/octet-stream	Feb 27, 2021, 1...	Regional	Feb 27, 20...	Not public	Google-managed key	—
Name	Size	Type	Created time	Storage class	Last modified	Public access	Encryption	Retention expiration date																																																												
errors.jsonl	0 B	application/octet-stream	Feb 27, 2021, 1...	Regional	Feb 27, 20...	Not public	Google-managed key	—																																																												
predictions_00001.j	3.4 KB	application/octet-stream	Feb 27, 2021, 1...	Regional	Feb 27, 20...	Not public	Google-managed key	—																																																												
predictions_00002.j	2.6 KB	application/octet-stream	Feb 27, 2021, 1...	Regional	Feb 27, 20...	Not public	Google-managed key	—																																																												
predictions_00003.j	2.6 KB	application/octet-stream	Feb 27, 2021, 1...	Regional	Feb 27, 20...	Not public	Google-managed key	—																																																												
predictions_00004.j	3.4 KB	application/octet-stream	Feb 27, 2021, 1...	Regional	Feb 27, 20...	Not public	Google-managed key	—																																																												
predictions_00005.j	3.4 KB	application/octet-stream	Feb 27, 2021, 1...	Regional	Feb 27, 20...	Not public	Google-managed key	—																																																												

My Project 45598 ▾

Search products and resources



▶ < > 0:00:02 / 0:00:02

Confidence threshold 0.00 Predict on: SHOT SEGMENT INTERVAL

	00:00	00:0.5	00:01	00:1.5	00:02	00:2.5	00:02.6
cartwheel	0.052						
golf	0.051						
kick_ball	0.056						
pullup	0.785						
ride_horse	0.056						

My Project 45598 ▾

Search products and resources



▶ < > 0:00:02 / 0:00:02

Confidence threshold: 0.00 Predict on: SHOT SEGMENT INTERVAL

	00:00	00:05	00:01	00:15	00:02	00:22.4
cartwheel	0.051					
golf	0.064					
kick_ball	0.062					
pullup	0.056					
ride_horse	0.767					

My Project 45598 ▾

Search products and resources



▶ < > 0:00:01 / 0:00:01

Confidence threshold 0.00 Predict on: SHOT SEGMENT INTERVAL

	00:00	00:0.5	00:01	00:01.4	1.5	00:02
cartwheel	0.062					
golf	0.06					
kick_ball	0.75					
pullup	0.063					
ride_horse	0.065					

My Project 45598 ▾

Search products and resources ▾



▶ < > 0:00:02 / 0:00:02

Confidence threshold 0.00 Predict on: SHOT SEGMENT INTERVAL

	00:00	00:0.5	00:01	00:1.5	00:02	00:2.5	00:03.0
cartwheel	0.74						
golf	0.066						
kick_ball	0.065						
pullup	0.066						
ride_horse	0.063						

CUSTOM

1. Setting up project and environment

The screenshot shows the Google Cloud Platform dashboard for a project named "My Custom Project". The dashboard is divided into several sections:

- Project info:** Shows the project name, ID, and number.
- API APIs:** Displays requests per second over time, showing no data available for the selected time frame.
- Google Cloud Platform status:** Shows all services normal.
- Billing:** Shows estimated charges for the billing period Mar 1 – 9, 2021, with USD \$0.00.
- Monitoring:** Allows setting up alerting policies and creating uptime checks.
- Error Reporting:** Shows no sign of any errors.

At the bottom, there is a Cloud Shell terminal window titled "(my-custom-project-307108)" containing the following command history:

```
Welcome to Cloud Shell! Type "help" to get started.  
Your Cloud Platform project in this session is set to my-custom-project-307108.  
Use "gcloud config set project [PROJECT_ID]" to change to a different project.  
somya_mishra@cloudshell:~ (my-custom-project-307108)$ gcloud config set project my-custom-project-307108  
Updated property [core/project].  
somya_mishra@cloudshell:~ (my-custom-project-307108)$ gsutil mb -p my-custom-project-307108 -l us-central1 gs://hello_custom my-custom-project-307108  
Creating gs://hello_custom my-custom-project-307108/...  
somya_mishra@cloudshell:~ (my-custom-project-307108)$ gsutil cp gs://cloud-samples-data/ai-platform/hello-custom/hello-custom-sample-v1beta1.tar.gz - | tar -xsv  
hello-custom-sample/  
hello-custom-sample/webapp/  
hello-custom-sample/function/  
hello-custom-sample/setup.py  
hello-custom-sample/trainer/  
hello-custom-sample/trainer/task.py  
hello-custom-sample/trainer/_init_.py  
hello-custom-sample/function/requirements.txt  
hello-custom-sample/function/main.py  
hello-custom-sample/webapp/_index.html  
hello-custom-sample/webapp/index.html  
hello-custom-sample/webapp/image-list.txt  
hello-custom-sample/webapp/index.css  
hello-custom-sample/webapp/main.js  
hello-custom-sample/webapp/function-url.js  
somya_mishra@cloudshell:~ (my-custom-project-307108)$ cd hello-custom-sample
```

