

Custom Training

```
Updated property [core/project].  
teepika_ramasamyramuthu@cloudshell:~ (direct-hope-306504)$ gsutil cp gs://cloud-samples-data/ai-platform/hello-custom/hello-custom-sample-v1beta1.tar.gz - | tar -xv  
hello-custom-sample/  
hello-custom-sample/webapp/  
hello-custom-sample/function/  
hello-custom-sample/setup.py  
hello-custom-sample/trainer/  
hello-custom-sample/trainer/task.py  
hello-custom-sample/trainer/_init_.py  
hello-custom-sample/function/requirements.txt  
hello-custom-sample/function/main.py  
hello-custom-sample/webapp/.index.html  
hello-custom-sample/webapp/index.html  
hello-custom-sample/webapp/image-list.txt  
hello-custom-sample/webapp/index.css  
hello-custom-sample/webapp/main.js  
hello-custom-sample/webapp/function-url.js  
teepika_ramasamyramuthu@cloudshell:~ (direct-hope-306504)$  
teepika_ramasamyramuthu@cloudshell:~ (direct-hope-306504)$  
teepika_ramasamyramuthu@cloudshell:~ (direct-hope-306504)$  
teepika_ramasamyramuthu@cloudshell:~ (direct-hope-306504)$  
teepika_ramasamyramuthu@cloudshell:~ (direct-hope-306504)$  
teepika_ramasamyramuthu@cloudshell:~ (direct-hope-306504)$
```

```
teepika_ramasamyramuthu@cloudshell:~/hello-custom-sample (direct-hope-306504)$ python3 setup.py sdist --formats=gztar  
running sdist  
running egg_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 top-level names to hello_custom_training.egg-info/top_level.txt  
writing manifest file 'hello_custom_training.egg-info/SOURCES.txt'  
reading 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  
  
running check  
warning: 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 to 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/SOURCES.txt -> 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/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 hello-custom-training-2.0/setup.cfg  
creating dist  
Creating tar archive  
removing 'hello-custom-training-2.0' (and everything under it)
```

```

ServiceException: 401 Anonymous caller does not have storage.objects.create access to the Google Cloud Storage object.
teeplika_ramasamy@cloudshell:~/hello-custom-sample (direct-hope-306504)$ gcloud auth login
Go to the following link in your browser:
https://accounts.google.com/o/oauth2/auth?response_type=code&client_id=32555940559.apps.googleusercontent.com&redirect_uri=urn%3Aietf%3Awg%3Auth%3A2.0%3Aob&scope=openid+https%3A%2F%2Fwww.googleapis.com%2Fauth%2Fuserinfo.email+https%3A%2F%2Fwww.googleapis.com%2Fauth%2Fcloud-platform+https%3A%2F%2Fwww.googleapis.com%2Fauth%2Faccounts.readonly&state=WtTICU2ZFOuNFSwAAuri6MwIcJzprmpot-consentaccess_type=offline&code_challenge=BMywq-BgKfT7vtexb0czewObzJzGFJzQy_N6gqll8&code_challenge_method=S256
Enter verification code: 4/1AYOe-j7p76onEMUytK21Al4PKXYnbneNaFlp4vArus8WbQQu5RgCoVKALzOc
You are now logged in as teeplika_ramasamy@ramasamy@sjtu.edu.
Your current project is (direct-hope-306504). You can change this setting by running:
$ gcloud config set project PROJECT_ID
teeplika_ramasamy@cloudshell:~/hello-custom-sample (direct-hope-306504)$ gcloud auth application-default login
You are running on a Google Compute Engine virtual machine.
The service credentials associated with this virtual machine
will automatically be used by Application Default
Credentials, so it is not necessary to use this command.

If you decide to proceed anyway, your user credentials may be visible
to others with access to this virtual machine. Are you sure you want
to authenticate with your personal account?

Do you want to continue (Y/n)? Y
Go to the following link in your browser:
https://accounts.google.com/o/oauth2/auth?response_type=code&client_id=764086051850-6qr4p6gi6hn506pt8ejug83di34lhr.apps.googleusercontent.com&redirect_uri=urn%3Aietf%3Awg%3Auth%3A2.0%3Aob&scope=openid+https%3A%2F%2Fwww.googleapis.com%2Fauth%2Fuserinfo.email+https%3A%2F%2Fwww.googleapis.com%2Fauth%2Fcloud-platform+https%3A%2F%2Fwww.googleapis.com%2Fauth%2Faccounts.readonly&state=xMCbPQf7nnDPkifijayaUztUo+prompt=consent&access_type=offline&code_challenge=cIAUB6fcAapUteCo_0yi1mrtKWFtIAp23Bp-1fOK&code_challenge_method=S256
Enter verification code: 4/1AYOe-j5d_D4qIXRNfkyaolsA_uzsxIgX0ac2T8_JpNVH07iW9977R10YFQ
Credentials saved to file: (/tmp/tmp.n9Vrjx2jE/application_default_credentials.json)

These credentials will be used by any library that requests Application Default Credentials (ADC).
/usr/bin/../lib/google-cloud-sdk/lib/third_party/google/auth/_default.py:69: UserWarning: Your application has authenticated using end user credentials from Google Cloud SDK without a quota project. You might receive a "quota exceeded" or "API not enabled" error. We recommend you run 'gcloud auth application-default login' and make sure a quota project is added. Or you can use service accounts instead. For more information about service accounts, see https://cloud.google.com/docs/authentication/
warnings.warn(CLQUOTD_SIN_CREDENTIAIS_WARNING)

Quota project "direct-hope-306504" was added to ADC which can be used by Google client libraries for billing and quota. Note that some services may still bill the project owning the resource.
teeplika_ramasamy@cloudshell:~/hello-custom-sample (direct-hope-306504)$
teeplika_ramasamy@cloudshell:~/hello-custom-sample (direct-hope-306504)$
teeplika_ramasamy@cloudshell:~/hello-custom-sample (direct-hope-306504)$ teeplika_ramasamy@cloudshell:~/hello-custom-sample (direct-hope-306504)$ gutil cp dist/hello-custom-training-2.0.tar.gz gs://direct-hope-306504-custom/training/
Copying file:/dist/hello-custom-training-2.0.tar.gz [Content-Type=application/x-tar]...
/ [1 files] | 1.9 KB/ 1.9 KB
Operation completed over 1 objects/1.9 KB.

