

1. Image

1. Project id: hw2p1-image

Project name *

hw2p1-image

?

Project ID: hw2p1-image. It cannot be changed later. [EDIT](#)

Organization *


sjsu.edu

▼

?

Select an organization to attach it to a project. This selection can't be changed later.

Location *

 sjsu.edu



[BROWSE](#)

Parent organization or folder

CREATE

CANCEL

2. API is enabled

 Google Cloud Platform  hw2p1-image ▼

The API is enabled

Cloud AI Platform API has been enabled.

Next, to use the API you'll need the right credentials.

[Go to credentials](#)

3. Authentication Setup

Create service account key

Service account

New service account

Service account name ?

hw2p1

Role ?

Owner

Service account ID

hw2p1-306

@hw2p1-image.iam.gserviceaccount.com

Key type

Downloads a file that contains the private key. Store the file securely because this key can't be recovered if lost.

☒ JSON

Recommended

☐ P12

For backward compatibility with code using the P12 format

Create

Cancel

4. Set environment variable

```
Administrator: Command Prompt
Microsoft Windows [Version 10.0.19041.804]
(c) 2020 Microsoft Corporation. All rights reserved.

C:\WINDOWS\system32>set GOOGLE_APPLICATION_CREDENTIALS=C:\Users\subar\Downloads\Study\8_CMPE-258-Sec49-DeepLearning\hw2\hw2p1-image-3ce38964a5bf.json

C:\WINDOWS\system32>
```

5. Cloud Console:

```
CLOUD SHELL
Terminal (hw2p1-image) x + v

Welcome to Cloud Shell! Type "help" to get started.
To set your Cloud Platform project in this session use "gcloud config set project [PROJECT_ID]"
subarnachowdhury_soma@cloudshell:~$ gcloud config set project hw2p1-image
Updated property [core/project].
subarnachowdhury_soma@cloudshell:~ (hw2p1-image) $
```

6. Created Google Cloud Storage Bucket

```
CLOUD SHELL
Terminal (hw2p1-image) x + v

Welcome to Cloud Shell! Type "help" to get started.
To set your Cloud Platform project in this session use "gcloud config set project [PROJECT_ID]"
subarnachowdhury_soma@cloudshell:~$ gcloud config set project hw2p1-image
Updated property [core/project].
subarnachowdhury_soma@cloudshell:~ (hw2p1-image)$ export PROJECT_ID=hw2p1-image
subarnachowdhury_soma@cloudshell:~ (hw2p1-image)$ gsutil mb -p ${PROJECT_ID} -l us-central1 gs://${PROJECT_ID}/
Creating gs://hw2p1-image/...
subarnachowdhury_soma@cloudshell:~ (hw2p1-image)$ export BUCKET=${PROJECT_ID}
subarnachowdhury_soma@cloudshell:~ (hw2p1-image)$
```