2. Training a custom image classification model

Train new model

1 Choose training method

2 Define your model

3 Training container

4 Hyperparameter tuning (Optional)

5 Compute and pricing

6 Prediction container (Optional)

START TRAINING **CANCEL**

Dataset * No managed dataset

Annotation set -

Objective Custom

Please refer to the pricing guide for more details (and available deployment options) for each method.

1 AutoML options are only available when you train with a managed dataset.

AutoML
Train high-quality models with minimal effort and machine learning expertise. Just specify how long you want to train. [Learn more](#)

AutoML Edge
Train a model that can be exported for on-prem/on-device use. Typically has lower accuracy. [Learn more](#)

Custom training (advanced)
Run your TensorFlow, scikit-learn, and XGBoost training applications in the cloud. Train with one of Google Cloud's pre-built containers or use your own. [Learn more](#)

CONTINUE

Train new model

1 Choose training method

2 Define your model

3 Training container

4 Hyperparameter tuning (Optional)

5 Compute and pricing

6 Prediction container (Optional)

START TRAINING **CANCEL**

Model name * hello_custom

ADVANCED OPTIONS

CONTINUE

Train new model

- Choose training method
- Define your model
- Training container**
- Hyperparameter tuning (Optional)
- Compute and pricing
- Prediction container (Optional)

START TRAINING CANCEL

Select a pre-built container or build a custom container using ML frameworks (as well as non-ML dependencies, libraries and binaries) that are not otherwise supported. [Learn more](#)

Pre-built container
View the list of [supported runtimes](#) including TensorFlow and scikit-learn versions

Custom container
Build a custom Docker container. Must be stored in [Container Registry](#)

Pre-built container settings

Before you begin, you need to package and upload your application code and dependencies to a Cloud Storage bucket. [Learn more](#)

In order to run in a pre-built container, your code needs to be in Python 3.7

Model framework *

Model framework version *

Package location (Cloud Storage path) * [BROWSE](#)

Learn how to [package and upload](#) your application code and dependencies

[+ ADD PACKAGE](#)

Python module *

Model output directory [BROWSE](#)

Your model artifacts and other data needed for training will be stored on Cloud Storage. You should specify a path here if you do not set an output directory in your application code or arguments.

Arguments

Optional. Add arguments for the command that runs when the container starts. Overrides the container's CMD instruction. Enter one parameter and its argument per line.

```
flag_a=xxxx
flag_b=yyyy
```

For parameters you want to tune with HyperTune, enter arguments of the hyperparameters you defined in the training code in the hyperTune setting below. If none, click Next to skip this step.

CONTINUE

Train new model

- Choose training method
- Define your model
- Training container
- Hyperparameter tuning (Optional)
- 5 Compute and pricing**
- 6 Prediction container (Optional)**

START TRAINING

CANCEL

Model training pricing is based on the length of time spent training, machine types, and any accelerators used. [Learn more](#)

Region *
us-central1 (Iowa)

Where your model should be trained. For efficiency, your selected region should match the same region as your dataset.

Compute settings

Select the type of virtual machine to use for your worker pool. You can add up to 4 worker pools. To learn about compute costs and how to map your ML framework's roles to specific worker pools, consult the [documentation](#)

Worker pool 0

Machine type *
n1-standard-4, 4 vCPUs, 15 GiB memory

Accelerator type

Accelerators can speed up model training that involves intensive compute tasks. [Learn more](#)

Worker count
1

Disk type
SSD

Disk size (GB)
100

▼ ADD MORE WORKER POOLS (OPTIONAL)

CONTINUE

Train new model

- Choose training method
- Define your model
- Training container
- Hyperparameter tuning (Optional)
- Compute and pricing
- Prediction container (Optional)

START TRAINING

CANCEL

You can associate your custom-trained model with a container in order to serve prediction requests using AI Platform (Unified). [Learn more about getting predictions.](#)

No prediction container

You can always import your model artifact later to serve prediction requests

Pre-built container

View the list of [supported runtimes](#) including TensorFlow, scikit-learn and PyTorch versions

