

Assignment Auto ML

Name Jagruti Mohanty

Part 1 a) Image
classification

Classification using vision

The screenshot shows the Google Cloud Platform console in a Safari browser window. The URL is `console.cloud.google.com`. A banner at the top indicates a free trial status with \$300.00 credit and 90 days remaining. The main navigation bar includes links for Home, Natural Language, Recommendations AI, Tables, Talent Solution, Translation, Vision, Video Intelligence, Game Servers, Google Maps Platform, Redis Enterprise, and Apache Kafka on Cloud. The Vision menu is open, showing sub-options: Dashboard (which is selected and highlighted in blue), Datasets, Models, Notebooks, Training, Models, Endpoints, and Batch predictions. The main content area displays the Vision API dashboard, which includes a chart titled "Requests (requests/sec)" over time (6 PM, 6:15, 6:30) and a note stating "No data is available for the selected time frame." To the right of the chart, there are sections for "Google Cloud Platform status" (All services normal) and "Monitoring" (with options to set up alerting policies, create uptime checks, and view all dashboards). On the left sidebar, there is a "Reading List" section with a message: "No Reading List Items" and "Reading List helps you save webpages and links for later, even when you are not connected to the Internet."

Uploaded Pictures of banana and coconut trees with two labels by downloading the data from google images using imageeye extension

Safari File Edit View History Bookmarks Window Help

console.cloud.google.com Sat Feb 20 7:55 PM

Free trial status: \$300.00 credit and 90 days remaining - with a full account, you'll get unlimited access to all of Google Cloud Platform.

DISMISS ACTIVATE

Google Cloud Platform datasetassignment258 Search products and resources

Vision treecocoanutbanana LABEL STATS EXPORT DATA

Dashboard Datasets Models

IMPORT IMAGES TRAIN EVALUATE TEST & USE Single-Label Classification

	All images	265	Filter Labeled	Filter images
Labeled	265	<input type="checkbox"/> Select all		
Unlabeled	0			

bananatree 156
coconuttree 109

ADD NEW LABEL

bananatree(1) coconuttree(1) bananatree(1)

coconuttree(1) coconuttree(1) bananatree(1)

Images per page: 50 201 – 250 of many

The screenshot shows the Google Cloud Vision API interface within the Google Cloud Platform console. The dataset is named 'datasetassignment258'. The 'IMAGES' tab is selected, displaying 265 images. The images are categorized into two main labels: 'bananatree' (156 images) and 'coconuttree' (109 images). Below the labels, there are three rows of image thumbnails. The first row contains images of potted banana plants. The second row contains images of coconut trees. The third row contains images of both banana and coconut trees. Each image is labeled with its category and a count of 1. At the bottom, there are navigation controls for images per page (set to 50) and the total number of images (201 - 250 of many).

After uploading data

The screenshot shows a Safari browser window on a Mac OS X desktop. The address bar displays 'console.cloud.google.com'. The main content is the Google Cloud Platform Vision interface, specifically the 'datasetassignment258' dataset page. A banner at the top indicates a free trial status with '\$300.00 credit and 90 days remaining'. The interface includes a navigation menu, a search bar, and tabs for 'IMPORT', 'IMAGES', 'TRAIN' (which is selected), 'EVALUATE', and 'TEST & USE'. The 'DATASETS' tab is currently active. A message states 'You have enough images to start training' and provides instructions for splitting the dataset into Train, Validation, and Test sets. Below this, a table shows the distribution of images across three categories: 'banana tree', 'coconut tree', and 'other'. A large blue 'START TRAINING' button is located at the bottom of the table.

Free trial status: \$300.00 credit and 90 days remaining - with a full account, you'll get unlimited access to all of Google Cloud Platform.

DISMISS ACTIVATE

Google Cloud Platform datasetassignment258 Search products and resources

Vision treecoconutbanana LABEL STATS EXPORT DATA

Dashboard IMPORT IMAGES TRAIN EVALUATE TEST & USE Single-Label Classification

Datasets

Models

You have enough images to start training

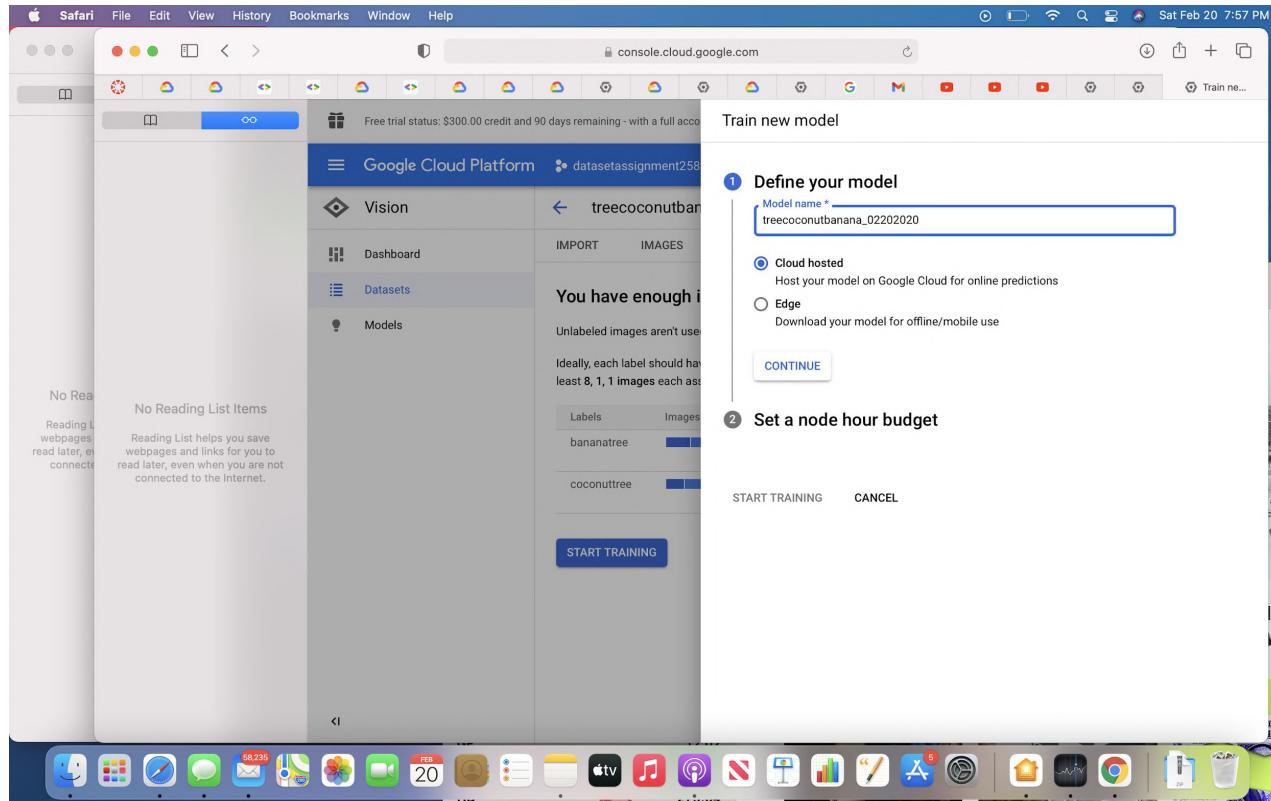
Unlabeled images aren't used. Your dataset will be automatically split into [Train, Validation, and Test sets](#).

Ideally, each label should have at least 10 images. Fewer images often result in inaccurate precision and recall. You must also have at least 8, 1, 1 images each assigned to your Train, Validation and Test sets.

Labels	Images	Train	Validation	Test
banana tree	<div style="width: 80%;"> </div> 156	125	16	15
coconut tree	<div style="width: 10%;"> </div> 109	87	11	11

START TRAINING

Started training the image classifier model



Safari File Edit View History Bookmarks Window Help

console.cloud.google.com Sat Feb 20 8:05 PM

Free trial status: \$300.00 credit and 90 days remaining - with a full account, you'll get unlimited access to all of Google Cloud Platform.

DISMISS ACTIVATE

Google Cloud Platform datasetassignment258 Search products and resources

Vision treecococonutbanana LABEL STATS EXPORT DATA

Dashboard IMPORT IMAGES TRAIN EVALUATE TEST & USE Single-Label Classification

Datasets Models

Models TRAIN NEW MODEL

treecococonutbanana_20210220080430

Training may take several hours. This includes node training time as well as infrastructure set up and tear down, which you aren't charged for.

You will be emailed once training completes.

Training model... CANCEL

No Reading List Items

No Reading List Items

Reading List helps you save webpages and links for you to read later, even when you are not connected to the Internet.

lis y f

20 20

Model training

No Reading List Items

Reading List helps you save webpages and links for you to read later, even when you are not connected to the Internet.

Your free trial is waiting: activate now to get \$300 credit to explore Google Cloud products. [Learn more](#)

DISMISS ACTIVATE

Google Cloud Platform datasetassignment258

Vision treecococonutbanana

IMPORT IMAGES TRAIN EVALUATE TEST & USE Single-Label Classification

Model treecococonutbanana_20210220080430 Confidence threshold 0.5

All labels

Label	Count
All labels	0.99857
bananatree	1
coconuttree	1

Total images 239
Test items 26
Precision 96.15%
Recall 96.15%

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

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.

Label	Item counts
coconuttree	1
banana	1
coconut	1
tree	1
banana tree	1
coconut tree	1
banana leaves	1
coconut leaves	1
banana flower	1
coconut flower	1

Your free trial is waiting: activate now to get \$300 credit to explore Google Cloud products. [Learn more](#)

DISMISS ACTIVATE

Google Cloud Platform datasetassignment258

Vision

treecoconutbanana

LABEL STATS EXPORT DATA

Dashboard Datasets Models

IMPORT IMAGES TRAIN EVALUATE TEST & USE Single-Label Classification

Model treecoconutbanana_20210220080430 Confidence threshold 0.5

No Reading List Items

Reading List helps you save webpages and links for you to read later, even when you are not connected to the Internet.

All labels

Label	Count
All labels	0.99857
bananatree	1
coconuttree	1

Total images: 239
Test items: 26
Precision: 96.15%
Recall: 96.15%

Precision

Recall

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.

Item counts

console.cloud.google.com

Your free trial is waiting: activate now to get \$300 credit to explore Google Cloud products. [Learn more](#)

DISMISS ACTIVATE

Google Cloud Platform datasetassignment258

Search products and resources

Vision

treecoco... LABEL STATS EXPORT DATA

Dashboard IMPORT IMAGES TRAIN EVALUATE TEST & USE Single-Label Classification

Datasets Model treecoco..._20210220080430

Your model is deployed and is available for online prediction requests. [Learn more](#) UPDATE DEPLOYMENT REMOVE DEPLOYMENT

Notice for beta users: The v1beta1 API endpoint is scheduled for deletion after GA release. If your beta models have not been [redeployed since October 17, 2019](#), please do so now to avoid interruption when the old service is shut down.

No Reading List Items

Reading List helps you save webpages and links for you to read later, even when you are not connected to the Internet.

Test your model

UPLOAD IMAGES

Up to 10 images can be uploaded at a time

Use your model

REST API Python

Use a REST API to get predictions from this model through Google Cloud. Use a Python client to get predictions from this model.

Imageye extension to download images for trainingset

A screenshot of a Mac desktop showing a Chrome browser window. The browser is displaying the 'Image downloader - Imageye' extension page from the Chrome Web Store. The page shows the extension's icon (a purple circle with a white download arrow), its name, 'Offered by: Imageye', a rating of 4.5 stars from 1,416 reviews, and a 'Productivity' category. It also indicates that over 100,000 users have installed it. Below the main listing, there are five related extensions: 'Mouse Clerk - Easy ima...', 'Image Downloader', 'IMAGE DOWNLOADER', 'Download & Edit All Ima...', and 'Image Downloader'. The background of the desktop shows a news article from Reuters about a Texas declaration after a deadly event.

Model prediction output

The screenshot shows a web browser window for the Google Cloud Platform Vision API. The URL is `console.cloud.google.com`. The main content area displays a banana tree with large green leaves. A sidebar on the left shows "No Reading List Items" and a "Datasets" section. The main panel has tabs for IMPORT, IMAGES, TRAIN, EVALUATE, and TEST & USE, with "TEST & USE" selected. Below the tabs, a message for beta users is displayed. The "Test your model" section includes a "UPLOAD IMAGES" button and a note that up to 10 images can be uploaded at a time. To the right, the "Predictions" section shows one object identified as "bananatree" with a confidence score of 1.00.

No Reading List Items

Reading List helps you save webpages and links for you to read later, even when you are not connected to the Internet.

Google Cloud Platform datasetassignment258 treecoco... LABEL STATS EXPORT DATA DISMISS ACTIVATE

Vision

Dashboard Datasets Models

IMPORT IMAGES TRAIN EVALUATE TEST & USE Single-Label Classification

Notice for beta users: The v1beta1 API endpoint is scheduled for deletion after GA release. If your beta models have not been [redeployed](#) since October 17, 2019, please do so now to avoid interruption when the old service is shut down.