7. Copying data set to storage:

```
terminal (hw2p1-image)

Copying gs://cloud-ml-data/img/flower_photos/dandelion/18276105805_d31d3f7e71.jpg [Content-Type=image/jpeg]...
Copying gs://cloud-ml-data/img/flower_photos/dandelion/18282528206_7fb3166041.jpg [Content-Type=image/jpeg]...
Copying gs://cloud-ml-data/img/flower_photos/dandelion/18304194360_2a4a0be631_m.jpg [Content-Type=image/jpeg]...
Copying gs://cloud-ml-data/img/flower_photos/dandelion/18342918441_b1bb69a2fd_n.jpg [Content-Type=image/jpeg]...
Copying gs://cloud-ml-data/img/flower_photos/dandelion/18479635994_83f93f4120.jpg [Content-Type=image/jpeg]...
Copying gs://cloud-ml-data/img/flower_photos/dandelion/18482768066_677292a64e.jpg [Content-Type=image/jpeg]...
Copying gs://cloud-ml-data/img/flower_photos/dandelion/18587334446_ef1021909b_n.jpg [Content-Type=image/jpeg]...
Copying gs://cloud-ml-data/img/flower_photos/dandelion/18687587599_3dd4fdf255.jpg [Content-Type=image/jpeg]...
Copying gs://cloud-ml-data/img/flower_photos/dandelion/18876985840_7531dc8e6a.jpg [Content-Type=image/jpeg]...
Copying gs://cloud-ml-data/img/flower_photos/dandelion/18803577858_fd0036e1f5_m.jpg [Content-Type=image/jpeg]...
Copying gs://cloud-ml-data/img/flower_photos/dandelion/18889216716_cd67aec890_n.jpg [Content-Type=image/jpeg]...
Copying gs://cloud-ml-data/img/flower_photos/dandelion/18995294384_77543e96b6_n.jpg [Content-Type=image/jpeg]...
Copying gs://cloud-ml-data/img/flower_photos/dandelion/18970601002_d70bc883a9.jpg [Content-Type=image/jpeg]...
Copying gs://cloud-ml-data/img/flower_photos/dandelion/18996760154_58d3c48604.jpg [Content-Type=image/jpeg]...
Copying gs://cloud-ml-data/img/flower_photos/dandelion/18996957833_0bd71fbdd4_m.jpg [Content-Type=image/jpeg]...
Copying gs://cloud-ml-data/img/flower_photos/dandelion/18996965033_1d92e5c99e.jpg [Content-Type=image/jpeg]...
Copying gs://cloud-ml-data/img/flower_photos/dandelion/18999743619_cec3f39bee.jpg [Content-Type=image/jpeg]...
Copying gs://cloud-ml-data/img/flower_photos/dandelion/19064700925_b93d474e37.jpg [Content-Type=image/jpeg]...
Copying gs://cloud-ml-data/img/flower_photos/dandelion/19004688463_12a8423109.jpg [Content-Type=image/jpeg]...

Copying gs://cloud-ml-data/img/flower_photos/tulips/9976515506_d496c5e72c.jpg/9446982168_06c4d71da3_n.jpg [Content-Type=image/jpeg]...
Copying gs://cloud-ml-data/img/flower_photos/tulips/9976515506_d496c5e72c.jpg/9831362123_5aac525a99_n.jpg [Content-Type=image/jpeg]...
Copying gs://cloud-ml-data/img/flower_photos/tulips/9976515506_d496c5e72c.jpg/9870557734_88eb3b9e3b_n.jpg [Content-Type=image/jpeg]...
Copying gs://cloud-ml-data/img/flower_photos/tulips/9976515506_d496c5e72c.jpg/9947374414_fdf1d0861c_n.jpg [Content-Type=image/jpeg]...
Copying gs://cloud-ml-data/img/flower_photos/tulips/9976515506_d496c5e72c.jpg/9947385346_3a8cacea02_n.jpg [Content-Type=image/jpeg]...
| [3.7k/3.7k files] [ 1.2 GiB / 1.2 GiB] 100% Done   5.9 MiB/s ETA 00:00:00
Operation completed over 3.7k objects/1.2 GiB.
subarnachowdhury_soma@cloudshell:~ (hw2p1-image)$
```

8. Created all_data.csv file with image and labels

```
subarnachowdhury_soma@cloudshell:~ (hw2p1-image)$ gsutil cp all_data.csv gs://${BUCKET}/csv/
Copying file://all_data.csv [Content-Type=text/csv]...
/ [1 files] [282.1 KiB/282.1 KiB]
Operation completed over 1 objects/282.1 KiB.
subarnachowdhury_soma@cloudshell:~ (hw2p1-image)$
```

```
gs://${BUCKET}/img/flower_photos/daisy/10559679065_50d2b16f6d.jpg,daisy
gs://${BUCKET}/img/flower_photos/dandelion/10828951106_c3cd47983f.jpg,dandelion
gs://${BUCKET}/img/flower_photos/roses/14312910041_b747240d56_n.jpg,roses
gs://${BUCKET}/img/flower_photos/sunflowers/127192624_afa3d9cb84.jpg,sunflowers
gs://${BUCKET}/img/flower_photos/tulips/13979098645_50b9eebc02_n.jpg,tulips
```

9. Create Dataset 'hw2p1-imagedata'

hw2p1-image

Search project

←

Create dataset

Dataset name *

hw2p1-imagedata

Can use up to 128 characters.

Select a data type and objective

First select the type of data your dataset will contain. Then select an objective.

IMAGE

TABULAR

TEXT

VIDEO

☒ Image classification (Single-label)

Predict the one correct label that you want assigned to an image.

☐ Image classification (Multi-label)

Predict multiple labels that you want assigned to an image.

Region

us-central1 (Iowa)

?