```

direct-hope-306504-custom

OBJECTS		CONFIGURATION		PERMISSIONS	
UPLOAD FILES	UPLOAD FOLDER	CREATE FOLDER	MANAGE HOLDS	DOWNLOAD	DELETE
Buckets > direct-hope-306504-custom > training 					
Filter by name prefix only ▾	 Filter	Filter objects and folders			
<input type="checkbox"/>	Name	Size	Type	Created time	Storage class
<input type="checkbox"/>	 hello-custom-trainin...	1.9 KB	application/x-tar	Mar 7, 2021, 2:08:...	Standard
Last modified					
Mar 7					

Train new model

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

START TRAINING

CANCEL

Dataset *

No managed dataset

Annotation set

-

Objective

Custom

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

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

AutoML

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

AutoML Edge

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

Custom training (advanced)

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

CONTINUE

Train new model

Choose training method

Define your model

3 Training container

4 Hyperparameter tuning
(Optional)

5 Compute and pricing

6 Prediction container
(Optional)

START TRAINING

CANCEL

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

Pre-built container

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

Custom container

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

Pre-built container settings

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

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

Model framework *

TensorFlow

Model framework version *

2.1

Package location (Cloud Storage path) *

gs:// direct-hope-306504-custom/training/hello-custom-train [BROWSE](#)

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

[+ ADD PACKAGE](#)

Python module *

trainer.task

Model output directory

gs:// direct-hope-306504-custom/output/ [BROWSE](#)

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

Train new model

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

START TRAINING CANCEL

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

Region *

us-central1 (Iowa) ▾

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

Compute settings

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

Worker pool 0

Machine type *

n1-standard-4, 4 vCPUs, 15 GiB memory ▾

Accelerator type

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

Worker count

1

Disk type

SSD ▾

Disk size (GB)

100

▼ ADD MORE WORKER POOLS (OPTIONAL)

CONTINUE

Train new model

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

START TRAINING

CANCEL

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

No prediction container

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

Pre-built container

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

Custom container

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

Pre-built container settings

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

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

Model framework *

TensorFlow

Model framework version *

2.1

Accelerator type *

None

Model directory *

 gs:// direct-hope-306504-custom/output/

BROWSE

Cloud Storage location containing the model artifact and any supporting files

Predict schemata

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

 gs:// Instances

BROWSE

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

 gs:// Parameters

BROWSE

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

[!\[\]\(ff1f7d8219d02d524c6f11d06b013128_img.jpg\) custom_model](#)

 Training began at Mar 7, 2021, 2:29:46 PM and is still in progress.

