

AI Platform: Custom Classification

Creation of Storage bucket and downloading of the custom code

```
Getting started - Go... Settings - IAM & Admin... Home - CMPE258DL... Storage browser - S... Home - CMPE258DL... automl_vid...ification... Datasets - AI Platform... https://console.cloud.google.com/home/dashboard?project=cmpe258dl&cloudshell=true&_ga=2.11757190... DISMISS ACTIVATE
Google Cloud Platform CMPE258DL Search products and resources
DASHBOARD ACTIVITY RECOMMENDATIONS + CREATE RESOURCE CUSTOMIZE
CLOUD SHELL Terminal (cmpe258dl) x + v Open Editor
Free trial status: $300.00 credit and 91 days remaining - with a full account, you'll get unlimited access to all of Google Cloud Platform.
raghavadevaraje_urs@cloudshell:~ (cmpe258dl)$ gsutil mb -p cmpe258dl -l us-central1 gs://cmpe258dl-ct
Creating gs://cmpe258dl-ct...
raghavadevaraje_urs@cloudshell:~ (cmpe258dl)$ gsutil cp gs://cloud-samples-data/ai-platform/hello-custom-sample-v1beta1.tar.gz - | tar -xvz
hello-custom-sample/
hello-custom-sample/webapp/
hello-custom-sample/function/
hello-custom-sample/main.py
hello-custom-sample/trainer/
hello-custom-sample/trainer/task.py
hello-custom-sample/trainer/_init_.py
hello-custom-sample/function/requirements.txt
hello-custom-sample/function/main.py
hello-custom-sample/webapp/index.html
hello-custom-sample/webapp/index.html
hello-custom-sample/webapp/image-list.txt
hello-custom-sample/webapp/index.css
hello-custom-sample/webapp/main.js
hello-custom-sample/webapp/function-url.js
raghavadevaraje_urs@cloudshell:~ (cmpe258dl)$ cd hello-custom-sample
raghavadevaraje_urs@cloudshell:~/hello-custom-sample (cmpe258dl)$ ls -lpr
.:
total 16
drwxr-xr-x 2 raghavadevaraje_urs raghavadevaraje_urs 4096 Feb 18 23:49 function/
-rw-r--r-- 1 raghavadevaraje_urs raghavadevaraje_urs 310 Oct 8 19:11 setup.py
drwxr-xr-x 2 raghavadevaraje_urs raghavadevaraje_urs 4096 Oct 8 22:28 trainer/
drwxr-xr-x 2 raghavadevaraje_urs raghavadevaraje_urs 4096 Feb 18 23:49 webapp/
./function:
total 8
-rw-r--r-- 1 raghavadevaraje_urs raghavadevaraje_urs 3171 Oct 8 19:10 main.py
-rw-r--r-- 1 raghavadevaraje_urs raghavadevaraje_urs 167 Oct 8 19:09 requirements.txt
./trainer:
total 4
-rw-r--r-- 1 raghavadevaraje_urs raghavadevaraje_urs 0 May 14 2020 _init_.py
-rw-r--r-- 1 raghavadevaraje_urs raghavadevaraje_urs 2746 Oct 8 19:04 task.py
./webapp:
total 144
-rw-r--r-- 1 raghavadevaraje_urs raghavadevaraje_urs 164 Oct 8 22:24 function-url.js
-rw-r--r-- 1 raghavadevaraje_urs raghavadevaraje_urs 130482 May 14 2020 image-list.txt
-rw-r--r-- 1 raghavadevaraje_urs raghavadevaraje_urs 439 May 14 2020 index.css
-rw-r--r-- 1 raghavadevaraje_urs raghavadevaraje_urs 1710 Jun 16 2020 index.html
-rw-r--r-- 1 raghavadevaraje_urs raghavadevaraje_urs 3634 Jun 17 2020 main.js
raghavadevaraje_urs@cloudshell:~/hello-custom-sample (cmpe258dl)$
```