Custom container

Build a custom Docker container. Must be stored in [Container Registry or Artifact Registry](#)

Pre-built container settings

AI Platform (Unified) provides Docker container images for serving predictions. To use a pre-built container, your trained model code must be in Python 3.7. [Learn more about pre-built containers](#)

In order to run in a pre-built container, your code needs to be in Python 3.7

Model framework *

TensorFlow

Model framework version *

2.1

Accelerator type *

None

Model directory *

 gs:// hello_custom_my-custom-project-307108/output/

BROWSE

Cloud Storage location containing the model artifact and any supporting files

Predict schemata

Optional. [Learn more about the predict schemata](#)

 gs:// Instances

BROWSE

Cloud Storage location to a YAML file that defines the format of a single instance used in prediction and explanation requests.

 gs:// Parameters

BROWSE

Cloud Storage location to a YAML file that defines the prediction and explanation parameters.

 gs:// Predictions

BROWSE

Cloud Storage location to a YAML file that defines the format of a single prediction or explanation.

Google Cloud Platform My Custom Project Search products and resources REFRESH

AI Platform (Unified)

- Training PREVIEW + CREATE
- TRAINING PIPELINE CUSTOM JOB HYPERPARAMETER TUNING

Region us-central1 (Iowa) Filter training pipelines...

Name	ID	Job type	Model type	Status	Created	Elapsed time
hello_custom	520631070281670912	Training pipeline	Custom	Running	Mar 9, 2021, 12:49:12 AM	32 sec

Google Cloud Platform My Custom Project Search products and resources

AI Platform (Unified)

hello_custom EXPORT

- DEPLOY & TEST BATCH PREDICTIONS MODEL PROPERTIES

Deploy your model

Endpoints are machine learning models made available for online prediction requests. Endpoints are useful for timely predictions from many users (for example, in response to an application request). You can also request batch predictions if you don't need immediate results.

DEPLOY TO ENDPOINT

Endpoint	ID	Models	Region	Last updated	API	Notification	Metadata	Encryption
hello_custom	1285179559288766464	1	us-central1	Mar 9, 2021, 10:38:59 AM	Sample request			Google-managed key

Test your model PREVIEW

JSON request

```
{
  "instances": [
    {
      "sample_key": "sample_value"
    }
  ]
}
```

PREDICT Response

Google Cloud Platform My Custom Project Search products and resources

hello_custom EXPORT

- DEPLOY & TEST BATCH PREDICTIONS MODEL PROPERTIES

Deploy your model

Endpoints are machine learning models made available for online prediction requests. Endpoints are useful for timely predictions from many users (for example, in response to an application request). You can also request batch predictions if you don't need immediate results.

DEPLOY TO ENDPOINT

Endpoint	ID	Models	Region	Last updated
No active endpoints containing this model				

Test your model PREVIEW

In order to test your model, you will need to deploy it first. [Pricing guide](#)

Your model must be successfully deployed to an endpoint before you can test it.

Deploy to endpoint

Define your endpoint

Create new endpoint (radio button selected) Endpoint name * hello_custom

Endpoint details

Model settings

hello_custom Traffic split * 100

Compute resources

Choose how compute resources will serve prediction traffic to your model

- Autoscaling: If you set a minimum and maximum, compute nodes will scale to meet traffic demand within those boundaries
- No scaling: If you only set a minimum, then that number of compute nodes will always run regardless of traffic demand (the maximum will be set to minimum)

Once scaling settings are set, they can't be changed unless you redeploy the model. [Pricing guide](#)

Minimum number of compute nodes * 1 Default is 1. If set to 1 or more, then compute resources will continuously run even without traffic demand. This can increase cost but avoid dropped requests due to node initialization.

Maximum number of compute nodes (optional) Enter a number equal to or greater than the minimum nodes. Can reduce costs but may cause reliability issues for high traffic.

Machine type * n1-standard-2, 2 vCPUs, 7.5 GiB memory

Service account A service account determines what Google Cloud resources your service code can access. By default, a Google-managed service account is used with permissions appropriate for most models. You can also use a user-managed service account to customize permissions. [Learn more](#)

Logging

Logging settings are permanent for this endpoint, and Stackdriver charges will apply. To change your logging preference in the future, create a new endpoint.