Status	Running
Training pipeline ID	9018185574925729792
Created	Mar 7, 2021, 2:29:36 PM
Start time	Mar 7, 2021, 2:29:46 PM
Elapsed time	4 min 1 sec
Region	us-central1
Encryption type	Google-managed key
Custom job	5955737828313792512
Machine type (Worker pool 0)	n1-standard-4
Machine count (Worker pool 0)	1
Container Location (Worker pool 0)	us-docker.pkg.dev/cloud-aiplatform/training/tf-cpu.2-1:latest
Dataset	No managed dataset
Algorithm	Custom training
Objective	Custom
Container (Training)	Prebuilt; TensorFlow 2.1; Python 3.7
Package locations	gs://direct-hope-306504-custom/training/hello-custom-training-2.0.tar.gz
Container (inference)	Prebuilt; TensorFlow 2.1; Python 3.7
Container Location (inference)	us-docker.pkg.dev/cloud-aiplatform/prediction/tf2-cpu.2-1:latest

Logs Explorer **OPTIONS** ▾ **REFINE SCOPE** **Project** **SHARE LINK** **QUERY SPECIFIED RANGE** **PAGE LAYOUT**

(i) New features are available in the Logs Explorer. **Dismiss** **Learn more**

Query preview
resource.labels.job_id="5955737828313792512" timestamp>="2021-03-07T22:29:47.143196Z"

Log fields **Histogram**
Search fields and values
RESOURCE TYPE
Cloud ML Job 3
SEVERITY
Info 3

Query results
SEVERITY TIMESTAMP PST SUMMARY

(i) Showing logs for time specified in query. To view more results update your query.

2021-03-07 14:29:47.876 PST Waiting for job to be provisioned.
textPayload: "Waiting for job to be provisioned."
insertId: "iliow0c32m"
resource: {
 timestamp: "2021-03-07T22:29:47.876001868Z"
 severity: "INFO"
}
labels: {
 logName: "projects/direct-hope-306504/logs/ml.googleapis.com%2F5955737828313792512"
 receiveTimestamp: "2021-03-07T22:29:49.377119001Z"
}

> 2021-03-07 14:32:48.404 PST Waiting for training program to start.
> 2021-03-07 14:32:48.942 PST Job is preparing.

5 days remaining - with a full account, you'll get unlimited access to all of Google Cloud Platform.

Deep Learning - Assignment 2 ▾

Search products and resources

custom_model

DEPLOY & TEST BATCH PREDICTIONS MODEL PROPERTIES

Deploy your model

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

DEPLOY TO ENDPOINT

Endpoint	ID	Models	Region
No active endpoints containing this model			

Test your model [PREVIEW]

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

Deploy to endpoint

1 Define your endpoint

2 Endpoint details

DEPLOY CANCEL

Create new endpoint Add to existing endpoint

Endpoint name * custom_model_endpoint

Model settings

custom_model

Traffic split * 100 %

Compute resources

Choose how compute resources will serve prediction traffic to your model

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

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

Minimum number of compute nodes * 1

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

Maximum number of compute nodes (optional)

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

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

Service account

Google Cloud Platform Deep Learning - Assignment 2 ▾

Search products and resources

AI Platform (Unified) custom_model_endpoint EDIT SETTINGS SAMPLE REQUEST

Dashboard Datasets Labeling tasks Notebooks Training Models Endpoints Batch predictions

Region us-central1

Logs [View Logs](#)