Upload your training application to Cloud Storage

```
Getting started - Go... Settings - IAM & Admin... Home - CMPE258DL... Storage browser - S... Home - CMPE258DL... automl_vid...ification... Datasets - AI Platform... https://console.cloud.google.com/home/dashboard?project=cmpe258dl&cloudshell=true&_ga=2.11757190... DISMISS ACTIVATE
Google Cloud Platform CMPE258DL Search products and resources
DASHBOARD ACTIVITY RECOMMENDATIONS + CREATE RESOURCE CUSTOMIZE
CLOUD SHELL Terminal (cmpe258dl) x + v Open Editor
Free trial status: $300.00 credit and 91 days remaining - with a full account, you'll get unlimited access to all of Google Cloud Platform.
-rw-r--r-- 1 raghavadevaraje_urs raghavadevaraje_urs 3634 Jun 17 2020 main.js
raghavadevaraje_urs@cloudshell:~/hello-custom-sample (cmpe258dl)$ less trainer/task.py
raghavadevaraje_urs@cloudshell:~/hello-custom-sample (cmpe258dl)$
raghavadevaraje_urs@cloudshell:~/hello-custom-sample (cmpe258dl)$ python3 setup.py sdist --formats=gztar
running sdist
running _check
running _info
creating hello_custom_training.egg-info
writing hello_custom_training.egg_info/PKG-INFO
writing dependency_links to hello_custom_training.egg_info/dependency_links.txt
writing requirements to hello_custom_training.egg_info/requirements.txt
writing manifest file 'hello_custom_training.egg_info/dependency_links.txt'
writing manifest file 'hello_custom_training.egg_info/SOURCES.txt'
writing manifest file 'hello_custom_training.egg_info/SOURCES.txt'
warning: sdist: standard file not found: should have one of README, README.rst, README.txt, README.md
warning: check: check: missing required meta-data: url
warning: check: missing meta-data: either (author and author_email) or (maintainer and maintainer_email) must be supplied
creating hello-custom-training-2.0
creating hello-custom-training-2.0/hello_custom_training.egg-info
creating hello-custom-training-2.0/trainer
copying files hello-custom-training-2.0...
copying setup.py -> hello-custom-training-2.0
copying hello_custom_training.egg_info/PKG-INFO -> hello-custom-training-2.0/hello_custom_training.egg_info
copying hello_custom_training.egg_info/dependency_links.txt -> hello-custom-training-2.0/hello_custom_training.egg_info
copying hello_custom_training.egg_info/requirements.txt -> hello-custom-training-2.0/hello_custom_training.egg_info
copying hello_custom_training.egg_info/SOURCES.txt -> hello-custom-training-2.0/hello_custom_training.egg_info
copying hello_custom_training.egg_info/top_level.txt -> hello-custom-training-2.0/hello_custom_training.egg_info
copying trainer/_init_.py -> hello-custom-training-2.0/trainer
copying trainer/task.py -> hello-custom-training-2.0/trainer
Writing HelloCustomTraining-2.0/setup.cfg
creating dist
Creating tar archive
removing 'hello-custom-training-2.0' (and everything under it)
raghavadevaraje_urs@cloudshell:~/hello-custom-sample (cmpe258dl)$ gsutil cp dist/hello-custom-training-2.0.tar.gz \ gs://cmpe258dl-ct/training/
invalidURLException: Invalid URL scheme "gs".
raghavadevaraje_urs@cloudshell:~/hello-custom-sample (cmpe258dl)$ gsutil cp dist/hello-custom-training-2.0.tar.gz \
> gs://cmpe258dl-ct/training/
Copying file:///dist/hello-custom-training-2.0.tar.gz [Content-Type:application/x-tar]...
/[1 files][ 1.9 KiB 1.9 KiB]
Operation completed over 1 objects/1.9 KiB.
raghavadevaraje_urs@cloudshell:~/hello-custom-sample (cmpe258dl)$
```