Enable access logging for this endpoint

Enable container logging for this endpoint

My Custom Project ▾

Search products and resources

hello_custom EXPORT

DEPLOY & TEST BATCH PREDICTIONS MODEL PROPERTIES

Deploy your model

Endpoints are machine learning models made available for online prediction requests. Endpoints are useful for timely predictions from many users (for example, in response to an application request). You can also request batch predictions if you don't need immediate results.

DEPLOY TO ENDPOINT

Endpoint	ID	Models	Region	Last updated
No active endpoints containing this model				

Test your model **[PREVIEW]**

- In order to test your model, you will need to deploy it first. [Pricing guide](#)
- Your model must be successfully deployed to an endpoint before you can test it.

Deploy to endpoint

Define your endpoint

Endpoint details

DEPLOY CANCEL

Location

Region us-central1 (Iowa)

Encryption

Use a customer-managed encryption key (CMK)

Google Cloud Platform My Custom Project ▾

Search products and resources

AI Platform (Unified) Endpoints **[PREVIEW]** + CREATE ENDPOINT

REFRESH

Dashboard

Datasets

Labeling tasks

Notebooks

Training

Models

Endpoints

Batch predictions

Endpoints are machine learning models made available for online prediction requests. Endpoints are useful for timely predictions from many users (for example, in response to an application request). You can also request batch predictions if you don't need immediate results.

To create an endpoint, you need at least one machine learning model

Region us-central1 (Iowa)

Filter endpoints

Endpoint	ID	Models	Region	Last updated	API	Notification	Metadata
hello_custom	1285179559288766464	1	us-central1	Mar 9, 2021, 10:47:43 AM	Sample request		

Sample Request

REST

PYTHON

You can now execute queries using the command line interface (CLI).

1. Make sure you have the [Google Cloud SDK](#) installed.
2. Run the following command to authenticate with your Google account.

```
$ gcloud auth application-default login
```



3. Create a JSON object to hold your data.

```
[  
  "instances": [  
    { "instance_key_1": "value", ... }, ...  
  ],  
  "parameters": { "parameter_key_1": "value", ... }, ...  
]
```



4. Create environment variables to hold your endpoint and project IDs, as well as your JSON object.

```
$ ENDPOINT_ID="1285179559288766464"  
$ PROJECT_ID="my-custom-project-307108"  
$ INPUT_DATA_FILE="INPUT-JSON"
```



5. Execute the request.

```
$ curl \  
  -X POST \  
  -H "Authorization: Bearer $(gcloud auth print-access-token)" \  
  -H "Content-Type: application/json" \  
  https://us-central1-aiplatform.googleapis.com/v1alpha1/\  
  -d "@${INPUT_DATA_FILE}"
```