Test your model

UPLOAD IMAGES

Up to 10 images can be uploaded at a time

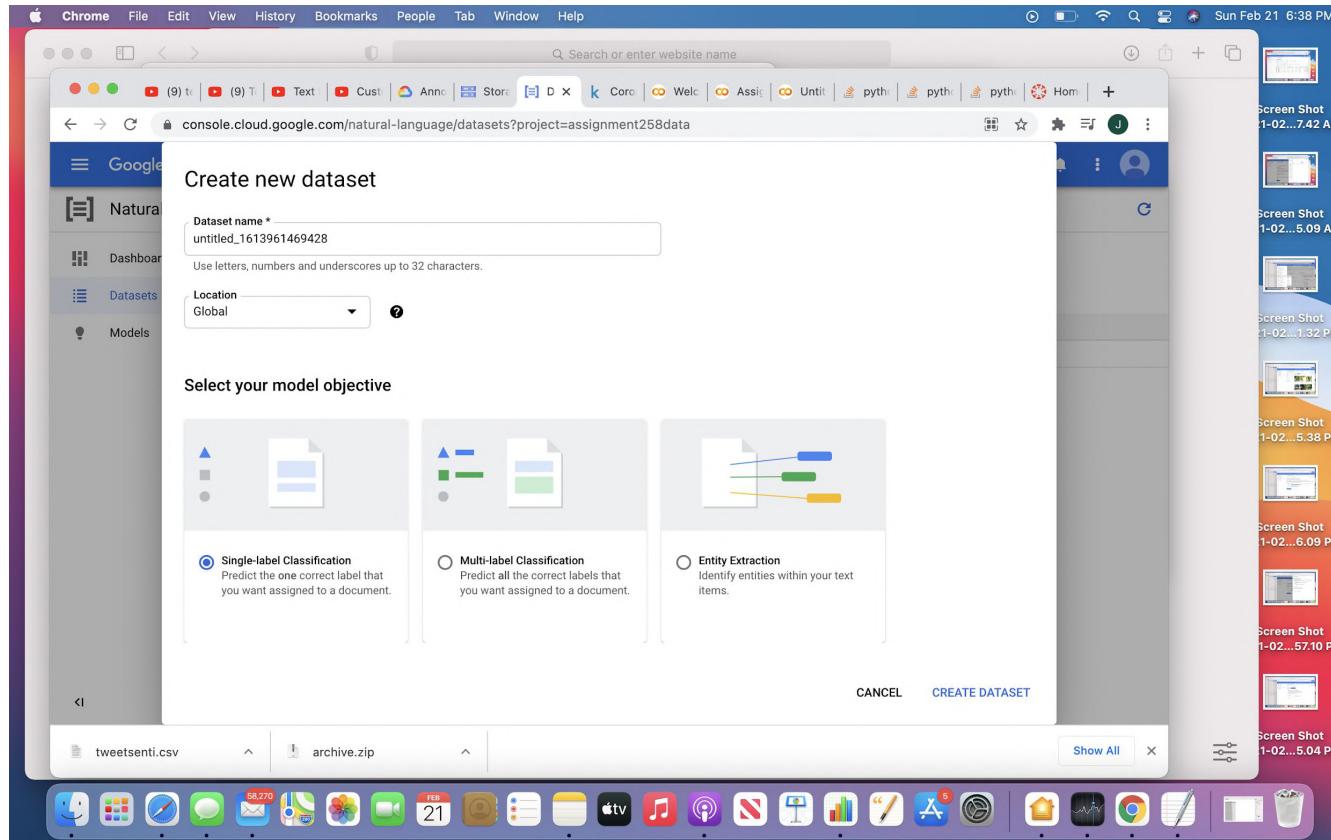


Predictions
1 object
bananatree 1 1.00

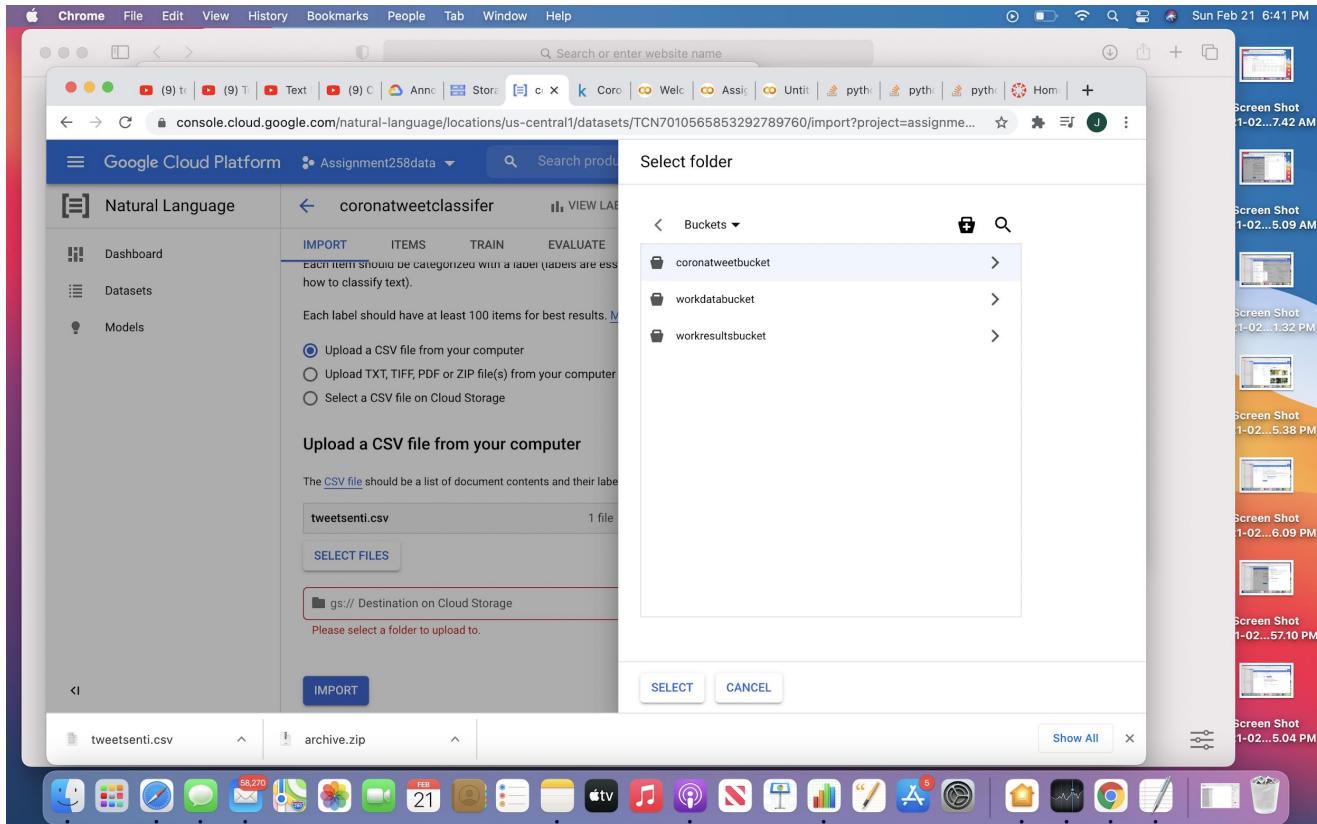
Part 1 b) Text classification

This classifier takes the text input and predicts if the sentiment was very positive , positive , neural , negative or very positive. Input dataset was taken from kaggle.

This is a single class classifier for the model to predict the sentiment analysis



Buckets are to store the dataset and here the training dataset is stored



Model processing step

A screenshot of a Mac desktop showing a Google Cloud Platform Natural Language interface in a Chrome browser window. The window title is "Google Cloud Platform - Assignment258data". The main content shows a "Processing text items" progress bar, which is nearly complete. Below the progress bar is a "CANCEL" button. At the bottom of the window, there are two tabs: "tweetsenti.csv" and "archive.zip". The browser's address bar shows the URL: "console.cloud.google.com/natural-language/locations/us-central1/datasets/TCN7010565853292789760/import?project=assignnme...". The browser's toolbar includes icons for Home, Stop, Refresh, Back, Forward, and Search. The status bar at the top right shows the date and time: "Sun Feb 21 6:43 PM". To the right of the browser window, a vertical stack of ten screen shots is visible, each labeled "Screen Shot 1-02...". The desktop background is a colorful abstract pattern.

This step to show the uploaded data for training and the labels

The screenshot shows a Mac desktop with a Google Cloud Platform Natural Language interface open in a browser window. The window title is "Google Cloud Platform Assignment258data". The main view is titled "coronatweetclassifier" and shows a table of "ITEMS". The table has columns for "ITEMS", "TRAIN", "EVALUATE", and "TEST & USE". A warning message "Warning: Importing data" is displayed above the table. The table rows include categories like "All items", "Labeled", "Unlabeled", "Training", "Validation", and "Testing", along with their respective counts. Below the table, there are filters for "Labels" and a list of sample tweets with their sentiment labels.

	ITEMS	TRAIN	EVALUATE	TEST & USE	
All items	41,147				Single-label Classification
Labeled	41,144				
Unlabeled	3				
Training	32,916				
Validation	4,114				
Testing	4,114				
extremely negative	5,481				
extremely positive	6,623				
negative	9,911				
neutral	7,709				
positive	11,420				

ITEMS

Labels	
<input type="checkbox"/> don't order toilet paper from wish. #wish #online #sales #toiletpaper #tp #coronavirus #small #...	positive
<input type="checkbox"/> the 3rd wave of consumer sentiment tracker in b n april 3 amp 6 2020 show that 15 of the population...	negative
<input type="checkbox"/> jeff bezos pledges \$100 million to feeding america for covid-19 relief: the commitment from the http...	extremely positive
<input type="checkbox"/> we're shifting our focus during this unprecedented time and doing our part to help people stay safe...	extremely positive
<input type="checkbox"/> #coronavirus: #jashore farmers take the hit for falling vege... https://t.co/vfgptuwk	negative
<input type="checkbox"/> as more retailers close physical stores or curtail hours as a result of covid-19, it is going to pu...	positive
<input type="checkbox"/> house members race back to washington amid fears the \$2 trillion #coronavirus bill could be delayed...	negative
<input type="checkbox"/> an employee at the amazon warehouse in balzac has tested positive for covid-19. we spoke to an infec...	extremely positive

[ADD NEW LABEL](#)

Search or enter website name

test5
gs://workdatabucket/sampletest/vid20.mp4,0.inf

console.cloud.google.com/natural-language/locations/us-central1/datasets/TCN7010565853292789760/examples?project=assign...

Google Cloud Platform Assignment258data

Search products and resources

Natural Language

coronatweetclassifier

VIEW LABEL STATS EXPORT DATA

IMPORT ITEMS TRAIN EVALUATE TEST & USE Single-label Classification

Dashboard Datasets Models

All items 41,147 Labeled 41,144 Unlabeled 3

Training 32,916 Validation 4,114 Testing 4,114

Filter Unlabeled Filter table

Items neutral @privycouncilca #socialdistancing isn't enough. i implore you to go visit any grocery store or pharm...

@tandhesi @foreignoffice @afzal4gorton @expressseries @sloughobserver @cmagovuk @sloughcouncil @slou...

extremely negative 5,481 extremely positive 6,623 negative 9,911 neutral 7,709 positive 11,420

ADD NEW LABEL

tweetsenti.csv

Screen Shot 1-02...7.42 AM

Screen Shot 1-02...5.09 AM

Screen Shot 1-02...1.32 PM

Screen Shot 1-02...5.38 PM

Screen Shot 1-02...6.09 PM

Screen Shot 1-02...57.10 PM

Screen Shot 1-02...5.04 PM

Search or enter website name

test5
gs://workdatabucket/sampletest/vid20.mp4,0.inf

console.cloud.google.com/natural-language/locations/us-central1/datasets/TCN7010565853292789760/examples?project=assign...

Google Cloud Platform Assignment258data

Search products and resources

Natural Language

coronatweetclassifier

VIEW LABEL STATS EXPORT DATA

IMPORT ITEMS TRAIN EVALUATE TEST & USE Single-label Classification

Dashboard Datasets Models

All items 41,144 Labeled 41,144 Unlabeled 0

Training 32,916 Validation 4,114 Testing 4,114

extremely negative 5,481 extremely positive 6,623 negative 9,911 neutral 7,709 positive 11,420

ADD NEW LABEL

3 examples is being deleted in the backend.

tweetsenti.csv

Screen Shot 1-02...7.42 AM

Screen Shot 1-02...5.09 AM

Screen Shot 1-02...1.32 PM

Screen Shot 1-02...5.38 PM

Screen Shot 1-02...6.09 PM

Screen Shot 1-02...57.10 PM

Screen Shot 1-02...5.04 PM

Search or enter website name

test5
gs://workdatabucket/sampletest/vid20.mp4,0.inf

console.cloud.google.com/natural-language/locations/us-central1/datasets/TCN7010565853292789760/train?project=assignment...

Google Cloud Platform Assignment258data Search products and resources

Natural Language

coronatweetclassifier

VIEW LABEL STATS EXPORT DATA

IMPORT ITEMS TRAIN EVALUATE TEST & USE Single-label Classification

Unlabeled text or documents aren't used. Your dataset will be automatically split into Train, Validation, and Test sets.

Ideally, each label should have at least 100 items assigned to it. Ensure your model is trained to predict equally well for each label.
[Learn more](#)

Labels ↑	Annotations	Train	Validation	Test
extremely negative	5481	4385	548	548
extremely positive	6623	5299	662	662
negative	9911	7929	991	991
neutral	7709	6167	771	771
positive	11420	9136	1142	1142

START TRAINING

tweetsenti.csv



Screen Shot 1-02...7.42 AM
Screen Shot 1-02...5.09 AM
Screen Shot 1-02...1.32 PM
Screen Shot 1-02...5.38 PM
Screen Shot 1-02...6.09 PM
Screen Shot 1-02...57.10 PM
Screen Shot 1-02...5.04 PM

Search or enter website name

test5

gs://workdatabucket/sampletest/vid20.mp4,0.inf

console.cloud.google.com/natural-language/locations/us-central1/datasets/TCN7010565853292789760/train?project=assignment...

Google Cloud Platform Assignment258data Search products and resources

Natural Language coronatweetclassifier VIEW LABEL STATS EXPORT DATA

Dashboard ITEMS TRAIN EVALUATE TEST & USE Single-label Classification

START TRAINING

coronatweetclassifier

Training may take several hours. You will be emailed once training completes.

Running: Training model

CANCEL

tweetsenti.csv

This screenshot shows the Google Cloud Platform Natural Language interface. On the left, there's a sidebar with 'Natural Language' selected. The main area shows a project named 'Assignment258data'. A modal window is open for a dataset named 'coronatweetclassifier', which is currently in the 'TRAIN' tab. The modal displays a message: 'Training may take several hours. You will be emailed once training completes.' Below this, it says 'Running: Training model' with a progress bar. There's also a 'CANCEL' button. At the bottom of the main page, there's a file named 'tweetsenti.csv'. The top of the screen shows a browser toolbar with various icons and a search bar. The status bar at the bottom has icons for battery, signal, and network, along with the date and time.

console.cloud.google.com/natural-language/locations/us-central1/datasets/TCN601943583544573952/examples?project=assignm... ☆ ↗ 2 J ⋮

Google Cloud Platform

Assignment258data

Search products and resources



Natural Language

← coronadataset

VIEW LABEL STATS

EXPORT DATA

Dashboard

IMPORT

ITEMS

TRAIN

EVALUATE

TEST & USE

Single-label Classification

Datasets

All items

4,999

Warning: Importing data

DETAILS

DISMISS

Models

Labeled

4,999

Unlabeled

0

Training

3,999

Validation

501

Testing

499

extremely negative

656

extremely positive

808

negative

1,223

neutral

948

positive

1,364

ADD NEW LABEL

tweetsenti (1).csv

tweetsenti (4).csv

tweetsenti (3).csv

archive.zip

Show All



console.cloud.google.com/natural-language/locations/us-central1/datasets/TCN601943583544573952;modelId=TCN3532486768462921728/train?project=assignment...

Google Cloud Platform

Natural Language

coronadataset

VIEW LABEL STATS EXPORT DATA

IMPORT ITEMS TRAIN EVALUATE TEST & USE Single-label Classification

START TRAINING

Cloud

coronadataset_20210221095304

Average precision 0.698

Precision 64.31% Recall 63.93%

Precision and recall are based on a score threshold of 0.5.