Run a custom training pipeline

The screenshot shows the Google Cloud Platform AI Platform (Unified) interface. On the left, a sidebar lists options like Dashboard, Datasets, Labeling tasks, Notebooks, Training (which is selected), Models, Endpoints, and Batch predictions. The main content area displays a custom training job named "hello_custom-custom-job". A message at the top states: "Training began at Feb 20, 2021, 11:21:51 AM and is still in progress." Below this, detailed job information is shown in tables:

Status	Pending
Custom job ID	6212557356283199488
Created	Feb 20, 2021, 11:21:51 AM
Start time	Feb 20, 2021, 11:21:51 AM
Elapsed time	19 sec
Region	us-central1
Encryption type	Google-managed key

Machine type (Worker pool 0)	n1-standard-4
Machine count (Worker pool 0)	1
Container Location (Worker pool 0)	us.gcr.io/cloud-aiplatform/training/tf-cpu.2-1:latest

Algorithm	Custom
Objective	Unknown
Container (Training)	Prebuilt; TensorFlow 2.1; Python 3.7
Package locations	gs://cmpe258dl-ct/training/hello-custom-training-2.0.tar.gz
Logs	View logs

Below these tables, there is a link to "VIEW CUSTOM JOB INPUTS IN JSON". Underneath, there are tabs for "CPU", "GPU", and "NETWORK". At the bottom right, there are "COLLAPSE ALL" and "EXPAND ALL" buttons.

The screenshot shows the Google Cloud Platform Logs Explorer interface. On the left, a sidebar lists Operations Logging, Logs Explorer (which is selected), Logs Dashboard, Logs-based Metrics, Logs Router, and Logs Storage. The main content area shows a query preview: "resource.labels.job_id='6212557356283199488' timestamp>='2021-02-20T19:21:51.419393Z'&interval=NO_LIMIT&project=cmpe258dl". Below this, there are sections for "Log fields", "Histogram", and "Query results". The histogram shows a single data point at 1.0 for the timestamp range from Feb 20, 11:21:50 AM to Feb 20, 11:22:54 AM. The query results table shows one log entry: "2021-02-20 11:21:51.823 PST service Waiting for job to b...". To the right, there is a sidebar titled "Recommended for you" with sections for "Sample queries", "5 favorite tools for improved log analytics", "Viewing logs", and "You might also like".

```

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]"
raghavadevarajee_urs@cloudshell:~$ gcloud config set project cmpe258d1
Updated property [core/project].
raghavadevarajee_urs@cloudshell:~$ (cmpe258d1)$ less function/main.py
function/main.py: No such file or directory
raghavadevarajee_urs@cloudshell:~$ cd hello-custom-sample/
raghavadevarajee_urs@cloudshell:~/hello-custom-sample (cmpe258d1)$ less function/main.py
raghavadevarajee_urs@cloudshell:~/hello-custom-sample (cmpe258d1)$ less function/main.py
raghavadevarajee_urs@cloudshell:~/hello-custom-sample (cmpe258d1)$ gcloud functions deploy classify_flower \
> --region us-central1 \
> --source function \
> --runtime python37 \
> --memory 2048MB \
> --trigger http \
> --allow-unauthenticated \
> --set-env-vars ENDPOINT_ID="7868738527062654976"
API [cloudfunctions.googleapis.com] not enabled on project
[530178337192]. Would you like to enable and retry (this will take a few minutes)? (y/N)? y
Enabling service [cloudfunctions.googleapis.com] on project [530178337192]...
Operation "operations/aci.p2-530178337192-2e27492f-4620-4ee3-a89b-17e6c4b822e6" finished successfully.