DONE

```
somya_mishra@cloudshell:~/hello-custom-sample (my-custom-project-307108)$ ENDPOINT_ID="1285179559288766464"  
somya_mishra@cloudshell:~/hello-custom-sample (my-custom-project-307108)$ PROJECT_ID="my-custom-project-307108"  
somya_mishra@cloudshell:~/hello-custom-sample (my-custom-project-307108)$ INPUT_DATA_FILE="INPUT-JSON"  
somya_mishra@cloudshell:~/hello-custom-sample (my-custom-project-307108)$ gcloud config set project my-custom-project-307108
```

```
somya_mishra@cloudshell:~/hello-custom-sample (my-custom-project-307108)$ gcloud functions deploy classify_flower \
>   --region us-central1 \
>   --source=Function \
>   --runtime=python37 \
>   --memory=2048MB \
>   --trigger=http \
>   --allow-unauthenticated \
>   --set-env-vars ENDPOINT_ID=${ENDPOINT_ID}
Deploying function (may take a while - up to 2 minutes)...+
For Cloud Build 2nd driver logs, visit: https://console.cloud.google.com/logs/viewer?project=my-custom-project-307108&advancedFilter=resource.type%3Dbuild%0Aresource.labels.build_id%3Df6901c3e-0ac7-4fb9-b...
Custom project-307108#flame#2Fcloudbuild
Deploying function (may take a while - up to 2 minutes)...done.
availableMemoryMb: 2048
buildId: f6901c3e-0ac7-4fb9-ba5a-f7f17d052227
entryPoint: classify_flower
environmentVariables:
  ENDPOINT_ID: '1285179559288766464'
httpsTrigger:
  securityLevel: SPECTRE OPTIONAL
  url: https://us-central1-my-custom-project-307108.cloudfunctions.net/classify_flower
ingressSettings: ALLOW_ALL
labels:
  deployment_tool: cli-gcloud
name: projects/my-custom-project-307108/locations/us-central1/functions/classify_flower
runtime: python37
serviceAccountEmail: my-custom-project-307108@appspot.gservicesaccount.com
sourceUploadUrl: https://storage.googleapis.com/gcf-upload-us-central1-7c09219-f63a-47b0-8d0e-8681fd0885e2/3abc672e-66c2-4236-a32f-1b1afbf4580.zip?GoogleAccessId=service-72052205638@gcf-admin-robot.iam.gserviceaccount.com
nature=NImgEjx4zBxkuXCElI8c2QJAlpjwMwLCJAM2fxfoLoi902U7EW42FB5h0+42FA0gDgWjFyQOasCSDlhKtc6hMq56PiuCA1HxSJU4q18M210IR4ymulDJJ7UqyMsExGhiP+2BxqqW1eb612sDrGvVsIHjNk8DxPNF24Yaq8dc0Yqb2W%2F2B91gbTi60S2P42FT7dbxa2BxHMM0ZqemMW42FDMygs+9zlb3eJ6Ea42BHmBSn58WCt2FEcTuv9Cs+7INEXoQcDcpq8FYOyM2EN9qGdgZ12XoKgZjQB2FaPRsEZIS.lg+2D+3D
status: ACTIVE
timeout: 60s
updateTime: '2021-03-09T19:10:35.349Z'
versionId: '5'
somya_mishra@cloudshell:~/hello-custom-sample (my-custom-project-307108)$
```

```
somya_mishra@cloudshell:~/hello-custom-sample (my-custom-project-307108)$ PROJECT_ID=my-custom-project-307108
somya_mishra@cloudshell:~/hello-custom-sample (my-custom-project-307108)$ BUCKET_NAME=hello_custom_my-custom-project-207108
somya_mishra@cloudshell:~/hello-custom-sample (my-custom-project-307108)$ echo "export const CLOUD_FUNCTION_URL='https://us-central1-$PROJECT_ID.cloudfunctions.net/classify_flower';" \
> > webapp/function-uri.js
somya_mishra@cloudshell:~/hello-custom-sample (my-custom-project-307108)$ gsutil -m cp -r webapp gs://$(BUCKET_NAME)/
Copying file://webapp/index.html [Content-Type=text/html]...
Copying file://webapp/function-uri.js [Content-Type=application/javascript]...
Copying file://webapp/_index.html [Content-Type=text/html]...
Copying file://webapp/main.js [Content-Type=application/javascript]...
Copying file://webapp/image-list.txt [Content-Type=text/plain]...
Copying file://webapp/index.css [Content-Type=text/css]...
- [6/6 files] [133.4 KiB/133.4 KiB] 100% Done.
Operation completed over 6 objects/133.4 KiB.
somya_mishra@cloudshell:~/hello-custom-sample (my-custom-project-307108)$ gsutil -m acl ch -u AllUsers:R gs://$(BUCKET_NAME)/webapp/*
Updated ACL on gs://hello_custom_my-custom-project-307108/webapp/main.js
Updated ACL on gs://hello_custom_my-custom-project-307108/webapp/_index.html
Updated ACL on gs://hello_custom_my-custom-project-307108/webapp/function-uri.js
Updated ACL on gs://hello_custom_my-custom-project-307108/webapp/index.css
Updated ACL on gs://hello_custom_my-custom-project-307108/webapp/image-list.txt
Updated ACL on gs://hello_custom_my-custom-project-307108/webapp/index.html
somya_mishra@cloudshell:~/hello-custom-sample (my-custom-project-307108)$
```

3. Serving predictions from a custom image classification model

Click on any of the following images to request a prediction from your image classification model.

[GET SIX NEW IMAGES](#)

 sunflowers	 dandelion	 roses
 daisy	 daisy	 dandelion

4. Results



roses

Prediction (probabilities):

- roses: 0.990992844
 - tulips: 0.00537364045
 - daisy: 0.00280156033
 - sunflowers: 0.000567171257
 - dandelion: 0.000264734641
-



sunflowers

Prediction (probabilities):

- sunflowers: 0.999939084
- tulips: 0.000057836
- dandelion: 0.00000188316449
- daisy: 8.60989815e-7
- roses: 3.98374965e-7

TABULAR

1. Setting up project and environment

The screenshot shows the Google Cloud Platform AI Platform (Unified) interface. On the left, a sidebar menu includes options like Dashboard, Datasets (which is selected), Labeling tasks, Notebooks, Training, Models, Endpoints, and Batch predictions. The main area is titled 'Create dataset' and shows a form for creating a new dataset named 'Structured_AutoML_Tutorial'. It asks to 'Select a data type and objective'. Under 'DATA TYPE', 'TABULAR' is selected, indicated by a blue underline. Below it are options for IMAGE, TEXT, and VIDEO. A preview section shows two scatter plots: one with green and orange points and another with blue points. The 'Regression/classification' option is selected, with a note that it predicts a target column's value and supports tables with hundreds of columns and millions of rows. A 'Region' dropdown is set to 'us-central1 (Iowa)'. At the bottom are 'CREATE' and 'CANCEL' buttons.