Model ID TCN3532486768462921728

Created Feb 21, 2021, 9:53:09 PM

→ See full evaluation

https://console.cloud.google.com/natural-language/locations/us-central1/dataset...

Model training evaluation

console.cloud.google.com/natural-language/locations/us-central1/datasets/TCN601943583544573952;modelId=TCN3532486768462921728/evaluate?project=assign...

Google Cloud Platform Assignment258data Search products and resources

Natural Language coronadataset VIEW LABEL STATS EXPORT DATA

IMPORT ITEMS TRAIN EVALUATE TEST & USE Single-label Classification

Model coronadataset_20210221095304 Confidence threshold 0.5

All labels 0.69793

Label	Precision	Recall
extremely negative	0.65914	0.65914
extremely positive	0.75163	0.75163
negative	0.62976	0.62976
neutral	0.84585	0.84585
positive	0.64447	0.64447

All labels

Test items 499

Precision 64.31% Recall 63.93%

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.](#)

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). If you have more than 10 labels, this table only includes the 10 labels with the most incorrect predictions.

predicted label | extremely negative | extremely positive | negative | neutral | positive

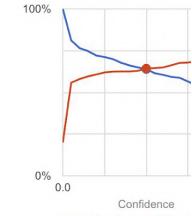
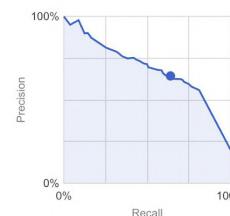
extremely negative | 0.65914 | 0.00000 | 0.00000 | 0.00000 | 0.00000

extremely positive | 0.00000 | 0.75163 | 0.00000 | 0.00000 | 0.00000

negative | 0.00000 | 0.00000 | 0.62976 | 0.00000 | 0.00000

neutral | 0.00000 | 0.00000 | 0.00000 | 0.84585 | 0.00000

positive | 0.00000 | 0.00000 | 0.00000 | 0.00000 | 0.64447



Confusion matrix

Google Cloud Platform Assignment258data Search products and resources

Natural Language coronadataset VIEW LABEL STATS EXPORT DATA

Dashboard Datasets Models

IMPORT ITEMS TRAIN EVALUATE TEST & USE Single-label Classification

Model coronadataset_20210221095304 Confidence threshold 0.5

Filter labels model on the precision-recall tradeoff curve. Learn more about these metrics and graphs.

All labels 0.69793

extremely negative 0.65914

extremely positive 0.75163

negative 0.62976

neutral 0.84585

positive 0.64447

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). If you have more than 10 labels, this table only includes the 10 labels with the most incorrect predictions.

True label	Predicted label	extremely negative	extremely positive	negative	neutral	positive
extremely negative	40%	-	54%	-	6%	
extremely positive	-	54%	-	2%	43%	
negative	10%	2%	64%	5%	20%	
neutral	1%	1%	9%	78%	11%	
positive	1%	7%	15%	6%	71%	

Recall 0% 0% 100% 0.0 Confidence Recall Prec

The screenshot shows the Google Cloud Platform Natural Language API interface for evaluating a dataset named 'coronadataset'. The 'EVALUATE' tab is selected. A table lists various labels and their associated scores. Below this, a confusion matrix is displayed as a grid where rows represent 'True label' and columns represent 'Predicted label'. The matrix shows the percentage of correct classifications (blue) and misclassifications (gray) for each label pair. A precision-recall tradeoff curve graph is also visible on the right.

Input data given and the prediction model results

The screenshot shows the Google Cloud Platform Natural Language API interface. On the left, there's a sidebar with 'Natural Language' selected, showing options like Dashboard, Datasets, and Models. The main area has a blue header bar with tabs for IMPORT, ITEMS, TRAIN, EVALUATE, and TEST & USE (which is currently active). Below the header, there's a text input field containing the sentence: "covid vaccines are delayed.This is not as promised !". A note below the input says "59948 characters remaining". A large blue "PREDICT" button is at the bottom of this section. Below this, under "Prediction results", is a table:

Predicted labels
negative 0.9968058 1.00
positive 0.001747738300
extremely n... 0.001168102800
neutral 0.000273348700
extremely p... 0.000005148190

Prediction results

covid vaccines are delayed.This is not as promised !
--

One more example

The screenshot shows the Google Cloud Platform Natural Language API interface. On the left, there's a sidebar with 'Natural Language' selected, showing options for 'Dashboard', 'Datasets', and 'Models'. The main area has a blue header bar with the title 'coronadataset' and buttons for 'VIEW LABEL STATS' and 'EXPORT DATA'. Below the header, there are tabs for 'IMPORT', 'ITEMS', 'TRAIN', 'EVALUATE', and 'TEST & USE', with 'TEST & USE' being the active tab. A status message 'Single-label Classification' is displayed. A text input field contains the sentence 'covid vaccine is magical.This is working great !'. Below the input field, it says '59952 characters remaining'. A large blue 'PREDICT' button is centered below the input field. Under the 'Prediction results' section, a table shows predicted labels and their scores:

Predicted labels	
extremely p...	0.9791784 0.98
positive	0.02048513 0.02
neutral	0.00018444 0.00
negative	0.00013504 0.00
extremely n...	0.000016948 0.00

The text 'covid vaccine is magical.This is working great !' is also displayed under the prediction results.



Natural Language	Models																															
Dashboard	<div>Location Global ?</div>																															
Datasets																																
Models	<table><thead><tr><th>Name</th><th>ID ?</th><th>Location</th><th>Objective</th><th>Dataset</th><th>Training items</th><th>AuPrc</th><th>Precision</th><th>Recall</th><th>Last updated</th><th>⋮</th></tr></thead><tbody><tr><td>coronadataset_20210221095304</td><td>TCN3532486768462921728</td><td>Global</td><td>Single-label Classification</td><td>coronadataset</td><td>3,999</td><td>0.7</td><td>64.31%</td><td>63.93%</td><td>Feb 22, 2021 2:07 AM</td><td>⋮</td></tr></tbody></table>										Name	ID ?	Location	Objective	Dataset	Training items	AuPrc	Precision	Recall	Last updated	⋮	coronadataset_20210221095304	TCN3532486768462921728	Global	Single-label Classification	coronadataset	3,999	0.7	64.31%	63.93%	Feb 22, 2021 2:07 AM	⋮
Name	ID ?	Location	Objective	Dataset	Training items	AuPrc	Precision	Recall	Last updated	⋮																						
coronadataset_20210221095304	TCN3532486768462921728	Global	Single-label Classification	coronadataset	3,999	0.7	64.31%	63.93%	Feb 22, 2021 2:07 AM	⋮																						

Part 1 c) Video Classification

This video classification used pexels.com to capture freely available video clips of people working in office environment and at home. Based on the surrounding , posture this model predicts if the input video the person is working from home or from office

Input for listing the training files and test files for the model to train

The screenshot shows the Google Cloud Platform Video Intelligence interface. The main navigation bar includes Chrome, File, Edit, View, History, Bookmarks, People, Tab, Window, Help, and a search bar. Below the bar, there are tabs for Google Video Intelligence, Quickstart: Using the console, Storage browser – Storage, and dataonefile – Video Intelligence.

The left sidebar has sections for Video Intelligence, Dashboard, Datasets, and Models. The 'TEST & USE' tab is currently selected. In the center, there's a 'Model' dropdown set to 'dataonefile_20210221121547'. Below it, the 'Test your model' section provides instructions for creating a batch prediction request with a CSV file. It also mentions pricing and a link to the pricing guide.

At the bottom, there are fields for 'Input CSV' (set to 'gs://*') and 'Results Bucket' (set to 'gs://*'). A note at the bottom states: 'Where your prediction results are sent'.

A vertical sidebar on the right displays a series of screen shots labeled 'Screen Shot 1-02... 7.42 AM', 'Screen Shot 1-02... 5.09 AM', 'Screen Shot 1-02... 1.32 PM', 'Screen Shot 1-02... 5.38 PM', and 'Screen Shot 1-02... 6.09 PM', with the last one being 'Screen Shot 1-02... 57.10 PM'.

Input had the train or test type , the file path in storage bucket and the label for training

The screenshot shows a Google Cloud Platform (GCP) interface for the Video Intelligence API. The user is in the 'TEST & USE' section of the 'dataonefile' dataset. They have specified an 'Input CSV' path as 'gs://workdatabucket/sampletest/test5.csv'. The 'Results Bucket' is set to 'gs://workresultsbucket'. A 'GET PREDICTIONS' button is visible. Below this, a 'Recent Predictions' table is shown, containing one entry: 'Input' file 'gs://.../test6.csv' and 'Results directory' 'prediction-dataonefile_20210221121547-2021-02-22T00:07:32.209893Z'. The timestamp 'Created' is 'Feb 21, 2021, 4:07:32 PM' and there is a 'VIEW' link. The interface is running in a Chrome browser on a Mac OS X desktop, with several other browser tabs and a sidebar of recent screen shots visible.

Storage bucket

The screenshot shows a Mac OS X desktop environment with a Chrome browser window open to the Google Cloud Platform Storage Bucket details page. The browser has several tabs open, including 'Working With Google Video', 'Datasets - Video Intelligence', 'Inbox (34,237) - jagruti.itter@gmail.com', and the current tab, 'workfromhome...atatabucket - Buck'. The main content area displays the 'Bucket details' for 'workdatabucket'. The left sidebar shows 'Storage' with 'Browser' selected, and 'Monitoring' and 'Settings' options. The main pane shows the 'OBJECTS' tab selected, displaying a list of objects: 'check', 'test.c', 'train.c', 'vid1.r', and 'vid2.r'. Each object entry includes columns for Name, Size, Type, Created time, Storage class, Last modified, Public access, and Encryption. A 'Filter by name prefix only' dropdown and a 'Filter' search bar are at the top of the list. Below the list are 'UPLOAD FILES', 'UPLOAD FOLDER', 'CREATE FOLDER', 'MANAGE HOLDS', 'DOWNLOAD', and 'DELETE' buttons. The status bar at the bottom shows various application icons and the date/time: Sun Feb 21 10:47 AM.

Name	Size	Type	Created time	Storage class	Last modified	Public access	Encryption
check	96 B	text/csv	Feb 21, 2021, 1...	Standard	Feb 21, 20...	Not public	Google-managed
test.c	52 B	text/csv	Feb 21, 2021, 1...	Standard	Feb 21, 20...	Not public	Google-managed
train.c	52 B	text/csv	Feb 21, 2021, 1...	Standard	Feb 21, 20...	Not public	Google-managed
vid1.r	3.1 MB	video/mp4	Feb 21, 2021, 9...	Standard	Feb 21, 20...	Not public	Google-managed
vid2.r	2.2 MB	video/mp4	Feb 21, 2021, 1...	Standard	Feb 21, 20...	Not public	Google-managed

These are the video files uploaded

The screenshot shows a Mac desktop environment with a Google Cloud Platform (GCP) Video Intelligence interface open in a browser window. The interface includes a sidebar with 'Video Intelligence', 'Dashboard', 'Datasets' (selected), and 'Models'. The main area has tabs for 'IMPORT' (selected), 'VIDEOS', 'TRAIN', and 'EVALUATE'. A message states 'Import completed with partial errors.' Below it, 'Import videos' instructions mention AutoML Video Intelligence uses videos to train a custom model. It lists requirements: upload labels in CSV or unlabeled videos, at least 100 segments per label, and processed videos stored in Cloud Storage. A 'Select a CSV file on Cloud Storage' section shows example CSV paths: 'TRAIN, gs://domestic-animals-vcm/horses/videos/train' and 'TEST, gs://domestic-animals-vcm/horses/videos/test'. A file selection dialog box is overlaid on the screen, titled 'Select object'. It shows a list of files from a 'workfromhome' bucket: 'check.csv', 'test.csv', 'train.csv', 'vid1.mp4', 'vid10.mp4', 'vid11.mp4', 'vid12.mp4', 'vid13.mp4', 'vid2.mp4', 'vid3.mp4', 'vid4.mp4', and 'vid5.mp4'. The 'check.csv' file is highlighted. At the bottom of the dialog are 'SELECT' and 'CANCEL' buttons. The desktop background shows a vertical stack of screen shots labeled 'Screen Shot 2021-02...'. The system tray at the bottom includes icons for Mail (88,261), Calendar, Maps, Photos, Videos, Reminders, Calendar (FEB 21), Wallet, Stocks, News, iTunes Store, App Store (5), Home, Health, and Safari.

Google Cloud Platform

Video Intelligence

IMPORT

VIDEOS

TRAIN

EVALUATE

Import completed with partial errors.

Import videos

AutoML Video Intelligence uses your videos to train a custom model. [Learn more about preparing your data.](#)

- Upload labels in your CSV, or upload un-labeled videos, and
- At least 100 video segments per label is recommended.
- Processed videos will be stored on Cloud Storage. Standard

Select a CSV file on Cloud Storage

The CSV file should contain paths to your train, test, and/or unlabeled video files. Paths must be relative to the Cloud Storage bucket. Allowed file types: .MOV, .MP4, .MPEG4, .MP4, or .AVI. [Learn more.](#)

Example CSV:

```
TRAIN, gs://domestic-animals-vcm/horses/videos/train  
TEST, gs://domestic-animals-vcm/horses/videos/test
```

gs://*

CONTINUE

Select object

workfromhome

check.csv

test.csv

train.csv

vid1.mp4

vid10.mp4

vid11.mp4

vid12.mp4

vid13.mp4

vid2.mp4

vid3.mp4

vid4.mp4

vid5.mp4

SELECT CANCEL

Screen Shot 2021-02... 0.07 PM

Screen Shot 2021-02... 7.42 AM

Screen Shot 2021-02... 1.32 PM

Screen Shot 2021-02... 5.38 PM

Screen Shot 2021-02... 6.09 PM

Screen Shot 2021-02... 57.10 PM

Screen Shot 2021-02... 5.04 PM

Data uploaded -

Chrome File Edit View History Bookmarks People Tab Window Help Sun Feb 21 11:05 AM

(8) Working With Google Video... dataonefile – Video Intelligence... Inbox (34,237) – jagruti.liter@gmail.com | workfromhomeatabucket – Buck... +

console.cloud.google.com/video-intelligence/datasets/VCN1950067984500260864/videos?importFinished=true&project=assignment2...