```

Create an endpoint

```

15     aip_client = aiplatform.gapic.PredictionServiceClient(client_options={
16         'api_endpoint': 'us-central1-prediction-aiplatform.googleapis.com'
17     })
18     aip_endpoint_name = f'projects/{os.environ["GCP_PROJECT"]}/locations/us-central1/endpoints/{os.environ["ENDPOINT_ID"]}'
19
20     def get_prediction(instance):
21         logging.info('Sending prediction request to AI Platform ...')
22         try:
23             pb_instance = json_format.ParseDict(instance, Value())
24             response = aip_client.predict(endpoint=aip_endpoint_name,
25                                           instances=[pb_instance])
26             return list(response.predictions[0])
27         except Exception as err:
28             logging.error(f'Prediction request failed: {type(err)}: {err}')
29             return None
30

```

For Cloud Build Stackdriver Logs, visit: https://console.cloud.google.com/logs/viewer?project=cmpe258d1&advancedFilter=resource.type%3Dbuild%0Aresource.labels.build_id%3Db49f38f1-13f1-47a2-bcfa-67b84e9557250AlogName%3Dprojects%2Fcmpe258d1%2Flogs%2Fcloudbuild

Deploying function (may take a while - up to 2 minutes)...done.

availableMemoryMb: 2048

buildId: b49f38f1-13f1-47a2-bcfa-67b84e955725

entryPoint: classify_flower

environmentVariables:

ENDPOINT_ID: '7868738527062654976'

httpsTrigger:

securityLevel: SECURE_OPTIONAL

url: https://us-central1-cmpe258d1.cloudfunctions.net/classify_flower

ingressSettings: ALLOW_ALL

labels:

deployment-tool: cli-gcloud

name: projects/cmpe258d1/locations/us-central1/functions/classify_flower

runtime: python37

serviceAccountEmail: cmpe258d1@appspot.gserviceaccount.com

sourceUploadUrl: https://storage.googleapis.com/gcf-upload-us-central1-be316e73-bdc4-4039-bae7-e7a6747572a5/13016db7-7063-4dcb-99a4-f3d0ed7b5265.zip?GoogleAccessId=service-530178337192@gcf-admin-worker.iam.gserviceaccount.com&Expires=161380463&Signature=g%2Fo5aFoD9AaC0917419Rg9j6j7UKxEnVkJxWrkaXwstFPckK0BLcf88bgIkLz7EB2UAodWbWOFpIvZGO%QkuQ1%2FhqNXBuWuQF0pHLL66cgY4pE81sY07J0N2B35851wvOuhcMSynGWhetQ67aeXb5jCrffpanOCAGhK0w5pFvVHx3ftvSQIPIfrKKNuw3tgPbu5kzqPval0y9MQRuZVf2gPhLIVyiCaAnyXDCjejeaPq2wbQLfgibKzHY%2Fog9zRdezzs6QfHgOH0dKKrgNUNV2tC1mRhngQmBVyjtkzAdkPle6i0u1vzu02id6xDUwugXw%3D%3D

startContainer: TRUE

timeout: 60

updateTime: '2021-02-21T03:41:33.723Z'