Model	Traffic split	Compute nodes	Type
custom_model	100%	Manual	Custom trained

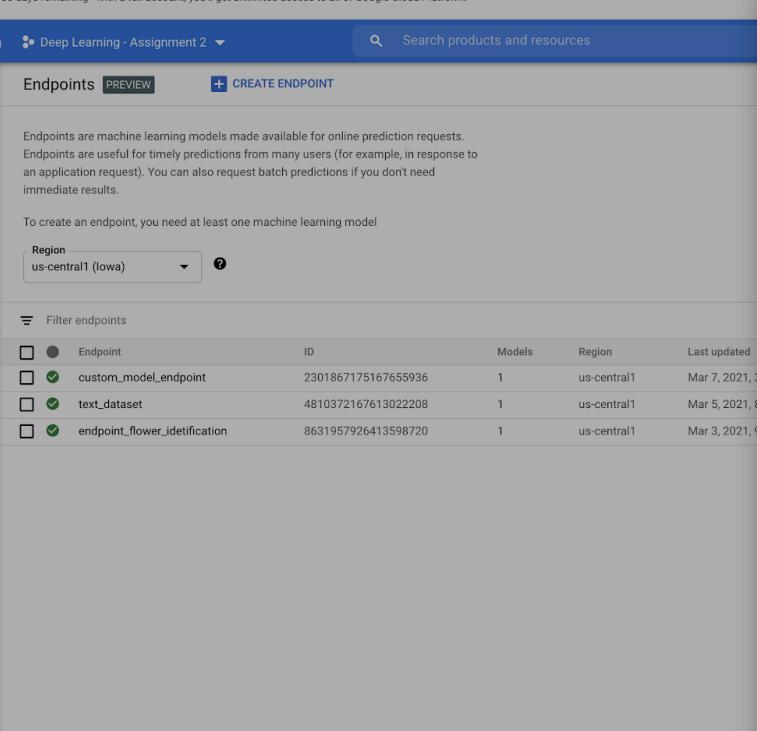
DEPLOY ANOTHER MODEL

Chart Interval: 1 hour 6 hours 12 hours 1 day 2 days 4 days 7 days 14 days 30 days

Predictions/second

No data is available for the selected time frame.

85 days remaining - with a full account, you'll get unlimited access to all of Google Cloud Platform.



Endpoints [PREVIEW](#) [CREATE ENDPOINT](#)

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

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

Region: us-central1 (Iowa) [?](#)

Filter endpoints

Endpoint	ID	Models	Region	Last updated
<input type="checkbox"/> custom_model_endpoint	2301867175167655936	1	us-central1	Mar 7, 2021, 3:30 AM
<input type="checkbox"/> text_dataset	4810372167613022208	1	us-central1	Mar 5, 2021, 8:30 PM
<input type="checkbox"/> endpoint_flower_idetification	8631957926413598720	1	us-central1	Mar 3, 2021, 9:30 PM

Sample Request

[REST](#) [PYTHON](#)

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

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

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

3. Create a JSON object to hold your data.

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

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

```
$ ENDPOINT_ID="2301867175167655936"
PROJECT_ID="direct-hope-386504"
INPUT_DATA_FILE="INPUT-JSON"
```

5. Execute the request.

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

[DONE](#)

Details

Name
Cloud Build API

By
Google

Service name
cloudbuild.googleapis.com

Overview
Creates and manages builds on Google Cloud Platform.

Activation status
Enabled

```
teepika_ramasamyamarimuthu@cloudshell:~/hello-custom-sample (direct-hope-306504)$ gcloud functions deploy classify_flower --region us-central1 --source=function --runtime=python37 --memory=2048MB --trigger-http --allow-unauthenticated --set-env-vars ENDPOINT_ID=2301867175167655936
Deploying function (may take a while - up to 2 minutes)...
For Cloud Build Stackdriver Logs, visit: https://console.cloud.google.com/logs/viewer?project=direct-hope-306504&advancedFilter=resource.type%3Dbuild%0Aresource.labels.build_id%3D7edd5a5a-7667-47b9-alb5-f452e62c88b1%0AlogName%3Dprojects%2Fdirect-hope-306504%2Flogs%2Fcloudbuild
Deploying function (may take a while - up to 2 minutes)...done.
availableMemoryMb: 2048
buildId: 7edd5a5a-7667-47b9-alb5-f452e62c88b1
entryPoint: classify_flower
environmentVariables:
  ENDPOINT_ID: '2301867175167655936'
httpsTrigger:
  securityLevel: SECURE OPTIONAL
  url: https://us-central1-direct-hope-306504.cloudfunctions.net/classify_flower
ingressSettings: ALLOW_ALL
labels:
  deployment-tool: cli-gcloud
name: projects/direct-hope-306504/locations/us-central1/functions/classify_flower
runtime: python37
serviceAccountEmail: direct-hope-306504@appspot.gserviceaccount.com
sourceUploadUrl: https://storage.googleapis.com/gcf-upload-us-central1-09b40182-6e84-417e-b6e8-17703cf78503/6f87e406-7afc-4181-8c94-7c2da422e0da.zip?GoogleAccessId=service-990704915987@gcf-admin-robot.iam.gserviceaccount.com&Expires=1615164444&Signature=FHSnAijxRVBg8C2DpmcDl2LOGBCNA%2BXp%2FaWlXEXZ2msHPTNYXHFxIBDtngq4xQZV%2FKhxFrRxLTlsLbIY%2Bz%2BzoyUkSyJ1ZEIz55NuLl9jJ6gi4JB3%2FGnucDKMzIl6d28r5rTVkPiSdfcl%2B5AacPnoG9hnr4mpzQowOLgJEVtL381AU2WN1qOUeWNxWAy565KPF%2F%2FGn2s7xvfq7ImfdSQ5q8TLUKEwewhn81DmTYN%2FLbxQvwuVas%2BRV4Pj%2FROMHFnN4MK%2FHAskliTHftg%2FAT6VYxhRnbz4hfUZimfhnyC%2FrVgVRVawHRKwpCGJZKBRh6KB099WqmojhWGELEX3tgpw%3D%3D
status: ACTIVE
timeout: 60s
updateTime: '2021-03-08T00:21:29.129Z'
versionId: '3'
```