Google Cloud Platform Assignment258data Search products and resources

Video Intelligence dataonefile BETA LABEL STATS EXPORT DATA

IMPORT VIDEOS TRAIN EVALUATE TEST & USE

All videos 12 Filter items

Labeled 12 Select all

Unlabeled 0

Annotations ▾ home(1)

Annotations ▾ home 12

ADD NEW LABEL

Items per page: 10 1 – 10 of many < >

Screen Shot 2021-02-07 PM 2021-02-7.42 AM

Screen Shot 2021-02-05 AM 2021-02-5.09 AM

Screen Shot 2021-02-13 PM 2021-02-1.32 PM

Screen Shot 2021-02-05 PM 2021-02-5.38 PM

Screen Shot 2021-02-06 PM 2021-02-6.09 PM

Screen Shot 2021-02-05 PM 2021-02-5.70 PM

Screen Shot 2021-02-05 PM 2021-02-5.04 PM

The screenshot shows the Google Cloud Platform Video Intelligence interface. On the left, a sidebar lists 'Dashboard', 'Datasets' (selected), and 'Models'. The main area is titled 'dataonefile BETA' and shows a table with video statistics: 'All videos' (12), 'Labeled' (12), and 'Unlabeled' (0). Below this, under 'Annotations', there is a section for 'home' with a count of 12. Two thumbnail images are displayed for 'home(1)' annotations, both showing a person working at a desk. The interface includes tabs for IMPORT, VIDEOS (selected), TRAIN, EVALUATE, TEST & USE, and buttons for LABEL STATS and EXPORT DATA. A search bar at the top right says 'Search products and resources'. The status bar at the bottom indicates 'Items per page: 10 1 – 10 of many < >'. To the right of the main window, a vertical stack of ten screen shots from previous sessions is visible, each labeled 'Screen Shot' with a timestamp.

Chrome File Edit View History Bookmarks People Tab Window Help

To: +

(8) Working With Google Video dataonefile – Video Intelligence Inbox (34,238) - jagruti iter@gmail.com workfromhomeatabucket – Buck

console.cloud.google.com/video-intelligence/datasets/VCN1950067984500260864/videos?importFinished=true&project=assignment2...

Google Cloud Platform Assignment258data Search products and resources

Video Intelligence ← dataonefile BETA LABEL STATS EXPORT DATA

Dashboard IMPORT VIDEOS TRAIN EVALUATE TEST & USE

Datasets All videos 23 Filter items

Models Labeled 23

Unlabeled 0

Filter labels

Annotations ▾ office(1)

Annotations ▾ home 12

Annotations ▾ office 11

ADD NEW LABEL

Screen Shot 2021-02...7.42 AM

Screen Shot 2021-02...5.09 AM

Screen Shot 2021-02...1.32 PM

Screen Shot 2021-02...5.38 PM

Screen Shot 2021-02...6.09 PM

Screen Shot 2021-02...57.10 PM

Added more data for training

Chrome File Edit View History Bookmarks People Tab Window Help Sun Feb 21 11:08 AM

To:

(8) Working With Google Video dataonefile – Video Intelligence Inbox (34,238) - jagruti.ite... workfromho...atabucket – Buck

console.cloud.google.com/video-intelligence/datasets/VCN1950067984500260864/train?project=assignment258data

Google Cloud Platform Assignment258data Search products and resources

Video Intelligence ← dataonefile BETA LABEL STATS EXPORT DATA

Dashboard Datasets Models

IMPORT VIDEOS TRAIN EVALUATE TEST & USE

Add more video segments boxes before training

Each label should have at least 10 video segments. Each label requires a minimum number of video segments: 10 for train, and 1 for test. [Learn more](#)

Some of your labels (e.g., "home") do not have enough video segments assigned to your Train sets. Import another CSV file and assign those videos to those sets.

Labels	Video segments	Train	Test
home	<div style="width: 12px;"></div>	12	9
office	<div style="width: 11px;"></div>	11	9
			2

Your videos are split into [training and test sets](#), so you can evaluate your model's performance. Unlabeled items will not be used.

START TRAINING

https://console.cloud.google.com/video-intelligence/datasets/VCN1950067984500260864/train?project=assignment258data

Screen Shot 2021-02...7.42 AM

Screen Shot 2021-02...5.09 AM

Screen Shot 2021-02...1.32 PM

Screen Shot 2021-02...5.38 PM

Screen Shot 2021-02...6.09 PM

Screen Shot 2021-02...5.70 PM

Screen Shot 2021-02...5.04 PM

Video Intelligence

dataonefile BETA

LABEL STATS **EXPORT DATA**

IMPORT **VIDEOS** **TRAIN** **EVALUATE** **TEST & USE**

Model
dataonefile_20210221121547

Model created
Feb 21, 2021
12:15 PM

Analyzed
7 videos
7 annotations

Avg precision 0.898

Precision 75.0%

Recall 85.7%

All labels

Score threshold 0.49

Displaying nearest threshold: 0.49

Total Videos 33
Total Annotations 33
Train Videos 26
Train Annotations 26
Precision 75.0%
Recall 85.7%

All test videos are evaluated at the time of training. If you modify this dataset after training, those modifications will not be reflected here.
[Learn more about these metrics and graphs](#)

Precision

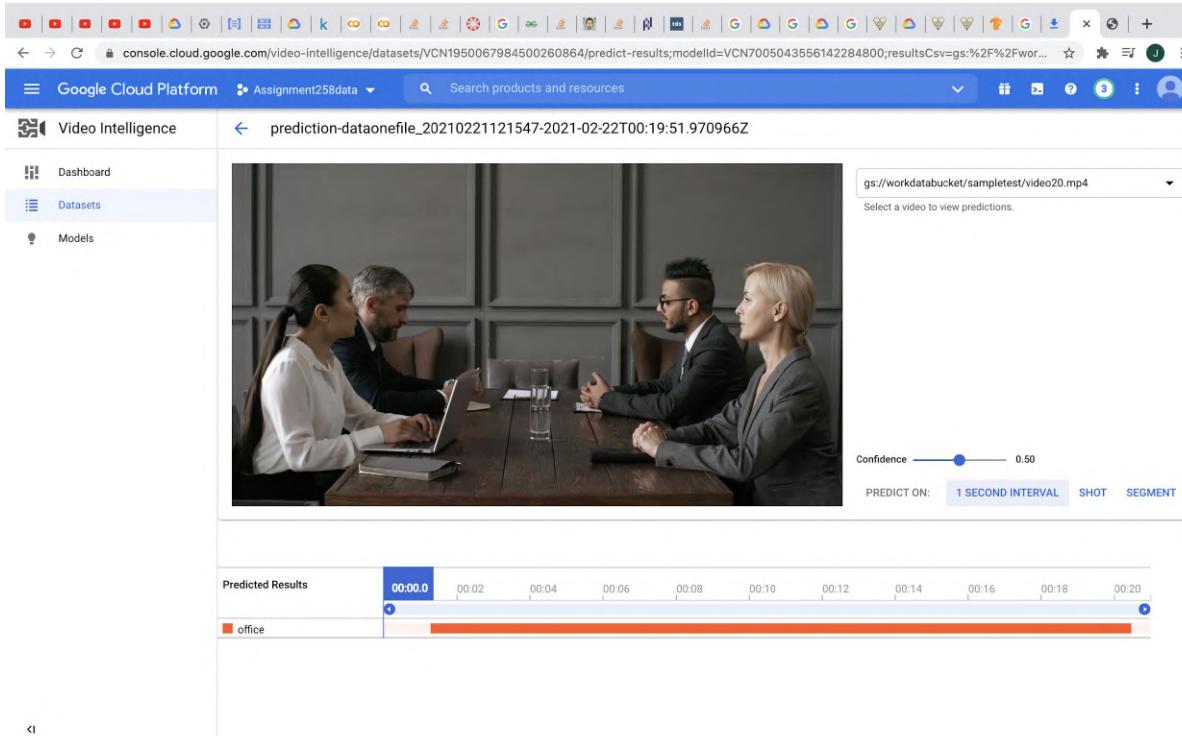
Recall



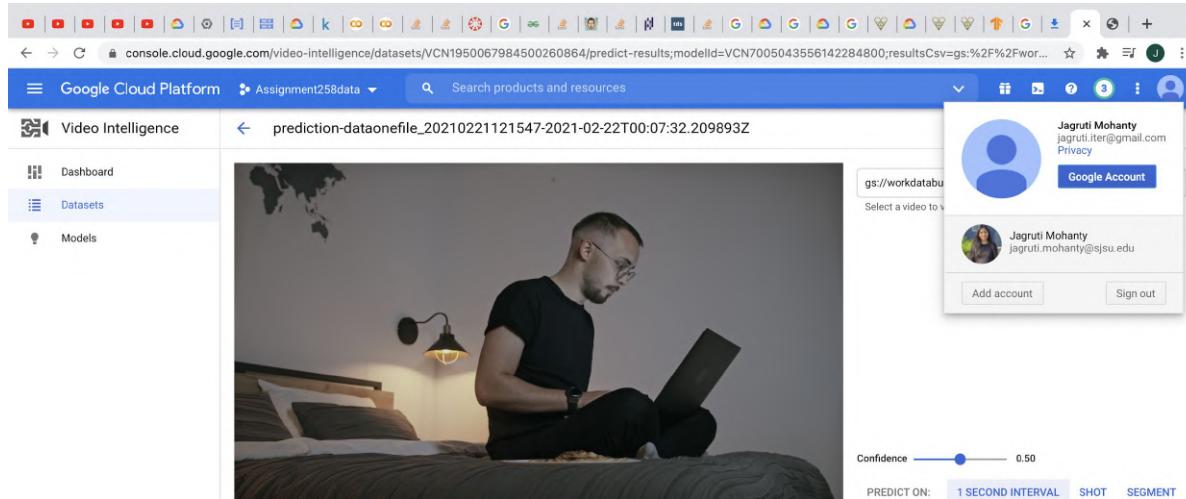
R

pxels-tima-mir....mp4 pexels-pavel-d....mp4 pexels-pavel-d....mp4 pexels-pavel-d....mp4 video (1).mp4 Show All X

This is to show the prediction results the model accurately predicts office environment



Model is able to accurately predict based on surrounding that person is working from home. My name is shown confirm assignment was done by my account



Predicted Results

00:00.0

00:02

00:04

00:06

00:08

00:10

00:12

00:14

00:16

00:18

00:20

home

Part 1 d) Structured Data
ran a regression model for
predicting mobile phone
price

Dataset was from kaggle , applied preprocessing and uploaded it into bucket for running regression task to provide input details for a mobile and based on configurations and other details predict what should be the price.

Data and features in the training set

Google Cloud Platform Assignment258version Search products and resources

Tables mobilepriceprediction [BETA]

IMPORT TRAIN MODELS EVALUATE TEST & USE

Summary
Total columns: 22
Total rows: 2,000

Numeric 14 (63.64%)
Categorical 8 (36.36%)

Target column
Select a column to be the target (what you want your model to predict) and add optional parameters like weight and time columns

price_range

The selected column is categorical data. AutoML Tables will build a classification model, which will predict the target from the classes in the selected column. [Learn more](#)

Additional parameters:
Data split: Manual

[EDIT ADDITIONAL PARAMETERS](#)

[TRAIN MODEL](#)

Filter Filter

Column name	Data type	Nullability	Missing% (Count)	Invalid values	Distinct values	Correlation with Target
battery_power	Numeric	Nullable	0% (0)	0% (0)	1,094	0.4
blue	Categorical	Nullable	0% (0)	0% (0)	2	0.1
clock_speed	Numeric	Nullable	0% (0)	0% (0)	26	0.4
dual_sim	Categorical	Nullable	0% (0)	0% (0)	2	0.1
fc	Numeric	Nullable	0% (0)	0% (0)	20	0.4
four_g	Categorical	Nullable	0% (0)	0% (0)	2	0.1
int_memory	Numeric	Nullable	0% (0)	0% (0)	63	0.4
m_dep	Numeric	Nullable	0% (0)	0% (0)	10	0.4
mobile_wt	Numeric	Nullable	0% (0)	0% (0)	121	0.4
n_cores	Numeric	Nullable	0% (0)	0% (0)	8	0.4
pc	Numeric	Nullable	0% (0)	0% (0)	21	0.4

This is to show the prediction accuracy of the model :

S | G | G | G | G | G | k | k | +

← → C console.cloud.google.com/automl-tables/locations/us-central1/datasets/TBL3136836855056564224;task=basic/train?folder=&organizationId=&project=assignment258vers... ☆ 🔍 J :

Google Cloud Platform Assignment258version Search products and resources

Tables Datasets Models

mobilepriceprediction BETA

IMPORT TRAIN MODELS EVALUATE TEST & USE

Models

Multi-class classification model
mobilepricepredic_20210223041613

AUC PR ? 0.998

AUC ROC ? 0.998
Precision ? 98.5%
Recall ? 98.5%
Log loss ? 0.042

Micro-averaged Precision and Recall are based on a score threshold of 0.5

Model ID	TBL7592763307514134528
Created on	Feb 23, 2021, 4:16:59 PM
Target	price_range
Feature columns	20 included
Test rows	200
Optimization objective	Log loss
Training cost	0.985 node hours
Model hyperparameters	Model Trials
Status	Not deployed



<https://console.cloud.google.com/automl-tables/locations/us-central1/datasets/TBL3136836855056564224;task=basic/train?project=assignment258version>

Tables ← mobilepriceprediction BETA

Datasets

Models

IMPORT TRAIN MODELS EVALUATE TEST & USE

CSVs from Cloud Storage

Bucket must be in the us-central1 region
[CSV formatting](#)
gs:// * mobilepricebucket/sample.csv BROWSE

Result

BigQuery project

Cloud Storage bucket

Bucket must be in the us-central1 region
gs:// * mobilepricebucket BROWSE

Generate feature importance

SEND BATCH PREDICTION

Recent Predictions ?

Input	Results directory	Created	Processed in	Status
No rows to display				



Tables ← mobilepriceprediction BETA

Datasets

Models

IMPORT TRAIN MODELS EVALUATE TEST & USE

CSVs from Cloud Storage

Bucket must be in the us-central1 region
[CSV formatting](#)
gs:// * mobilepricebucket/sample.csv BROWSE

Result

BigQuery project

Cloud Storage bucket

Bucket must be in the us-central1 region
gs:// * mobilepricebucket BROWSE

Generate feature importance

SEND BATCH PREDICTION

Recent Predictions ?