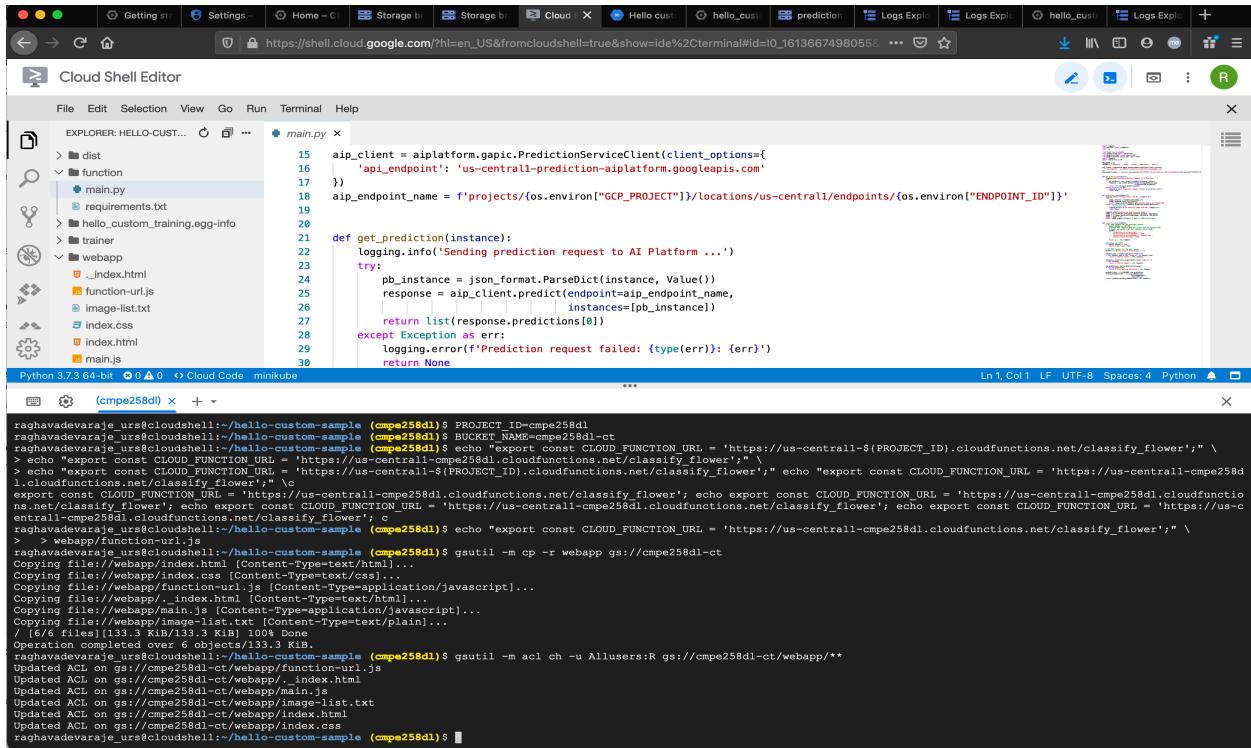
versionId: '3'

raghavadevarajee_urs@cloudshell:~/hello-custom-sample (cmpe258d1)\$ PROJECT_ID=cmpe258d1

raghavadevarajee_urs@cloudshell:~/hello-custom-sample (cmpe258d1)\$ BUCKET_NAME=cmpe258d1-ct

raghavadevarajee_urs@cloudshell:~/hello-custom-sample (cmpe258d1)\$

Deploy a Cloud Function



The screenshot shows the Cloud Shell Editor interface. The left sidebar lists project files: dist, function (with main.py), requirements.txt, hello_custom_training.egg-info, trainer, and webapp (containing .index.html, function-url.js, image-list.txt, index.css, index.html, and main.js). The main editor area contains the main.py code:

```
15     aip_client = aiplatform.gapic.PredictionServiceClient(client_options={
16         'api_endpoint': 'us-central1-prediction-aiplatform.googleapis.com'
17     })
18     aip_endpoint_name = f'projects/{os.environ["GCP_PROJECT"]}/locations/us-central1/endpoints/{os.environ["ENDPOINT_ID"]}'
19
20     def get_prediction(instance):
21         logging.info('Sending prediction request to AI Platform ...')
22         try:
23             pb_instance = json_format.ParseDict(instance, Value())
24             response = aip_client.predict(endpoint=aip_endpoint_name,
25                                            instances=[pb_instance])
26             return list(response.predictions[0])
27         except Exception as err:
28             logging.error(f'Prediction request failed: {type(err)}: {err}')
29
30     return None
```