10. Import Data from Storage

Select an import method

- **Upload images:** Recommended if you don't have labels yet
 - **Import files:** Recommended if you already have labels. An import file is a list of Cloud Storage URIs to your images and optional data, like labels. [Learn how to create an import file](#)
- ☐ Upload images from your computer
- ☐ Upload import files from your computer
- ☒ Select import files from Cloud Storage

Select import files from Cloud Storage

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

Import file path * **BROWSE** ? **Data split** ?

[ADD ANOTHER FILE](#)

What happens next?

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

CONTINUE

11. Finished Importing Data

<input type="checkbox"/>	Name	ID	Region	Type	Items	Labels	Last updated ↓	Status	Metadata
<input type="checkbox"/>	hw2p1-imagedata	1833615959223435264	us-central1	Image	3,667	-	February 21, 2021	Finished importing data	

12. Selecting Training Model:

Train new model

1 Choose training method

2 Define your model

3 Compute and pricing

START TRAINING

CANCEL

Dataset *
hw2p1-imagedata (3667 images)

Annotation set *
hw2p1-imagedata_icn

Objective
Image classification (Single-label)

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

☒ AutoML

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

☐ AutoML Edge

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

☐ Custom training (advanced)

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

CONTINUE

13. Created model 'hw2p1-imagedata_model' and selected pricing for 8hours

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

You can train for as little as 8 node hours. You may also be eligible to train with free node hours. [Pricing guide](#)

Budget *

8

Maximum node hours

Estimated completion date: Feb 21, 2021 3 PM GMT-8



Enable early stopping

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

14. Got Email Notification about successful training

AI Platform finished training model "hw2p1-imagedata_model" Inbox x

AI Platform <noreply-aiplatform@google.com>
to me ▾

1:38 PM (7 minutes ago) ☆

Hello AI Platform Customer,

AI Platform finished training model "hw2p1-imagedata_model".

Additional Details:

Operation State: Succeeded

Resource Name:

projects/589827040428/locations/us-central1/trainingPipelines/7068241285483593728

To continue your progress, go back to your training pipeline using

https://console.cloud.google.com/ai/platform/models?_ga=2.63127535.1955457830.1613882938-601871661.1612817001&authuser=1&project=hw2p1-image&supportedpurview=project

Sincerely,
The Google Cloud AI Team

15. Trained Model

Filter models...							
	Name	ID	Data	Endpoints	Region	Type	Created
✓	hw2p1-imagedata_model	6245102900465369088	hw2p1-imagedata_icn	0	us-central1	Image classification	Feb 21, 2021, 1:17:48 PM

16. Created Deployment Endpoint 'hw2p2-hello_automl_image'

Endpoint name *
hw2p2-hello_automl_image



Model settings

Add model



Model name *
hw2p1-imagedata_model



Traffic split *
100

%



AutoML image classification and object detection models require a fixed number of compute nodes per model. If you want to change your compute resources for this model in the future, you will have to create a new endpoint.

[Pricing guide](#)



The number of nodes you specify in the input field below will always be ready, and you will be charged continuously for them. [Learn more about nodes and prediction cost](#)

Number of compute nodes *
1

The number of nodes to allocate for this endpoint.

New endpoint

✓ Define your endpoint

2 Endpoint details

CREATE

CANCEL

Location

Region
us-central1 (Iowa)

Encryption

☐ Use a customer-managed encryption key (CMEK)

17. Model Deployment

<input type="checkbox"/>	Endpoint	ID	Models	Region	Last updated	API
<input type="checkbox"/>	hw2p2-hello_automl_image	377000546931834880	1	us-central1	Feb 21, 2021, 1:54:04 PM	Sample request

18. Successful Deployment

AI Platform finished creating endpoint "hw2p2-hello_automl_image" Inbox ×

AI Platform <noreply-aiplatform@google.com>

to me ▾

Hello AI Platform Customer,

AI Platform finished creating endpoint "hw2p2-hello_automl_image".