2. Creating a dataset and training an AutoML classification model

 AI Platform (Unified) <hr/>  Dashboard  Datasets Selected  Labeling tasks  Notebooks  Training  Models  Endpoints  Batch predictions	<p>Structured_AutoML_Tutorial</p> <p>SOURCE ANALYZE</p> <p>Add data to your dataset</p> <p>Before you begin, read the data guide to learn how to prepare your data. Then choose a data source.</p> <p>Select a data source</p> <ul style="list-style-type: none"><input type="radio"/> CSV file: Can be uploaded from your computer or on Cloud Storage. Learn more<input type="radio"/> BigQuery: Select a table or view from BigQuery. Learn more <p><input type="radio"/> Upload CSV files from your computer</p> <p><input checked="" type="radio"/> Select CSV files from Cloud Storage</p> <p><input type="radio"/> Select a table or view from BigQuery</p> <p>Select CSV files from Cloud Storage</p> <p>Enter the Cloud Storage path to one or more CSV files. Data from multiple files will be referenced as one dataset.</p> <p>Import file path * <input type="text" value="gs://cloud-ml-tables-data/bank-marketing.csv"/> BROWSE ?</p> <p>ADD ANOTHER FILE</p> <p>What happens next?</p> <p>The selected CSV file will be associated with your dataset. Making changes to the referenced CSV file will affect the dataset.</p> <p>CONTINUE</p>
---	---

Google Cloud Platform My Tabular Project Search products and resources

AI Platform (Unified) Structured_AutoML_Tutorial

SOURCE ANALYZE

Dataset Info

Created: Mar 10, 2021 12:22 AM
Dataset format: CSV
Dataset location: <gs://cloud-ml.../bank-marketing.csv>

Summary

Total columns: 17
Total rows: 45,211

General statistics generated by Mar 10, 2021 12:31 AM [GENERATE STATISTICS](#)

Filter Enter property name or value

Field Name	Missing % (count)	Distinct values
Age	-	77
Balance	-	7168
Campaign	-	48
Contact	-	3
Day	-	31
Default	-	2
Deposit	-	2
Duration	-	1573
Education	-	4
Housing	-	2
Job	-	12
Loan	-	2
MaritalStatus	-	3
Month	-	12
PDays	-	559
POutcome	-	4
Previous	-	41

Rows per page: 50 1 – 17 of 17 < >

Train new model

- 1 Choose training method
- 2 Define your model
- 3 Choose training options
- 4 Compute and pricing

START TRAINING

CANCEL

Dataset
Structured_AutoML_Tutorial

Objective *
Classification

Please refer to the pricing guide for more details (and available deployment options) for each method.

AutoML

Train high-quality models with minimal effort and machine learning expertise. Just specify how long you want to train. [Learn more](#)

Custom training (advanced)

Run your TensorFlow, scikit-learn, and XGBoost training applications in the cloud. Train with one of Google Cloud's pre-built containers or use your own. [Learn more](#)

[CONTINUE](#)

Train new model

- Choose training method
- Define your model
- Choose training options
- Compute and pricing

START TRAINING **CANCEL**

Model name * ?

Target column * ▼

Export test dataset to BigQuery

ADVANCED OPTIONS

CONTINUE

Train new model

- Choose training method
- Define your model
- Choose training options
- Compute and pricing