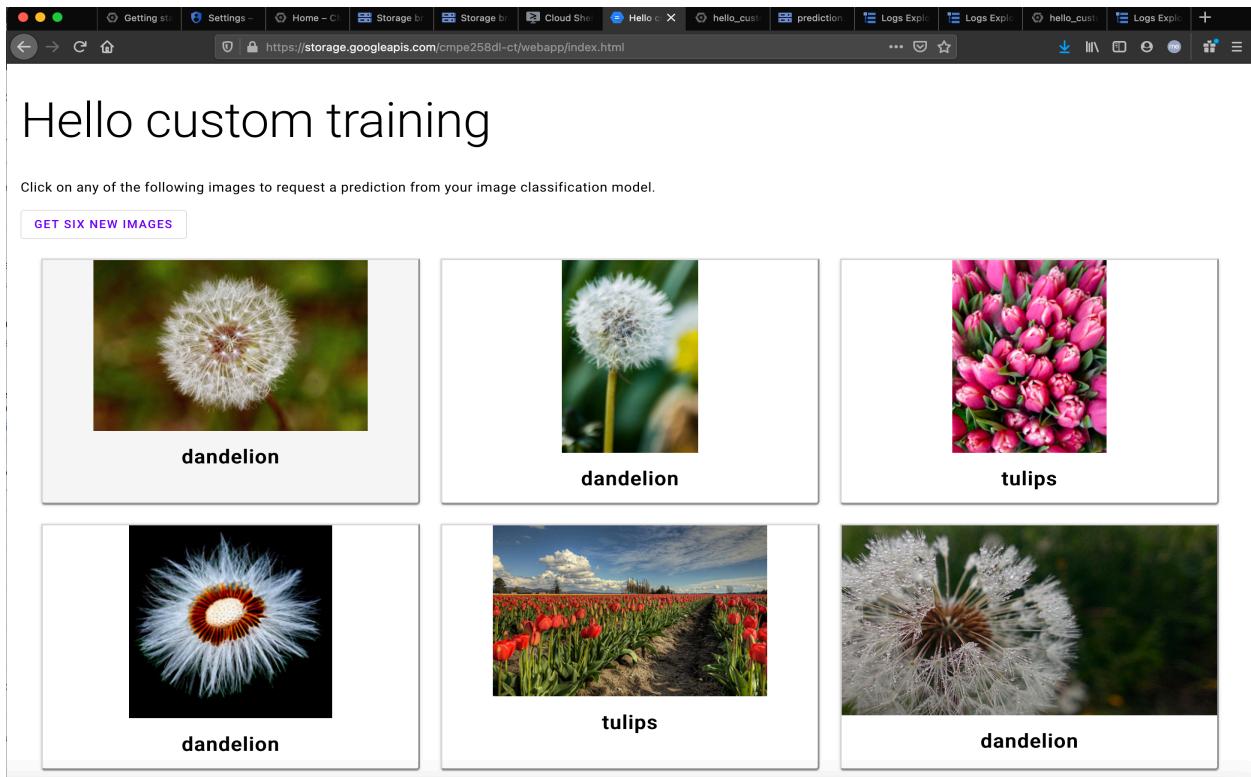
Below the code, a terminal window shows the deployment command:

```
raghavadevaraj@rsh-usr@cloudshell:~/hello-custom-sample (cmpe258dl)$ gcloud functions deploy classify_flower --runtime python37 --trigger-http --allow-unauthenticated
Function deployed successfully.
Function URL: https://us-central1-cmpe258dl.cloudfunctions.net/classify_flower
```

The terminal also shows the creation of a Cloud Storage bucket:

```
Creating new bucket cmpe258dl-staging.
```