Input	Results directory	Created	Processed in	Status
No rows to display				





☰ Google Cloud Platform ⚙ Assignment258version ⌂ Search products and resources ⌂

Storage Bucket details ⌂ REFRESH LEARN

Browser mobilepricebucket

OBJECTS CONFIGURATION PERMISSIONS RETENTION LIFECYCLE

Buckets > mobilepricebucket ⌂

UPLOAD FILES UPLOAD FOLDER CREATE FOLDER MANAGE HOLDS DOWNLOAD DELETE

Filter by name prefix only ▾ Filter objects and folders

<input type="checkbox"/>	Name	Size	Type	Created time	Storage class	Last modified	Public access	Encryption	Retention
<input type="checkbox"/>	mobileprice-2021-02-24T00:08:3	140.3 KB	text/csv	Feb 23, 2021, 4...	Standard	Feb 23, 20...	Not public	Google-managed key	—
<input type="checkbox"/>	mobileprice-2021-02-24T00:11:3	131.6 KB	text/csv	Feb 23, 2021, 4...	Standard	Feb 23, 20...	Not public	Google-managed key	—
<input type="checkbox"/>	mobileprice.csv	140.3 KB	text/csv	Feb 23, 2021, 4...	Standard	Feb 23, 20...	Not public	Google-managed key	—
<input type="checkbox"/>	prediction-mobilepricepredic_202	—	Folder	—	—	—	—	—	—
<input type="checkbox"/>	sample.csv	383 B	text/csv	Feb 24, 2021, 1...	Standard	Feb 24, 20...	Not public	Google-managed key	—

prediction-mobil....csv ⌂ prediction-mobil....csv ⌂ Show All X

Tables ← mobilepriceprediction BETA

Datasets IMPORT TRAIN MODELS EVALUATE TEST & USE

Models BATCH PREDICTION ONLINE PREDICTION EXPORT YOUR MODEL

Model
mobilepricepredic_20210223041613 ▾

ⓘ To use online prediction, deploy your model to the cloud. Deployment takes 10-15 minutes. Once your model is deployed, charges are per hour and depend on model size and number of machines used. (Your model is 430.219 MB) [Learn more](#)

DEPLOY MODEL

Online prediction JSON CODE VIEW

Online prediction deploys your model so you can send real-time REST requests to it. Online prediction is useful for time-sensitive predictions (for example, in response to an application request). [Learn more](#)

Online prediction pricing is based on the size of your model and the length of time your model is deployed. [View pricing guide](#). Your model's endpoints are available as a JSON object. You can execute a query using the command line interface (CLI). Switch to JSON CODE VIEW to get a JSON request. [Learn more](#)

Predict label

price_range

Prediction result

Feature column name

Column ID

Data type

Status ↓

Value

Local feature importance ?

battery_power

8850211534282948608

Numeric

Required

1960

blue

8273750781979525120

Categorical

Required

1

console.cloud.google.com/automl-tables/locations/us-central1/datasets/TBL3136836855056564224;modelId=TBL7592763307514134528;tab=

Google Cloud Platform Assignment258version Search products and resources

MAIL now

AutoML Tables

AutoML Tables finished batch prediction using model "mobilepriceprediction". Hello AutoML Tables Customer, AutoML Tables finished batch prediction using model "mobileprice...

Tables ← mobilepriceprediction **BETA**

IMPORT TRAIN MODELS EVALUATE **TEST & USE**

CSVs from Cloud Storage
Bucket must be in the us-central1 region
[CSV formatting](#)

gs:/// **BROWSE**

Result
 BigQuery project
 BigQuery Project Id *

Cloud Storage bucket
Bucket must be in the us-central1 region
 gs:/// **BROWSE**

Generate feature importance

SEND BATCH PREDICTION

Recent Predictions [?](#)

	Input	Results directory	Created	Processed in	Status
	gs://.../sample.csv	prediction-mobilepricepredic_20210223041613-2021-02-24T19:29:27.483302Z	Feb 24, 2021, 11:29:27 AM	4 min 44 sec	

Tables ← mobilepriceprediction BETA

Datasets IMPORT TRAIN MODELS EVALUATE TEST & USE

Models Model mobilepricepredic_20210223041613

Multi-class classification model
Feb 23, 2021, 4:16:59 PM
Training cost: 0.985 node hours

Target	Feature columns	Optimized for	AUC PR	AUC ROC	Precision	Recall	Log loss
price_range	20 included 200 test rows	Log loss	0.998	0.998	98.5%	98.5%	0.042

Micro-averaged precision and recall are generated using a score threshold of 0.5

→ EXPORT PREDICTIONS ON TEST DATASET TO BIGQUERY You have up to 30 days to export your test dataset to BigQuery

Filter	Filter labels	⋮
All		All
1		Score threshold 0.50
2		F1 score 0.985
3		Precision 98.5% (197/200)
0		True positive rate (Recall) 98.5% (197/200)
		False positive rate 0.005 (3/600)

The score threshold determines the minimum level of confidence needed to make a prediction positive. [Learn more about model evaluation](#)

Precision-Recall curve showing high performance with AUC of 0.998.

Precision: 0% to 100%
Recall: 0% to 100%

AUC: 0.998 PRC ?

Part 2) Time series



Launcher

Name /

src

tutorials

Notebook

 Python 3

 Python [conda env:root] *

Console

 Python 3

 Python [conda env:root] *

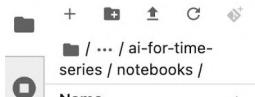
Other

 Terminal

 Text File

 Markdown File

 Show Contextual Help



Untitled.ipynb X Terminal 1 X

```
(base) jupyter@tensorflow-2-4-20210224-080518:~$ git clone https://github.com/GoogleCloudPlatform/training-data-analyst
Cloning into 'training-data-analyst'...
remote: Enumerating objects: 60, done.
remote: Counting objects: 100% (60/60), done.
remote: Compressing objects: 100% (49/49), done.
remote: Total 45362 (delta 21), reused 41 (delta 11), pack-reused 45302
Receiving objects: 100% (45362/45362), 479.04 MiB | 31.75 MiB/s, done.
Resolving deltas: 100% (28507/28507), done.
Checking out files: 100% (9178/9178), done.
(base) jupyter@tensorflow-2-4-20210224-080518:~$
```



+ Untitled.ipynb

/ ... / notebooks / data /

Name

- cta_ridership.csv

```
[ ]: # Copyright 2020 Google LLC
#
# Licensed under the Apache License, Version 2.0 (the "License");
# you may not use this file except in compliance with the License.
# You may obtain a copy of the License at
#
#     https://www.apache.org/licenses/LICENSE-2.0
#
# Unless required by applicable law or agreed to in writing, software
# distributed under the License is distributed on an "AS IS" BASIS,
# WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
# See the License for the specific language governing permissions and
# limitations under the License.
```

Overview

In this notebook, you will learn how to load, explore, visualize, and pre-process a time-series dataset. The output of this notebook is a processed dataset that will be used in following notebooks to build a machine learning model.

Dataset

[CTA - Ridership - Daily Boarding Totals](#): This dataset shows systemwide boardings for both bus and rail services provided by Chicago Transit Authority, dating back to 2001.

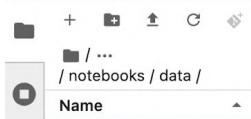
Objective

The goal is to forecast future transit ridership in the City of Chicago, based on previous ridership.

Install packages and dependencies

Restarting the kernel may be required to use new packages.

```
[ ]: %pip install -U statsmodels scikit-learn --user
```



Untitled.ipynb Terminal 1 01-explore.ipynb cta_ridership.csv

Delimiter: ,

	service_date	total_rides
1	2001-01-01	423647
2	2001-01-02	1282779
3	2001-01-03	1361355
4	2001-01-04	1420032
5	2001-01-05	1448343
6	2001-01-06	832757
7	2001-01-07	545656
8	2001-01-08	1575927
9	2001-01-09	1578282
10	2001-01-10	1586936
11	2001-01-11	1603064
12	2001-01-12	1624237
13	2001-01-13	861847
14	2001-01-14	547933
15	2001-01-15	1087994
16	2001-01-16	1646530
17	2001-01-17	1639033
18	2001-01-18	1625828
19	2001-01-19	1493815
20	2001-01-20	846163
21	2001-01-21	550488
22	2001-01-22	1604713
23	2001-01-23	1630335
24	2001-01-24	1598496
25	2001-01-25	1614134
26	2001-01-26	1562363
27	2001-01-27	858914
28	2001-01-28	543253



Google Cloud Platform Assignment258version Search products and resources

BigQuery FEATURES & INFO SHORTCUT HIDE PREVIEW FEATURES

SQL workspace Explorer + ADD DATA EDITOR X ASSIGN... X + COMPOSE NEW QUERY

Data transfers assignment258version + CREATE DATASET PIN PROJECT

Scheduled queries

Reservations

BI Engine assignment258version

Type to search ?

Viewing pinned projects.

Resources in this project

Use the Explorer panel to view your data, or create a new dataset using the Create Dataset option above.

assignment258version





Google Cloud Platform Assignment258version Search products and resources

BigQuery FEATURES & INFO SHORTCUT HIDE PREVIEW FEATURES

SQL workspace Explorer + ADD DATA

Data transfers

Scheduled queries

Reservations

BI Engine

assignment258version RIDERDA...

Type to search

Description Labels

None None

Dataset info

Dataset ID	assignment258version:riderdata
Created	Feb 24, 2021, 8:21:46 AM
Default table expiration	10 days 0 hr
Last modified	Feb 24, 2021, 8:21:46 AM
Data location	US

"cta_ridership" created. Go to table

JOB HISTORY QUERY HISTORY SAVED QUERIES

Google Cloud Platform

Assignment258version

Search products and resources

BigQuery

FEATURES & INFO SHORTCUT HIDE PREVIEW FEATURES

SQL workspace

Explorer + ADD DATA

Data transfers

Scheduled queries

Reservations

BI Engine

assignment258version

riderdata

riderdata

riderdata

bqpublicdata

Type to search

RUN SAVE SCHEDULE MORE

Syntax error: Expected end of input but got identifier "assignment258v"

1 SELECT * FROM assignment258version.riderdata.riderdata LIMIT 10

Query results SAVE RESULTS EXPLORE DATA

Query complete (0.4 sec elapsed, 108.4 KB processed)

Job information Results JSON Execution details

Row	service_date	total_rides
1	2018-12-23	590592
2	2006-01-03	1312512
3	2006-09-25	1707520
4	2004-10-26	1643520
5	2002-07-23	1578240
6	2005-12-12	1578496
7	2007-07-31	1583616

JOB HISTORY QUERY HISTORY SAVED QUERIES



☰ Google Cloud Platform • Assignment258version ▾ Search products and resources

BigQuery

FEATURES & INFO SHORTCUT HIDE PREVIEW FEATURES

SQL workspace

Explorer + ADD DATA

Data transfers

Scheduled queries

Reservations

BI Engine

Type to search

Viewing pinned projects.

assignment258version

riderdata

riderdata

bigquery-public-data

RIDERDA... X RIDERDA... X *UNSAVE... 2 X COMPOSE NEW QUERY

RUN SAVE SCHEDULE MORE

This query will process 108.4 KiB (ML) when run.

```
1 CREATE OR REPLACE MODEL
2   `assignment258version.riderdata.cta_ridership_model`
3   OPTIONS(MODEL_TYPE='ARIMA',
4           TIME_SERIES_TIMESTAMP_COL='service_date',
5           TIME_SERIES_DATA_COL='total_rides',
6           HOLIDAY_REGION='us') AS
7   SELECT
8     service_date, total_rides
9   FROM
10   `assignment258version.riderdata.riderdata`
```

JOB HISTORY QUERY HISTORY SAVED QUERIES



BigQuery

FEATURES & INFO SHORTCUT HIDE PREVIEW FEATURES

SQL workspace

Explorer + ADD DATA

RIDERDA... X RIDERDA... X *UNSAVE... 2 X COMPOSE NEW QUERY

RUN SAVE SCHEDULE MORE

This query will process 0 B when run.

```
1 SELECT
2 *
3 FROM
4 ML.EVALUATE(MODEL `assignment258version.riderdata.cta_ridership_model`)
```

Type to search ?

Data transfers

Scheduled queries

Reservations

BI Engine

assignment258version

riderdata

cta_ridership_model

riderdata

bigquery-public-data

Query results SAVE RESULTS EXPLORE DATA

Query complete (0.4 sec elapsed, 0 B processed)

Job information Results JSON Execution details

Row	non_seasonal_p	non_seasonal_d	non_seasonal_q	has_drift	log_likelihood	AIC	variance	seasc
1	1	1	4	true	-84343.91298029698	168701.82596059397	2.1214766324672794E9	WEEK
2	1	1	4	false	-84345.76278035615	168703.5255607123	2.1226282591786644E9	WEEK
3	4	1	1	true	-84346.86918283005	168707.7383656601	2.1232853081307085E9	WEEK

Rows per page: 100 1 - 42 of 42 First page < > Last page

JOB HISTORY QUERY HISTORY SAVED QUERIES

Google Cloud Platform

Assignment258version

Search products and resources

BigQuery FEATURES & INFO SHORTCUT HIDE PREVIEW FEATURES

SQL workspace Explorer + ADD DATA

Data transfers

Scheduled queries

Reservations

BI Engine

assignment258version

- riderdata
- cta_ridership_model
- riderdata

bigquery-public-data

RIDERDA... X RIDERDA... X *UNSAVE... 2 X + COMPOSE NEW QUERY

RUN SAVE SCHEDULE MORE This query will process 23.4 KiB when run.

```
1
2 SELECT *
3
4 FROM
5 ML.PREDICT(MODEL `assignment258version.riderdata.cta_ridership_model`,
6 STRUCT(7 AS horizon))
```

Query results SAVE RESULTS EXPLORE DATA

Query complete (0.3 sec elapsed, 23.4 KB processed)

Job information Results JSON Execution details

Row	forecast_timestamp	forecast_value	standard_error	confidence_level	prediction_interval_lower_bound	prediction_interval
1	2020-01-01 00:00:00 UTC	662436.4424369269	46059.49014554253	0.95	572322.980240453	752549
2	2020-01-02 00:00:00 UTC	1029641.4669424891	46276.328347693256	0.95	939103.76989082	1120179
3	2020-01-03 00:00:00 UTC	1201660.2034356925	47233.43871922012	0.95	1109249.9600529654	1294070
4	2020-01-04 00:00:00 UTC	651095.9776391207	48157.99332862347	0.95	556876.8819095747	745315
5	2020-01-05 00:00:00 UTC	467394.91846646497	48621.50963880497	0.95	372268.97250121285	562520
6	2020-01-06 00:00:00 UTC	1158999.319539823	48869.23710364581	0.95	1063388.705171438	1254609
7	2020-01-07 00:00:00 UTC	1127789.5651062205	49011.66149084522	0.95	1031900.3033930386	1223678

JOB HISTORY QUERY HISTORY SAVED QUERIES

Google Cloud Platform

Assignment258version

Search products and resources

BigQuery

FEATURES & INFO SHORTCUT HIDE PREVIEW FEATURES

SQL workspace

Explorer + ADD DATA

Data transfers

Scheduled queries

Reservations

BI Engine

assignment258version

riderdata

riderdata

riderdata

bqpublic-data

Type to search

RUN SAVE SCHEDULE MORE

Syntax error: Expected end of input but got identifier "assignment258v"

1 SELECT * FROM assignment258version.riderdata.riderdata LIMIT 10

Query results SAVE RESULTS EXPLORE DATA

Query complete (0.4 sec elapsed, 108.4 KB processed)

Job information Results JSON Execution details

Row	service_date	total_rides
1	2018-12-23	590592
2	2006-01-03	1312512
3	2006-09-25	1707520
4	2004-10-26	1643520
5	2002-07-23	1578240
6	2005-12-12	1578496
7	2007-07-31	1583616

JOB HISTORY QUERY HISTORY SAVED QUERIES

BigQuery FEATURES & INFO SHORTCUT HIDE PREVIEW FEATURES

SQL workspace Explorer + ADD DATA

Data transfers

Scheduled queries

Reservations

BI Engine

assignment258version

- riderdata
- ct_a_ridership_model
- riderdata

bqpublic-data

Type to search

Viewing pinned projects.