START TRAINING **CANCEL**

GENERATE STATISTICS ▾

Filter Enter property name or value

Field Name ↑	Transformation	Missing % (count) ?	Distinct values ?	Correlation w/ target ?	⊖
<input type="checkbox"/> Age	Numeric ▾	-	77	-	⊖
<input type="checkbox"/> Balance	Numeric ▾	-	7168	-	⊖
<input type="checkbox"/> Campaign	Numeric ▾	-	48	-	⊖
<input type="checkbox"/> Contact	Categorical ▾	-	3	-	⊖
<input type="checkbox"/> Day	Numeric ▾	-	31	-	⊖
<input type="checkbox"/> Default	Categorical ▾	-	2	-	⊖
<input type="checkbox"/> Duration	Numeric ▾	-	1573	-	⊖
<input type="checkbox"/> Education	Categorical ▾	-	4	-	⊖
<input type="checkbox"/> Housing	Categorical ▾	-	2	-	⊖
<input type="checkbox"/> Job	Categorical ▾	-	12	-	⊖
<input type="checkbox"/> Loan	Categorical ▾	-	2	-	⊖
<input type="checkbox"/> MaritalStatus	Categorical ▾	-	3	-	⊖
<input type="checkbox"/> Month	Categorical ▾	-	12	-	⊖
<input type="checkbox"/> PDays	Numeric ▾	-	559	-	⊖
<input type="checkbox"/> POutcome	Categorical ▾	-	4	-	⊖
<input type="checkbox"/> Previous	Numeric ▾	-	41	-	⊖

Rows per page: 50 ▾ 1 - 16 of 16 < >

ADVANCED OPTIONS

CONTINUE

Train new model

- Choose training method
- Define your model
- Choose training options
- Compute and pricing

START TRAINING **CANCEL**

Enter the maximum number of node hours you want to spend training your model.

You can train for as little as 1 node hour. You may also be eligible to train with free node hours. [Pricing guide](#)

Budget * Maximum node hours ?

Estimated completion date: Mar 10, 2021 2 AM GMT-8

Enable early stopping
Ends model training when no more improvements can be made and refunds leftover training budget. If early stopping is disabled, training continues until the budget is exhausted.

Google Cloud Platform > My Tabular Project > AI Platform (Unified) > Training [PREVIEW] + CREATE

Search products and resources

REFRESH

Training PIPELINE CUSTOM JOB HYPERPARAMETER TUNING

Training pipelines are the primary model training workflow in AI Platform (Unified). You can use training pipelines to create an AutoML-trained model or a custom-trained model. For custom-trained models, training pipelines orchestrate custom training jobs and hyperparameter tuning with additional steps like adding a dataset or uploading the model to AI Platform for prediction serving. [Learn More](#)

Region: us-central1 (Iowa)

Filter: Filter training pipelines...

Name	ID	Job type	Model type	Status	Created	Elapsed time
Structured_AutoML_Tutorial	1906298075865939968	Training pipeline	Tabular classification	Running	Mar 10, 2021, 12:35:15 AM	9 min 58 sec

Google Cloud Platform > My Tabular Project > AI Platform (Unified) > Structured_AutoML_Tutorial > EVALUATE > DEPLOY & TEST > BATCH PREDICTIONS > MODEL PROPERTIES

Search products and resources

EVALUATE DEPLOY & TEST BATCH PREDICTIONS MODEL PROPERTIES

All labels

1: 0.99982
2: 0.81132

Confidence threshold: 0.5

All labels

PRAUC: 0.979
ROC AUC: 0.976
Log loss: 0.192
F1 score: 0.910288
Precision: 91%
Recall: 91%
Created: Mar 10, 2021, 1:41:08 AM

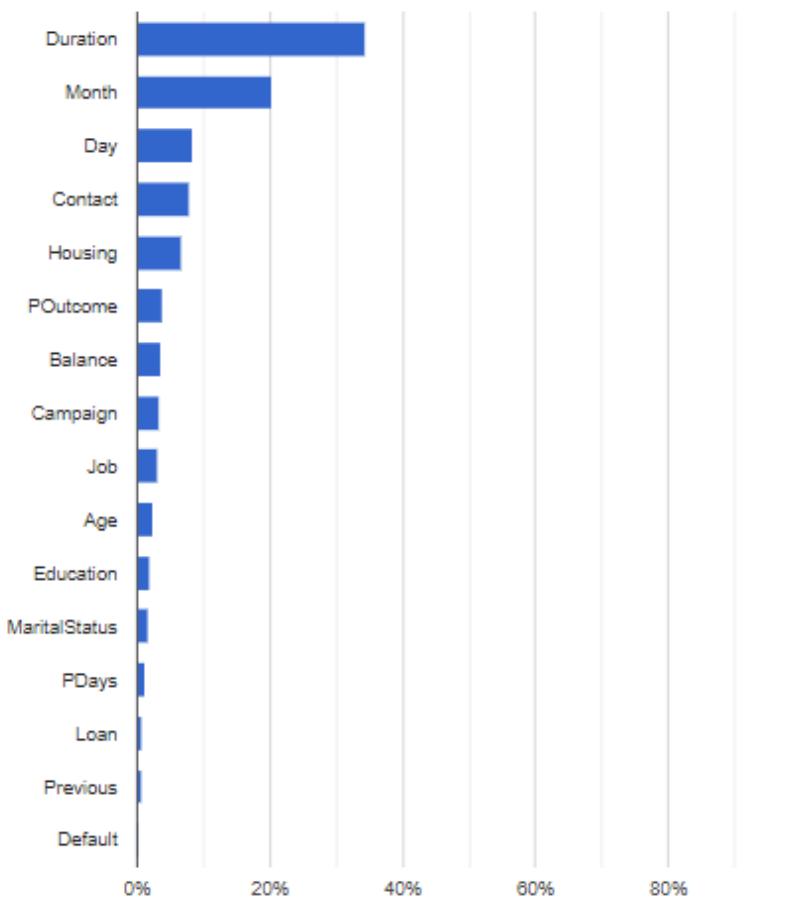
Use the slider to see which confidence threshold works best for your model. See the precision-recall curve. [Learn more about these metrics and graphs.](#)