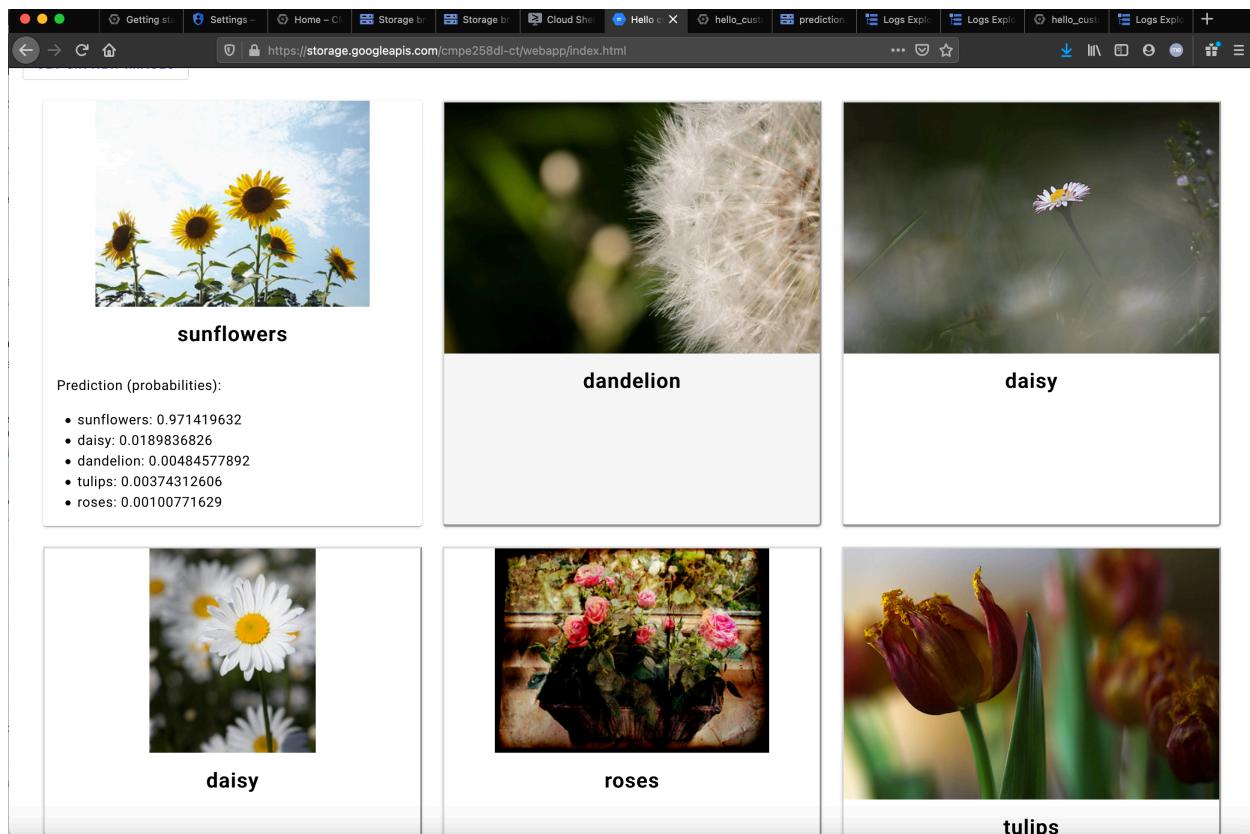
Use a web app to send prediction requests



The screenshot shows a web browser window with the URL <https://storage.googleapis.com/cmpe258dl-ct/webapp/index.html>. The page title is "Hello custom training". It displays a grid of six images for prediction:

- A dandelion flower labeled "dandelion".
- A dandelion flower labeled "dandelion".
- A cluster of pink tulips labeled "tulips".
- A close-up of a dandelion flower labeled "dandelion".
- A field of red tulips under a cloudy sky labeled "tulips".
- A close-up of a dandelion flower labeled "dandelion".

Below the images, there is a button labeled "GET SIX NEW IMAGES".



Remove endpoint

Your endpoint will no longer be available for online prediction requests.

Remove endpoint "hello_custom"?

CANCEL CONFIRM

The screenshot shows the Google Cloud Platform AI Platform (Unified) Models page. The left sidebar lists options: Dashboard, Datasets, Labeling tasks, Notebooks, Training, Models (which is selected), Endpoints, and Batch predictions. The main content area has tabs for Models (selected), PREVIEW, CREATE, and IMPORT. A message at the top encourages upgrading the account. The Models table shows two entries:

Name	ID	Type	Created	Notifications	Metadata
hello_custom	2305016	Custom trained	Feb 20, 2021, 12:24:06 PM		
automl_text_classification_model1	7743112	Text classification	Feb 18, 2021, 3:36:25 PM		

A modal dialog titled "Delete model" is open, asking if the user wants to proceed with the deletion. It includes a message: "Your model and its evaluations will be removed from your Google Cloud project. This may affect any active endpoints using this model. Delete model 'hello_custom'?", with "CANCEL" and "DELETE" buttons.