1 |
2 SELECT
3 *
4 FROM
5 ML.FORECAST(MODEL `assignment258version.riderdata.ct_a_ridership_model`,
6 STRUCT(7 AS horizon))

RUN SAVE SCHEDULE MORE This query will process 23.4 KiB when run.

Query results

SAVE RESULTS

EXPLORE DATA

Query complete (0.4 sec elapsed, 0 B processed)

Job information Results JSON Execution details

Row	non_seasonal_p	non_seasonal_d	non_seasonal_q	has_drift	log_likelihood	AIC	variance	seasc
1	1	1	4	true	-84343.91298029698	168701.82596059397	2.1214766324672794E9	WEEK
2	1	1	4	false	-84345.76278035615	168703.5255607123	2.1226282591786644E9	WEEK
3	4	1	1	true	-84346.86918283005	168707.7383656601	2.1232853081307085E9	WEEK

Rows per page: 100 ▾ 1 - 42 of 42 First page < > Last page

+

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Name	Last Modified
cnn_export	22 minutes ago
data	33 minutes ago
lstm_export	24 minutes ago
trainer	20 minutes ago
01-explore.ipynb	30 minutes ago
02-model.ipynb	14 minutes ago
03-cloud-training.ipynb	8 minutes ago
cta_ridership.csv	30 minutes ago

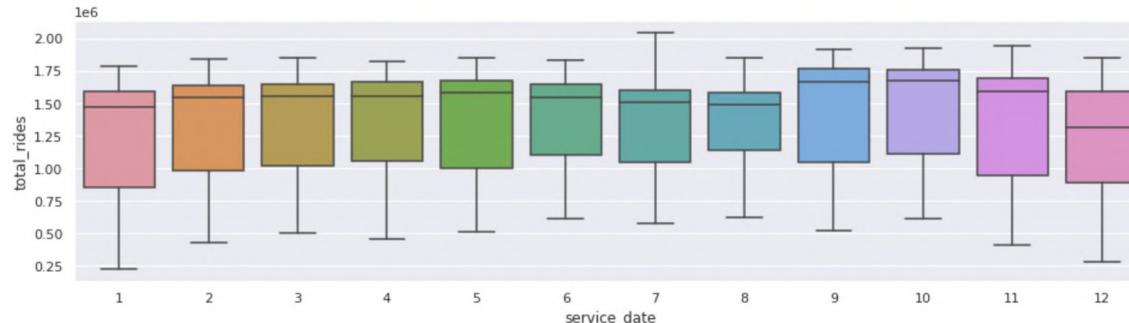
Untitled1.ipynb Terminal 1 01-explore.ipynb 02-model.ipynb 03-cloud-training.ipynb cta_ridership.csv Python 3

+ git

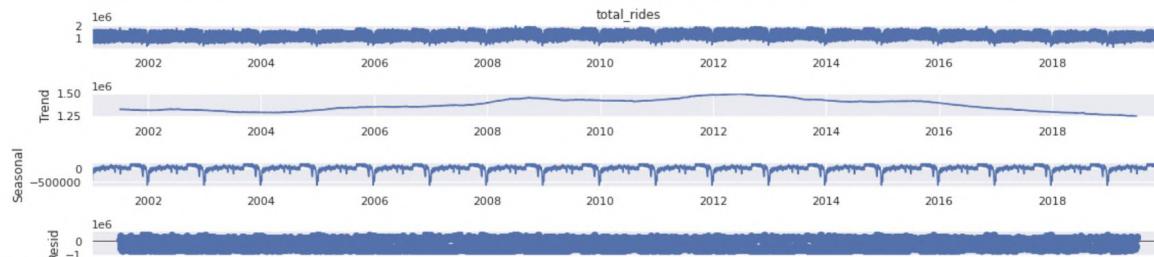
[18]: # Show the distribution of values for each month in a boxplot:

months = df.index.to_series().dt.month

fig = sns.boxplot(x=months, y=df[target])



[19]: # Decompose the data into trend and seasonal components

result = seasonal_decompose(df[target], period=365)
fig = result.plot()

Name	Last Modified
cnn_export	22 minutes ago
data	33 minutes ago
lstm_export	24 minutes ago
trainer	20 minutes ago
01-explore.ipynb	30 minutes ago
02-model.ipynb	14 minutes ago
03-cloud-training.ipynb	8 minutes ago
cta_ridership.csv	30 minutes ago

Untitled1.ipynb Terminal 1 01-explore.ipynb 02-model.ipynb 03-cloud-training.ipynb cta_ridership.csv Python 3

```
[16]: df[target].describe().apply(lambda x: round(x))
```

```
[16]: count      6939
mean    1368761
std     391443
min    222071
25%   1005394
50%   1548343
75%   1660947
max    2049519
Name: total_rides, dtype: int64
```

TODO 3: Explore seasonality

- Is there much difference between months?
- Can you extract the trend and seasonal pattern from the data?

```
[17]: # Show the distribution of values for each day of the week in a boxplot:
# Min, 25th percentile, median, 75th percentile, max

daysofweek = df.index.to_series().dt.dayofweek

fig = sns.boxplot(x=daysofweek, y=df[target])
```

A boxplot titled "total_rides" on the y-axis and "service_date" on the x-axis. The x-axis categories are labeled 0, 1, 2, 3, 4, 5, and 6. Each category has a boxplot representing the distribution of total_rides for that day of the week. The y-axis has major ticks at 0.25, 0.50, 0.75, 1.00, 1.25, 1.50, 1.75, and 2.00. The boxplots show varying median values and whisker ranges across the days.



Name	Last Modified
cnn_export	22 minutes ago
data	33 minutes ago
lstm_export	24 minutes ago
trainer	20 minutes ago
01-explore.ipynb	30 minutes ago
02-model.ipynb	14 minutes ago
03-cloud-training.ipynb	8 minutes ago
cta_ridership.csv	30 minutes ago

fig = plt.show()



```
[14]: # Explore rides by day type: Weekday (W), Saturday (A), Sunday/Holiday (U)  
sns.lineplot(data=df, x=df.index, y=df[target], hue=df['day_type']).set_title('Total Rides by Day Type')  
fig = plt.show()
```





/ ... / ai-for-time-series / notebooks /

Name	Last Modified
cnn_export	22 minutes ago
data	33 minutes ago
lstm_export	25 minutes ago
trainer	20 minutes ago
01-explore.ipynb	30 minutes ago
02-model.ipynb	14 minutes ago
03-cloud-training.ipynb	9 minutes ago
cta_ridership.csv	31 minutes ago

[29]: evaluate(y_pred_sn, 0)

==== t+(1-7) ===

R^2: 0.675

MAPE: 0.11

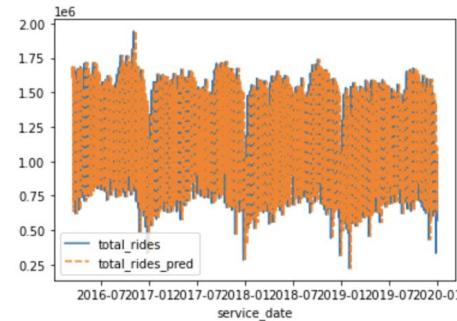
MAE: 108722.34

==== t+1 ===

R^2: 0.676

MAPE: 0.11

MAE: 108556.529

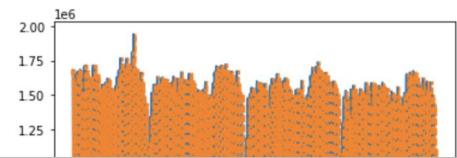


==== t+2 ===

R^2: 0.675

MAPE: 0.11

MAE: 108611.732



Name	Last Modified
cnn_export	23 minutes ago
data	34 minutes ago
lstm_export	25 minutes ago
trainer	21 minutes ago
01-explore.ipynb	31 minutes ago
02-model.ipynb	15 minutes ago
03-cloud-training.ipynb	9 minutes ago
cta_ridership.csv	31 minutes ago

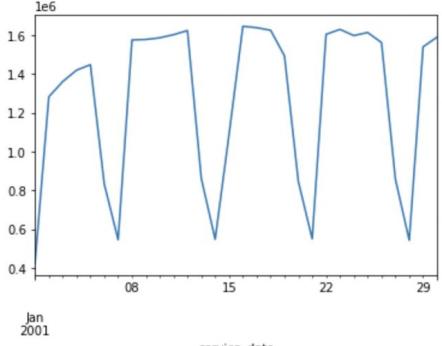
Untitled1.ipynb Terminal 1 01-explore.ipynb 02-model.ipynb 03-cloud-training.ipynb cta_ridership.csv Python 3

```
[10]: processed_file = 'cta_ridership.csv' # Which file to save the results to

if os.path.exists(processed_file):
    input_file = processed_file # File created in previous lab
else:
    input_file = f'data/{processed_file}'

[11]: df = pd.read_csv(input_file, index_col='ts_col', parse_dates=True)

# Plot 30 days of ridership
_ = df[target_col][:30].plot()
```



```
[12]: # Define some characteristics of the data that will be used later
n_features = len(df.columns)

# Index of target column. Used later when creating dataframes.
target_col_num = df.columns.get_loc(target_col)
```

Process data

File / ... / ai-for-time-series / notebooks /

Name	Last Modified
cnn_export	23 minutes ago
data	34 minutes ago
lstm_export	25 minutes ago
trainer	21 minutes ago
01-explore.ipynb	31 minutes ago
02-model.ipynb	15 minutes ago
03-cloud-training.ipynb	9 minutes ago
cta_ridership.csv	31 minutes ago

Untitled1.ipynb Terminal 1 01-explore.ipynb 02-model.ipynb 03-cloud-training.ipynb cta_ridership.csv Python 3

[13]: # Split data

```
size = int(len(df) * train_split)
df_train, df_test = df[0:size].copy(deep=True), df[size:len(df)].copy(deep=True)

df_train.head()
```

[13]: total_rides

service_date	total_rides
2001-01-01	423647
2001-01-02	1282779
2001-01-03	1361355
2001-01-04	1420032
2001-01-05	1448343

[14]: _ = df_train.plot()

Scale values

Name	Last Modified
cnn_export	23 minutes ago
data	34 minutes ago
lstm_export	25 minutes ago
trainer	21 minutes ago
01-explore.ipynb	31 minutes ago
02-model.ipynb	15 minutes ago
03-cloud-training.ipynb	9 minutes ago
cta_ridership.csv	32 minutes ago

```
Untitled1.ipynb  X  Terminal 1  X  01-explore.ipynb  X  02-model.ipynb  X  03-cloud-training.ipynb  X  cta_ridership.csv  X  Python 3 [●]
```

```
body='instances': instances
).execute()

if 'error' in response:
    raise RuntimeError(response['error'])

return response['predictions']

[*]: # Predict with the 1st element from the test set

prediction_json = {input_layer_name: X_test[0].tolist()}

pred_val = predict_json(PROJECT, MODEL_NAME, prediction_json)

pred_val

[*]: # Print prediction and compare to actual value

print('Predicted riders:', int(round(inverse_scale(np.array([pred_val[0]['dense'][0]]).reshape(1,1))[0][0])))
print('Actual riders: ', int(round(inverse_scale(np.array([y_test[0]]))[0][0])))
```

Cleanup

```
[*]: # Delete model version resource
!echo gcloud ai-platform versions delete {version} --model {MODEL_NAME} --quiet

# Delete model resource
!echo gcloud ai-platform models delete {MODEL_NAME} --quiet
```

Conclusion

In this section, you've learned how to:

- Prepare data and models for training in the cloud
- Train your model and monitor the progress of the job with AI Platform Training
- Predict using the model with AI Platform Predictions

Part 1) d Custom Model using
different datasets computer edge to
get tensorflow lite model

This model classifier was build by downloading the images related to - carrot , potatoes , beetroot . The part of building custom model was used later by downloading the tensorflow lite version and using it in android application.

The classifier was trained and then deployed on android application .

Veg classifier

Chrome File Edit View History Bookmarks People Tab Window Help

console.cloud.google.com/vision/datasets/ICN7334825026463465472/images?project=assignment258data

Google Cloud Platform Assignment258data Search products and resources

Vision vegclassifier LABEL STATS EXPORT DATA

Dashboard IMPORT IMAGES TRAIN EVALUATE TEST & USE Single-Label Classification

Datasets All images 518 Filter images

Select all

Models Labeled 518 Unlabeled 0

Filter labels + :

Label	Count
beet	138
carrot	191
potato	189

ADD NEW LABEL

Images per page: 50 1 – 50 of many < >

one-carrot-white...jpg images (3).jpeg images (1).jpeg images (2).jpeg Show All

Chrome File Edit View History Bookmarks People Tab Window Help

Sun Feb 21 11:46 PM

console.cloud.google.com/vision/datasets/ICN7334825026463465472/images?project=assignment258data

Google Cloud Platform Assignment258data

Vision

Dashboard

Datasets

Models

vegclassifier

IMPORT IMAGES TRAIN EVALUATE

All images 518

Labeled 518

Unlabeled 0

Filter labels + :

beet 138

carrot 191

potato 189

ADD NEW LABEL

Label Stats

Unlabeled images aren't used. Your dataset will be automatically split into Train, Validation and Test sets.

Ideally, each label should have at least 10 images. Fewer images often result in inaccurate precision and recall. You must also have at least 8, 1, 1 images each assigned to your Train, Validation and Test sets.