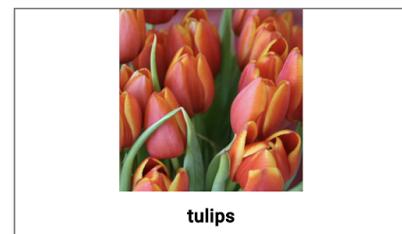
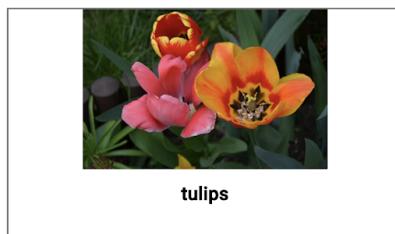
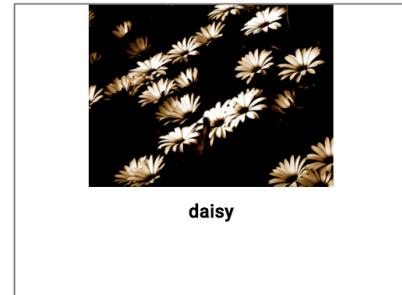
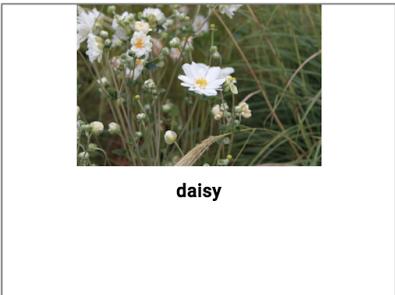
```
teepika_ramasamyamarimuthu@cloudshell:~/hello-custom-sample (direct-hope-306504)$ gsutil -m cp -r webapp gs://${BUCKET_NAME}/
Copying file://webapp/function-url.js [Content-Type=application/javascript]...
Copying file://webapp/index.html [Content-Type=text/html]...
Copying file://webapp/.index.html [Content-Type=text/html]...
Copying file://webapp/main.js [Content-Type=application/javascript]...
Copying file://webapp/image-list.txt [Content-Type=text/plain]...
Copying file://webapp/index.css [Content-Type=text/css]...
- [6/6 files][133.4 KiB/133.4 KiB] 100% Done
Operation completed over 6 objects/133.4 KiB.
```

```
teepika_ramasamyamarimuthu@cloudshell:~/hello-custom-sample (direct-hope-306504)$ gsutil -m acl ch -u AllUsers:R gs://${BUCKET_NAME}/webapp
/**/
Updated ACL on gs://direct-hope-306504-custom/webapp/.index.html
Updated ACL on gs://direct-hope-306504-custom/webapp/main.js
Updated ACL on gs://direct-hope-306504-custom/webapp/function-url.js
Updated ACL on gs://direct-hope-306504-custom/webapp/index.css
Updated ACL on gs://direct-hope-306504-custom/webapp/image-list.txt
Updated ACL on gs://direct-hope-306504-custom/webapp/index.html
teepika_ramasamyamarimuthu@cloudshell:~/hello-custom-sample (direct-hope-306504)$
```

Hello custom training

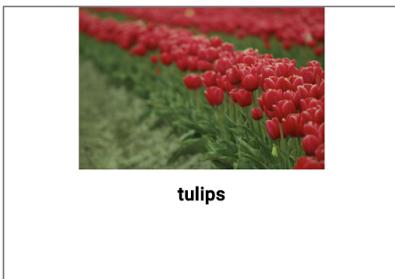
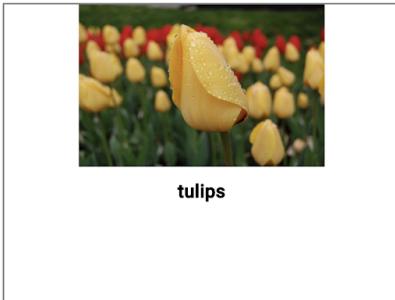
Click on any of the following images to request a prediction from your image classification model.

[GET SIX NEW IMAGES](#)



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

[GET SIX NEW IMAGES](#)



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

[GET SIX NEW IMAGES](#)



dandelion



sunflowers



tulips



sunflowers



roses



dandelion