Confusion matrix

This table shows how often the model classified each label correctly (in blue), and which labels were most often confused for that label (in gray). Note that this table is limited to the 10 most confused labels. You can download the entire confusion matrix as a CSV file.

		Predicted label	
		1	2
True label	1	96%	4%
	2	51%	49%

Feature Importance



3. Deploying a model and requesting a prediction

Deploy to endpoint

1 Define your endpoint

2 Endpoint details

DEPLOY **CANCEL**

Create new endpoint Add to existing endpoint

Endpoint name * **Structured_AutoML_Tutorial** ?

Model settings

Structured_AutoML_Tutorial

Traffic split * **100** % ?

Compute resources

Choose how compute resources will serve prediction traffic to your model

- Autoscaling: If you set a minimum and maximum, compute nodes will scale to meet traffic demand within those boundaries
- No scaling: If you only set a minimum, then that number of compute nodes will always run regardless of traffic demand (the maximum will be set to minimum)

Once scaling settings are set, they can't be changed unless you redeploy the model. [Pricing guide](#)

Minimum number of compute nodes * **1**

Default is 1. If set to 1 or more, then compute resources will continuously run even without traffic demand. This can increase cost but avoid dropped requests due to node initialization.

Maximum number of compute nodes (optional)

Enter a number equal to or greater than the minimum nodes. Can reduce costs but may cause reliability issues for high traffic.

Machine type * **n1-standard-8, 8 vCPUs, 30 GiB memory** ?

Logging

Logging settings are permanent for this endpoint, and Stackdriver charges will apply. To change your logging preference in the future, create a new endpoint.

Enable access logging for this endpoint
 Enable container logging for this endpoint

It may take several minutes for endpoint settings to take effect.

CANCEL DONE

Google Cloud Platform My Tabular Project Search products and resources

AI Platform (Unified) Structured_AutoML_Tutorial VIEW DATASET EXPORT

EVALUATE DEPLOY & TEST BATCH PREDICTIONS MODEL PROPERTIES

DEPLOY TO ENDPOINT

Name	ID	Models	Region	Last updated	API	Notification	Metadata	Encryption
Structured_AutoML_Tutorial	5096350743951048704	1	us-central1	Mar 10, 2021, 10:09:33 AM	Sample request			Google-managed key

Test your model PREVIEW

Feature column name	Type	Required or optional	Value	Local feature importance
Age	Text	Required	38.000000	--
Balance	Text	Required	387.000000	--
Campaign	Text	Required	2.000000	--
Contact	Text	Required	cellular	--
Day	Text	Required	15.000000	--
Default	Text	Required	no	--
Duration	Text	Required	171.000000	--
Education	Text	Required	secondary	--
Housing	Text	Required	yes	--
Job	Text	Required	blue-collar	--

Predicted column not yet known

Prediction result

Rows per page: 10 1 - 10 of 16

PREDICT RESET

4. Results

Test your model PREVIEW

Feature column name	Type	Required or optional	Value	Local feature importance
Age	Text	Required	43.000000	-0.000036582350730896
Balance	Text	Required	200.000000	-3.178914388020833e-7
Campaign	Text	Required	2.000000	0
Contact	Text	Required	cellular	0
Day	Text	Required	15.000000	0
Default	Text	Required	no	0
Duration	Text	Required	189.000000	-0.001279706756273906
Education	Text	Required	secondary	0
Housing	Text	Required	yes	0
Job	Text	Required	blue-collar	0

PREDICT

RESET

Predict label

Prediction result

1

Confidence score: 0.9898909330368042