Labels	Images	Train	Validation
beet	138	110	14
carrot	191	153	19
potato	189	151	19

DONE

one-carrot-white...jpg

images (3).jpeg

images (1).jpeg

images (2).jpeg

Show All

The screenshot shows the Google Cloud Vision API interface for a dataset named 'vegclassifier'. The 'IMAGES' tab is selected, displaying statistics for three labeled categories: beet, carrot, and potato. The total number of images is 518, all of which are labeled. The images are split into Train, Validation, and Test sets. A detailed table shows the distribution of images for each category. Below the table, there's a 'DONE' button. At the bottom, a file bar lists several image files: 'one-carrot-white...jpg', 'images (3).jpeg', 'images (1).jpeg', 'images (2).jpeg', and a 'Show All' button. The interface includes a sidebar with 'Vision', 'Dashboard', 'Datasets', and 'Models' sections, and a top navigation bar with 'File', 'Edit', 'View', etc. The status bar at the bottom shows various system icons and the date/time: Sun Feb 21 11:46 PM.



Model definition

Chrome File Edit View History Bookmarks People Tab Window Help Sun Feb 21 11:46 PM

console.cloud.google.com/vision/datasets/ICN7334825026463465472/train?project=assignment258data

Google Cloud Platform Assignment258data Train new model

Vision ← vegclassifier LABEL ST

Dashboard IMPORT IMAGES TRAIN

Datasets

Models

You have enough images to start training.

Unlabeled images aren't used. Your dataset will be trained on 10 images per class.

Ideally, each label should have at least 10 images. You have at least 8, 1, 1 images each assigned to your Train, Test, and Evaluation datasets.

Labels	Images
beet	1
carrot	1
potato	1

START TRAINING

① Define your model

Model name * vegclassifier_20210221114643

Cloud hosted Host your model on Google Cloud for online predictions

Edge Download your model for offline/mobile use

CONTINUE

② Set a node hour budget

START TRAINING CANCEL

one-carrot-white....jpg images (3).jpeg images (1).jpeg images (2).jpeg Show All

Screen Shot 1-02...7.42 AM

Screen Shot 1-02...5.09 AM

Screen Shot 1-02...1.32 PM

Screen Shot 1-02...5.38 PM

Screen Shot 1-02...6.09 PM

Screen Shot 1-02...5.10 PM

Screen Shot 1-02...5.04 PM

The screenshot shows the Google Cloud Platform Vision API console. A modal window titled 'Train new model' is open. Step 1, 'Define your model', has a 'Model name' field containing 'vegclassifier_20210221114643'. The 'Cloud hosted' radio button is selected. Step 2, 'Set a node hour budget', has 'START TRAINING' and 'CANCEL' buttons. In the background, the main interface shows a dataset named 'Assignment258data' with 10 images per class for labels like beet, carrot, and potato. A sidebar on the right lists recent screen shots.

console.cloud.google.com/vision/datasets/ICN7334825026463465472/train?project=assignment258data

Train new model

1 Define your model

Model name *
vegclassifier_20210221114643

Cloud hosted
Host your model on Google Cloud for online predictions

Edge
Download your model for offline/mobile use

CONTINUE

2 Set a node hour budget

START TRAINING CANCEL

one-carrot-white....jpg images (3).jpeg images (1).jpeg images (2).jpeg Show All

Vision Assignment258data

IMPORT IMAGES TRAIN

Warning: Failed to import some images

You have enough images to start training.

Unlabeled images aren't used. Your dataset will be trained with at least 8, 1, 1 images each assigned to your Train, Validation, and Test datasets.

Labels	Images
beet	██████████
carrot	██████████
potato	██████████

START TRAINING

Screen Shot 1-02...7.42 AM

Screen Shot 1-02...5.09 AM

Screen Shot 1-02...1.32 PM

Screen Shot 1-02...5.38 PM

Screen Shot 1-02...6.09 PM

Screen Shot 1-02...57.10 PM

Screen Shot 1-02...5.04 PM

console.cloud.google.com/vision/datasets/ICN7334825026463465472/train?project=assignment258data

Train new model

1 Define your model

Model name *
vegclassifier_20210221114643

Cloud hosted
Host your model on Google Cloud for online predictions

Edge
Download your model for offline/mobile use

CONTINUE

2 Optimize model for

3 Set a node hour budget

START TRAINING CANCEL

one-carrot-white....jpg images (3).jpeg images (1).jpeg images (2).jpeg Show All

Vision Assignment258data

IMPORT IMAGES TRAIN

Warning: Failed to import some images

You have enough images to start training.

Unlabeled images aren't used. Your dataset will be trained with at least 8, 1, 1 images each assigned to your Train, Validation, and Test datasets.

Labels	Images
beet	██████████
carrot	██████████
potato	██████████

START TRAINING

Screen Shot 1-02...7.42 AM

Screen Shot 1-02...5.09 AM

Screen Shot 1-02...1.32 PM

Screen Shot 1-02...5.38 PM

Screen Shot 1-02...6.09 PM

Screen Shot 1-02...57.10 PM

Screen Shot 1-02...5.04 PM

console.cloud.google.com/vision/datasets/ICN7334825026463465472/train?project=assignment258data

Train new model

Define your model

Optimize model for

Set a node hour budget

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

We recommend using 3 node hours for your dataset. However, you can train for as little as 1 node hours. You may also eligible to train with free node hours. [Pricing guide](#)

Set your budget *

3 node hours

Estimated completion date: Feb 22, 2021 3 AM
GMT-8

START TRAINING **CANCEL**

one-carrot-white....jpg

images (3).jpeg

images (1).jpeg

images (2).jpeg

Show All

Screen Shot 1-02...7.42 AM

Screen Shot 1-02...5.09 AM

Screen Shot 1-02...1.32 PM

Screen Shot 1-02...5.38 PM

Screen Shot 1-02...6.09 PM

Screen Shot 1-02...57.10 PM

Labels Images

Labels	Images
beet	██████████
carrot	██████████
potato	██████████

START TRAINING

Classifier trained successfully

The screenshot shows the Google Cloud Platform interface for the Vision service. The left sidebar has 'Vision' selected under 'Datasets'. The main area displays a table of datasets. One dataset is listed:

Name	Type	Total images	Labeled images	Last updated	Status
vegclassifier ICN7334825026463465472	Single-Label Classification	518	518	Feb 21, 2021, 11:45:39 PM	Success: Training model

The status column indicates 'Success: Training model'.

console.cloud.google.com/vision/datasets/ICN7334825026463465472/images?project=assignment258data

Google Cloud Platform Assignment258data Search products and resources

Vision vegclassifier LABEL STATS EXPORT DATA

Dashboard IMAGES TRAIN EVALUATE TEST & USE Single-Label Classification

Datasets All images 518 Filter images

Models Labeled 518 Unlabeled 0

Filter labels + :

Label	Count
beet	138
carrot	191
potato	189

ADD NEW LABEL

carrot(1) potato(1) beet(1) carrot(1) potato(1)

carrot(1) potato(1) beet(1) carrot(1) beet(1)

potato(1) beet(1) beet(1) beet(1) carrot(1)

Images per page: 50 1 – 50 of many

The screenshot shows the Google Cloud Vision interface for a model named 'vegclassifier'. On the left, there's a sidebar with 'Vision' selected. The main area has tabs for 'IMPORT', 'IMAGES' (which is active), 'TRAIN', 'EVALUATE', and 'TEST & USE'. Below these tabs, it says 'Single-Label Classification'. The 'IMAGES' tab displays a grid of 5x10 images. Each image is labeled with its category and count: 'carrot(1)', 'potato(1)', 'beet(1)', 'carrot(1)', 'potato(1)' in the first row; 'carrot(1)', 'potato(1)', 'beet(1)', 'carrot(1)', 'beet(1)' in the second row; and 'potato(1)', 'beet(1)', 'beet(1)', 'beet(1)', 'carrot(1)' in the third row. A 'Filter images' section with a color gradient slider is located above the grid. The bottom of the screen shows navigation controls for images per page (50) and the total count (1 – 50 of many).

Model evaluation

The screenshot shows the Google Cloud Platform interface for a 'vegclassifier' model. The URL in the browser is `console.cloud.google.com/vision/datasets/ICN7334825026463465472/train?project=assignment258data`. The left sidebar has 'Vision' selected under 'Datasets'. The main page shows the 'TRAIN' tab is active, with 'EVALUATE' and 'TEST & USE' also present. A 'Single-Label Classification' label is visible. The 'Models' section displays a card for 'vegclassifier_20210221114643' with an average precision of 0.993. Below the card, detailed model statistics are listed:

Stat	Value
Average precision	0.993
Precision*	96.08%
Recall*	94.23%
* Using a score threshold of 0.5	
Model ID	ICN9159734502862356480
Created	Feb 21, 2021, 11:48:05 PM
Base model	None
Data	518 images
Model type	Mobile Best Trade-Off
Train cost	0.972 node hours
Deployment state	Not deployed

Buttons at the bottom include 'SEE FULL EVALUATION' and 'RESUME TRAINING'.



Google Cloud Platform Assignment258data Search products and resources

console.cloud.google.com/vision/datasets/ICN7334825026463465472;modelId=ICN9159734502862356480/evaluate?project=assignment258data Single-Label Classification

Google Cloud Platform Assignment258data Search products and resources

Vision

vegclassifier

LABEL STATS

EXPORT DATA

IMPORT

IMAGES

TRAIN

EVALUATE

TEST & USE

Single-Label Classification

Model
vegclassifier_20210221114643

Confidence threshold

0.5

Filter labels



All labels

0.99259

beet

1

carrot

0.99282

potato

1

Test items

52

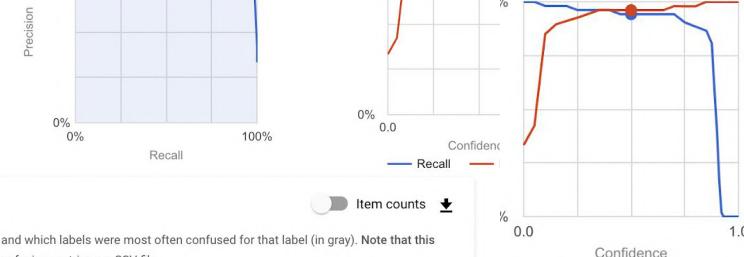
Precision

96.08%

Recall

94.23%

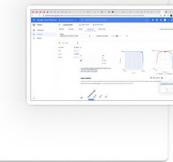
Use the slider to see which confidence threshold works best for your model on the precision-recall tradeoff curve.
[Learn more about these metrics and graphs.](#)



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.

True Label	Predicted Label		
	potato	carrot	beet
potato	100%	-	-
carrot	-	89%	11%
beet	-	-	100%



console.cloud.google.com/vision/datasets/ICN7334825026463465472;modelId=ICN9159734502862356480/predict?project=assignment258data

Google Cloud Platform Assignment258data

Search products and resources

Vision

vegclassifier

LABEL STATS EXPORT DATA

IMPORT IMAGES TRAIN EVALUATE TEST & USE

Single-Label Classification

Model
vegclassifier_20210221114643

To use online prediction, deploy your model to the cloud. Deployed model charges are per hour and number of machines used. [Pricing guide](#)

DEPLOY MODEL

Notice for beta users: The v1beta1 API endpoint is scheduled for deletion after GA release. If your beta models have not been [redeployed since October 17, 2019](#), please do so now to avoid interruption when the old service is shut down.

Use your model



TF Lite

Export your model as a TF Lite package to run your model on edge or mobile devices.



TensorFlow.js

Export your model as a TensorFlow.js package to run your model in the browser and in Node.js.



Core ML

Export a .mlmodel file to run your model on iOS and macOS devices.



Container

Export your model as a TF Saved Model to run on a Docker container.



Coral

Export your model to run on Edge TPU-based devices.

Stored the tensorflow lite model in bucket

The screenshot shows the Google Cloud Platform Vision interface for a dataset named "Assignment258data". The left sidebar includes options for Vision, Dashboard, Datasets, and Models. The main area displays a "vegclassifier" model with tabs for IMPORT, IMAGES, TRAIN, EVALUATE, and TEST & USE. The TEST & USE tab is selected. A dropdown menu shows the model version: "vegclassifier_20210221114643". Below the dropdown, two informational messages are present: one about online prediction charges and another about the beta API endpoint being scheduled for deletion.

Export TF Lite package

The Tensorflow Lite (.tflite) format allows you to run your model on mobile and embedded devices.

1. Export your model as a TF Lite package.
Destination folder on Cloud Storage
 workdatabucket [BROWSE](#)
2. After your model finishes exporting, you can copy your package to your computer using this command:
`$ gsutil cp -r gs://workdatabucket ./download_dir` [COPY](#)
3. Follow the quickstart to learn how to implement your model on your device.
[Android quickstart](#) [iOS quickstart](#)

Use your model

- TF Lite**
Export your model as a TF Lite package to run your model on edge or mobile devices.
- TensorFlow.js**
Export your model as a TensorFlow.js package to run your model in the browser and in Node.js.
- Core ML**
Export a .mlmodel package to run your model on iOS and macOS.
- Coral**
Export your model to run on Edge TPU.

Google Cloud Platform Assignment258data Search products and resources

Vision vegclassifier LABEL STATS EXPORT DATA IMPORT IMAGES TRAIN EVALUATE TEST & USE Model vegclassifier_20210221114643 To use online prediction, deploy your model to the cloud. Deployed model charges are per hour and not per prediction. Notice for beta users: The v1beta1 API endpoint is scheduled for deletion after GA release. If you beta to avoid interruption when the old service is shut down.

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[Android quickstart](#) [iOS quickstart](#)

EXPORT OPEN IN GCS

Use your model

TF Lite TensorFlow.js Core ML

Coral

Google Cloud Platform Assignment258data Search products and resources

Vision vegclassifier LABEL STATS EXPORT DATA

IMPORT IMAGES TRAIN EVALUATE TEST & USE

Model vegclassifier_20210221114643

To use online prediction, deploy your model to the cloud. Deployed model charges are per hour and...

Notice for beta users: The v1beta1 API endpoint is scheduled for deletion after GA release. If your beta...

Use your model

TF Lite Export your model as a TF Lite package to run your model on edge or mobile devices.

TensorFlow.js Export your model as a TensorFlow.js package to run your model in the browser and in Node.js.

Core ML Export a .mlmodel file to run your model on iOS and macOS.

Coral Export your model to run on Edge TPU-based devices.

Export operation finished

Export TensorFlow.js package

You can use your model in a web browser or on node.js using the TensorFlow.js JavaScript library.