Additional Details:

Operation State: Succeeded

Resource Name:

projects/589827040428/locations/us-central1/endpoints/377000546931834880

To continue your progress, go back to your endpoint using

<https://console.cloud.google.com/ai/platform/locations/us-central1/models/6245102900465369088/deploy?authuser=1&project=hw2p1-image&supportedpurvie>

Sincerely,

The Google Cloud AI Team

☰ Filter endpoints

<input type="checkbox"/>	Endpoint	ID	Models	Region	Last updated	API
<input checked="" type="checkbox"/>	hw2p2-hello_automl_image	377000546931834880	1	us-central1	Feb 21, 2021, 2:01:50 PM	Sample request

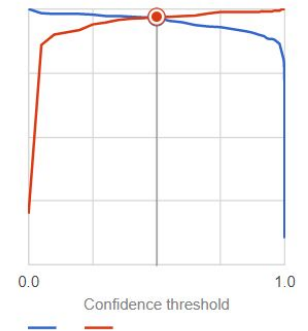
19. After Deployment

Confidence threshold   0.5

All labels

Average precision	0.994
Precision	97%
Recall	96.7%
Created	Feb 21, 2021, 1:38:30 PM
Total images	3,667
Training images	2,933
Validation images	367
Test images	367

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



20. Confusion Matrix

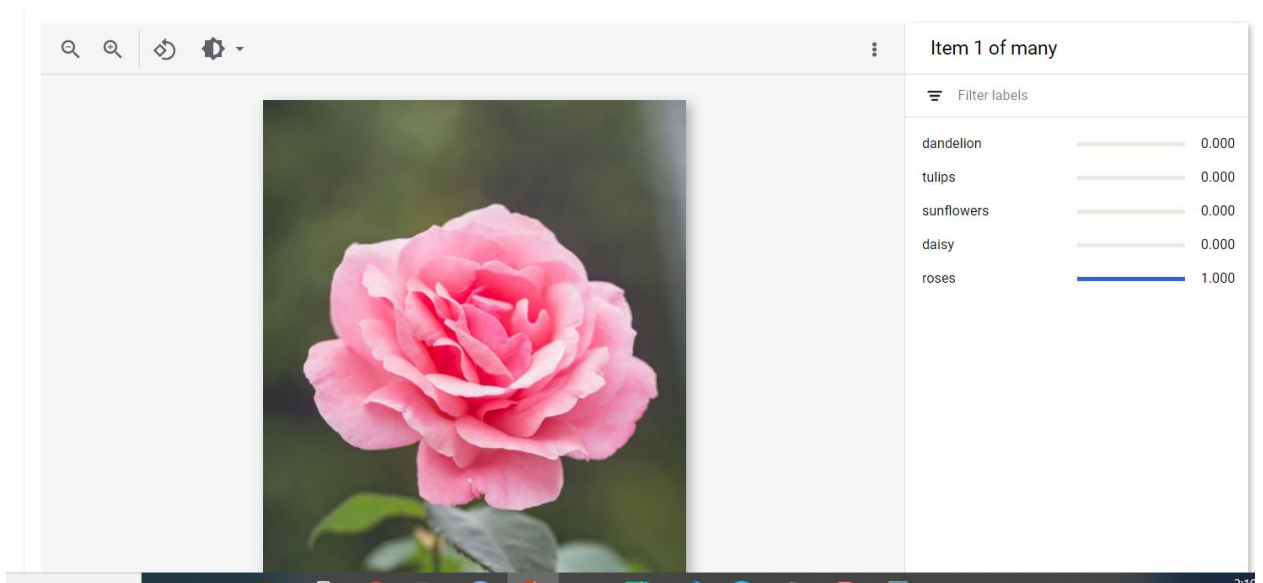
Confusion matrix

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

True label \ Predicted label	dandelion	tulips	sunflowers	daisy	roses
dandelion	98%	—	—	2%	—
tulips	1%	93%	—	1%	5%
sunflowers	—	—	100%	—	—
daisy	2%	—	—	95%	3%
roses	—	2%	—	—	98%

21. Prediction 100% Correct

Test your model [PREVIEW](#)



22. Removed Storage

```
Removing gs://hw2p1-image/img/flower_photos/tulips/9976515506_d496c5e72c.j
Removing gs://hw2p1-image/img/flower_photos/tulips/9976515506_d496c5e72c.j
Removing gs://hw2p1-image/img/flower_photos/tulips/9976515506_d496c5e72c.j
Removing gs://hw2p1-image/img/flower_photos/tulips/9976515506_d496c5e72c.j
Removing gs://hw2p1-image/img/flower_photos/tulips/9976515506_d496c5e72c.j
Removing gs://hw2p1-image/img/flower_photos/tulips/9976515506_d496c5e72c.j
/ [3.7k/3.7k objects] 100% Done 205.00 objects/s ETA 00:00:00
Operation completed over 3.7k objects.
Removing gs://hw2p1-image/...
subarnachowdhury_soma@cloudshell:~ (hw2p1-image)$
```