1. Export your model as a TensorFlow.js package.

Destination folder on Cloud Storage

workdatabucket/tensorflowjs/

BROWSE

EXPORT OPEN IN GCS

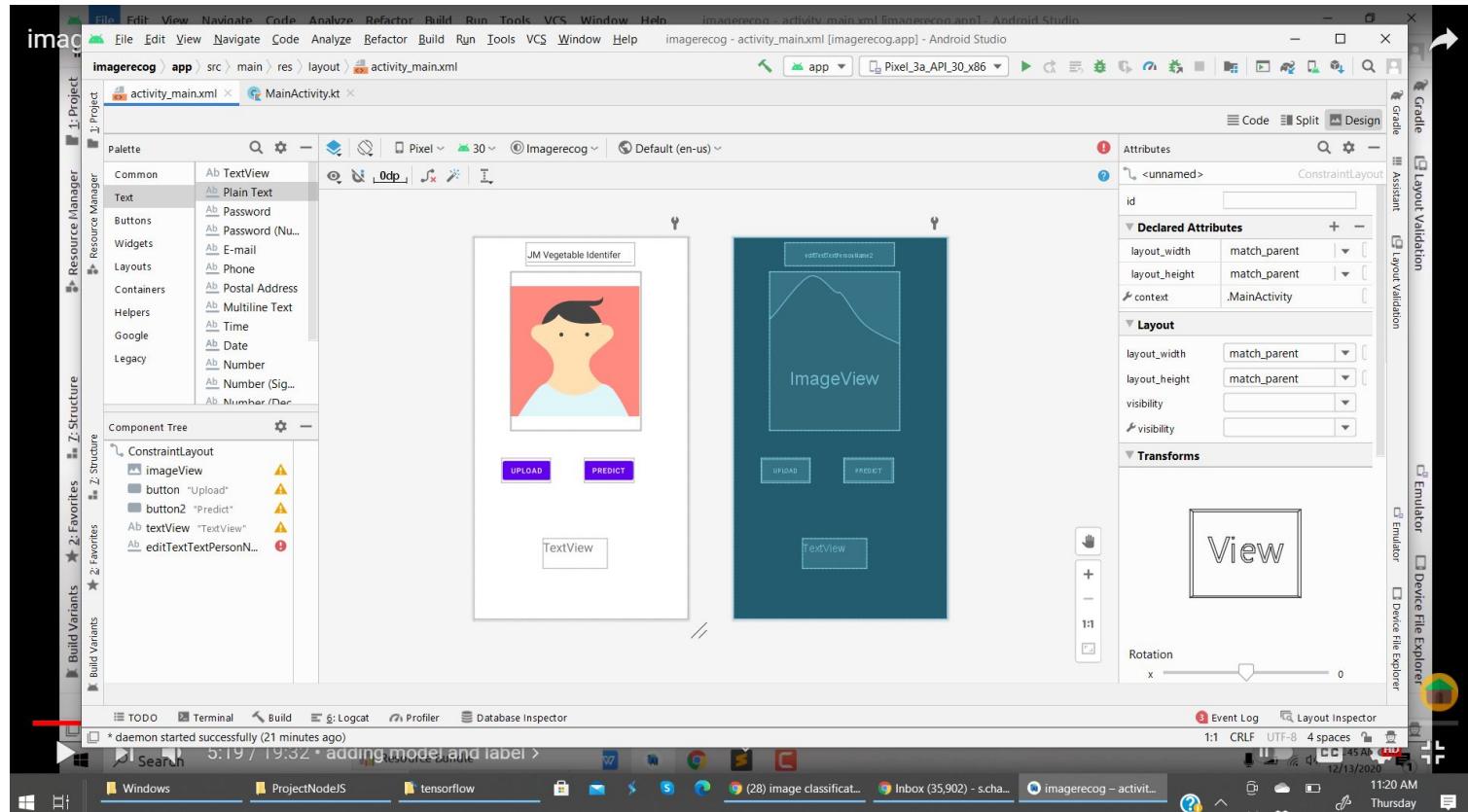
2. After your model finishes exporting, you can copy your package to your computer using this command:

```
$ gsutil cp -r gs://workdatabucket/tensorflowjs/ ./dow
```

3. Follow the quickstart to learn how to implement your model. [Image Classification quickstart](#) [Image Object Detection quickstart](#)

Part 2) Android Part deployment

This is to build the ui part



This is to add the code and integrate the model with tensorflow lite model

```
plugins {
    id 'com.android.application'
    id 'kotlin-android'
}

android {
    compileSdkVersion 30
    buildToolsVersion "30.0.3"

    defaultConfig {
        applicationId "com.example.imagerrecog"
        minSdkVersion 16
        targetSdkVersion 30
        versionCode 1
        versionName "1.0"

        testInstrumentationRunner "androidx.test.runner.AndroidJUnitRunner"
    }

    buildTypes {
        release {
            minifyEnabled false
            proguardFiles getDefaultProguardFile('proguard-android-optimize.txt'), 'proguard-rules.pro'
        }
    }

    compileOptions {
        sourceCompatibility JavaVersion.VERSION_1_8
    }
}
```

Program Files (x86)

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help imagerecog - activity_main.xml [imagerecog.app] - Android Studio

Pin to Quick access

Import TensorFlow Lite model

activity_main.xml MainActivity

Gradle project sync in progress...

Palette

Common Text Buttons Widgets Layouts

Ab TextView Ab Plain Text Ab Password Ab Password (...) Ab E-mail Ab Phone Ab Postal Add

Component Tree

ConstraintLayout

- imageView
- button "Upload"
- button2 "Predict"
- Ab textView "TextView"
- Ab editTextTextPersonN...

Model location: tensorflow\tensorflow\models\classifier\andriod\model-export\icn\tflite-vegclassifier_20210221114643-2021

Create ml directory in main

Automatically add build feature and dependencies to build.gradle

```
buildFeatures {  
    mlModelBinding true  
}  
  
org.tensorflow:tensorflow-lite-support:0.1.0-rc1  
org.tensorflow:tensorflow-lite-metadata:0.1.0-rc1
```

Automatically add TensorFlow Lite GPU dependencies to build.gradle (optional)

```
org.tensorflow:tensorflow-lite-gpu:2.2.0
```

This is needed to ensure ML Model Binding works correctly [Learn more](#)

! Select a TensorFlow Lite model file to import.

Previous Next Cancel Finish

Code Split Design

ConstraintLayout

Attributes

match_parent match_parent .MainActivity

match_parent match_parent

Emulator Device File Explorer

Event Log

2/25/2021 9:38 AM Android Studio 4.2 Beta Update...

9:55 AM Low disk space on a Andr

10:56 AM Gradle sync started

10:59 AM Gradle sync finished in 3 r

TODO Terminal Build Logcat Profiler Database Inspector Event Log Layout Inspector

Android Studio is using the following JDK location when running Gradle: // C:\Program Files\Android\Android Studio\jre // Using different JDK locations on different processes might cause Gradle to spa... (39 minutes 1:1 CRLF UTF-8 4 spaces)

36 items

Program Files (x86) ProjectNodeJS tensorflow

11:41 AM Thursday 2/25/2021

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help My Application - activity_main.xml [My_Application.app] - Android Studio

Pin to Quick access

MyApplication > app > src > main > res > layout > activity_main.xml

Android app Pixel_3a_API_30_x86

Code Split Design

Palette

Common Text Buttons Widgets Layouts Containers Helpers Google Legacy

Attributes

<unnamed>

id

Declared Attributes

layout_width match_parent

layout_height match_parent

context .MainActivity

Layout

layout_width match_parent

layout_height match_parent

visibility

Transforms

View

Rotation

Component Tree

ConstraintLayout

- imageView
- button "Upload"
- button2 "Predict"
- textView "Select Image..."
- editTextTextPersonN...

Event Log Layout Inspector

27:1 CRLF UTF-8 4 spaces

Android Studio 4.2 Beta 5 available Update...

11 items 1 item selected 478 KB

Android Windows (C:) Andriod HBO Max - Google C... Friends List My Application – acti... 10:08 PM Monday 3/8/2021

2021-02-22 (1).png - ...

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help My Application - MainActivity.kt [My_Application.app] - Android Studio

Pin to Quick access

app src main java com example myapplication MainActivity onCreate(savedInstanceState:Bundle?) app Pixel_3a_API_30_x86

Android

1: Project

Quick Resource Manager

Des Down Doc Picture And Assis kdd Screen Creati Drop OneD This P Networ Favorites

Build Variants

Gradle Scripts build.gradle (Project: My_Application) build.gradle (Module: My_Application.app) gradle-wrapper.properties (Gradle Version) proguard-rules.pro (ProGuard Rules for My_Application.app)

model-vegclassifier.tflite

MainActivity.kt

activity_main.xml

```
// Releases model resources if no longer used.  
model.close()  
}  
  
}  
  
override fun onActivityResult(requestCode: Int, resultCode: Int, data: Intent?) {  
    super.onActivityResult(requestCode, resultCode, data)  
  
    imgview.setImageURI(data?.data)  
    var uri: Uri? = data?.data  
  
    bitmap = MediaStore.Images.Media.getBitmap(this.contentResolver, uri)  
}  
  
}  
  
// fun getMax(arr:FloatArray) : Int {  
//     var int = 0  
//     var min = 0.0f  
//     for (i in 0..3) {  
//         if (arr[i] > min) {  
//             int = i  
//             min = arr[i]  
//         }  
//     }  
//     return min  
// }
```

Android Studio 4.2 Beta 5 available
Update...

Event Log Layout Inspector

Android Studio 4.2 Beta 5 available: // Update... (13 minutes ago)

23:58 CRLF UTF-8 4 spaces

11 items 1 item selected 478 KB

Andriod Windows (C:) Andriod HBO Max - Google C... Friends List My Application - Ma...

2021-02-22 (1).png - ...

10:08 PM Monday 3/8/2021

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help My Application - MainActivity.kt [My_Application.app] - Android Studio

Pin to Quick access

app src main java com example myapplication MainActivity onCreate(savedInstanceState:Bundle?) app Pixel_3a_API_30_x86

Android

1: Project

Quick Resource Manager

Java (generated)

Assets labels.txt

res drawable ic_launcher_background.xml ic_launcher_foreground.xml (v24)

layout activity_main.xml

mipmap ic_launcher (6) ic_launcher_round (6)

values colors.xml strings.xml themes (2)

ml model-vegclassifier.tflite

Gradle Scripts build.gradle (Project: My_Application) build.gradle (Module: My_Application.app) gradle-wrapper.properties (Gradle Version) proguard-rules.pro (ProGuard Rules for My_Application.app)

model-vegclassifier.tflite MainActivity.kt activity_main.xml

```
import ...
class MainActivity : AppCompatActivity() {
    lateinit var bitmap : Bitmap
    lateinit var imgview : ImageView
    override fun onCreate(savedInstanceState : Bundle?) {
        super.onCreate(savedInstanceState)
        setContentView(R.layout.activity_main)
        imgview = findViewById(R.id.imageView)

        var tv: TextView = findViewById(R.id.textView)
        var select: Button = findViewById(R.id.button)

        select.setOnClickListener(View.OnClickListener { it: View!
            var intent: Intent = Intent(Intent.ACTION_GET_CONTENT)
            intent.type = "image/*"

            startActivityForResult(intent, requestCode: 100)
        })

        var predict:Button = findViewById(R.id.button2)
        predict.setOnClickListener(View.OnClickListener { it: View!
    })
}
```

Android Studio 4.2 Beta 5 available Update...

Event Log Layout Inspector

27:1 CRLF UTF-8 4 spaces

11 items 1 item selected 478 KB

Android Windows (C:) Andriod HBO Max - Google C... Friends List My Application - Ma... 10:07 PM Monday 3/8/2021

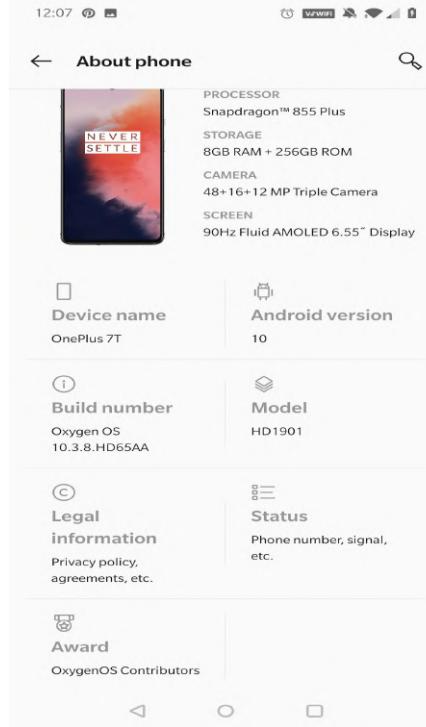
2021-02-22 (1).png - ...

Output on android phone

Vegetable classifier



My phone used for android application testing



← Developer options



On



System UI demo mode

Quick settings developer tiles

Trust agents only extend unlock

If enabled, trust agents will keep your device unlocked.

Allow USB debugging?

USB debugging is intended for development purposes only. Use it to copy data between your computer and your device, install apps on your device without notification and read log data.

CANCEL OK

USB debugging

Debug mode when USB is connected

Wireless ADB debugging



Revoke USB debugging authorisations

Bug report shortcut

Show a button in the power menu for taking a bug report

Select mock location app

No mock location app set

2:15



imagerecog

JM Vegetable Identifier

UPLOAD

PREDICT

TextView



2:17



imagerecog

JM Vegetable Identifier

UPLOAD

PREDICT

TextView



6:42

⌚ WiFi 🔔 🔋

My Application



UPLOAD

PREDICT

<Category "carrot" (score=0.0546875)>

Uploaded the image for classification



UPLOAD

PREDICT

Select Image Prediction

Output of the model to identify carrot is 91 percent :

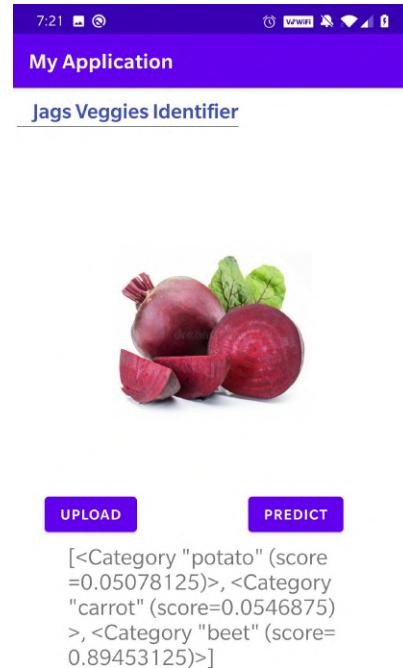


UPLOAD

PREDICT

```
[<Category "potato" (score=0.04296875)>, <Category "carrot" (score=0.91015625)>, <Category "beet" (score=0.046875)>]
```

This is to show the beetroot was predicted with maximum score



Thank you

For any queries please check the dataset repo in google drive shared in the link :

[https://drive.google.com/drive/u/1/folders/1_9yPC9ddUCGKkcwHD6CfVnGIptLWu
n_t](https://drive.google.com/drive/u/1/folders/1_9yPC9ddUCGKkcwHD6CfVnGIptLWun_t)