

# Explore Machine Learning Models with Explainable AI: Challenge Lab

Let us pass!

2021-06-18

# First of all, I have tried 4 times... Orz



Is with Explainable AI: Challenge Lab

0/5



Explore Machine Learning Models with Explainable AI: Challenge Lab	Lab	23 minutes ago	1 minute ago	100.0/100.0	✓
VPC Networks - Controlling Access	Lab	about 1 hour ago	28 minutes ago	100.0/100.0	✓
Multiple VPC Networks	Lab	about 1 hour ago	about 1 hour ago	100.0/100.0	✓
User Authentication: Identity-Aware Proxy	Lab	about 6 hours ago	about 6 hours ago	100.0/100.0	✓
Explore Machine Learning Models with Explainable AI: Challenge Lab	Lab	1 day ago	about 24 hours ago	90.0/100.0	✗
Build and Secure Networks in Google Cloud	Quest	1 day ago			
Explore Machine Learning Models with Explainable AI: Challenge Lab	Lab	1 day ago	1 day ago	90.0/100.0	✗
Explore Machine Learning Models with Explainable AI: Challenge Lab	Lab	1 day ago	1 day ago	90.0/100.0	✗
Explore Machine Learning Models with Explainable AI: Challenge Lab	Lab	1 day ago	1 day ago	90.0/100.0	✗

# Deploy the models to AI Platform

Now, you'll [deploy your models](#) to the AI Platform.

**Hint:** You need to first create a storage bucket to store your models in.

## Key Step:

### Create the Complete AI Platform model

Use the following to create your first AI Platform model:

- Model Name = `complete_model`
- Version Name = `v1`
- Python version = **3.7**
- Framework = **TensorFlow**
- Framework version = `2.3.1`
- ML Runtime version = `2.3`

### Create the Limited AI Platform model

Use the following to create your second AI Platform model:

- Model Name = `limited_model`
- Version Name = `v1`
- Python version = **3.7**
- Framework = **TensorFlow**
- Framework version = `2.3.1`
- ML Runtime version = `2.3`

We should not follow this.  
We should keep using the  
Notebooks' value:

**saved\_complete\_model**  
and  
**saved\_limited\_model**

Click *Check my progress* to verify the objective.

Crad · 2 months ago · edited

Hi Chris,

This challenge has been updated and the "walkthrough" is out-of-date now.

Changes that were needed on my side in order to properly finish without any issues:

1. Change region for notebook instance to us-central1
2. Bucket HAS TO be multiregional (otherwise qwiklabs won't notice your deployed models).
3. DON'T change REGION variable to 'us-west1', keep it as 'us-central1' within the notebook
4. Qwiklabs sends a notification that you need to specify TensorFlow Runtime version to 2.3 and there are a couple changes to the directory naming schema within the bucket itself. Most up to date version creation commands are:

```
!gcloud ai-platform versions create $VERSION_NAME \  
--model=$MODEL_NAME \  
--framework='TensorFlow' \  
--runtime-version=2.3 \  
--origin=$MODEL_BUCKET/saved_complete_model/complete_model \  
--staging-bucket=$MODEL_BUCKET \  
--python-version=3.7 \  
--project=$GCP_PROJECT
```

and

```
!gcloud ai-platform versions create $VERSION_NAME \  
--model=$LIM_MODEL_NAME \  
--framework='TensorFlow' \  
--runtime-version=2.3 \  
--origin=$MODEL_BUCKET/saved_limited_model/limited_model \  
--staging-bucket=$MODEL_BUCKET \  
--python-version=3.7 \  
--project=$GCP_PROJECT
```

With these changes applied it's a breeze. Thank you for your work!

EDIT: You might also wonder whether the model names are correct. The qwiklabs notifications are specifying that the model name should be 'complete\_model' while the notebook script has 'saved\_complete\_model'. But leave it as 'saved\_complete\_model'. I already reported the issue, so this might be changed in the future, but if you leave it as is then everything's fine.

^ | v · Reply · Share >

# Key Step:

Runtime should use **2.3**

# Lesson learnt

1. True that, there are YouTube and GitHub provides some solutions.
2. But, **Qwiklabs** modified their questions time to time.
3. “Comment” is the MUST-READ!

# References

- **Explore Machine Learning Models with Explainable AI: Challenge Lab | logbook**

<https://chriskyfung.github.io/blog/qwiklabs/Explore-Machine-Learning-Models-with-Explainable-AI-Challenge-Lab> (The first comment is important!)

- **My GitHub Repo**

<https://github.com/oktak/Cloud-Study-Jam-2021>

# Thanks

- **Leonardo LEE**

He has given me the hints, and then I can pass the Lab successfully.

- **The support team of Qwiklabs**

They response quickly. Though they tried to send me some GitHub and YouTube links that they are not leading me to the final solution. (I've called support via the Chat of Qwiklabs. )

Explore Machine Learning

Notebooks – AI Platform

← → ↺

console.cloud.google.com/ai-platform/notebooks/list/instances?project=qwiklabs-gcp-04-deab0c858996

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Google Cloud Platform

qwiklabs-gcp-04-deab0c858996

🔍 Search products and resources

⌵ 🔔 ? 🗲 👤

AI Platform

Dashboard

Data Labeling

Notebooks

Pipelines

Jobs

Models

Notebooks

NEW INSTANCE

REFRESH

START

STOP

RESET

DELETE

HIDE INFO PANEL

1

Migrate your notebooks and provide the new API". [Learn more](#)

ENABLE NO

Create and use Jupyter notebooks with JupyterLab pre-installed frameworks. [Learn more](#)

Filter

Enter property

□ ●

Inst

Customize instance

Python 3

Includes scikit-learn, pandas and more

Python 3 (CUDA Toolkit 11.0)

Optimized for NVIDIA GPUs

TensorFlow Enterprise

Includes Keras, scikit-learn, pandas, NLTK and more

PyTorch 1.8

Includes scikit-learn, pandas, NLTK and more

R 4.0

Includes basic R packages, scikit-learn, pandas, NLTK and more

RAPIDS 0.18 [EXPERIMENTAL]

Optimized for NVIDIA GPUs

Kaggle Python [BETA]

Python image for Kaggle Notebooks, supporting hundreds of machine learning libraries popular on Kaggle

Theia IDE [EXPERIMENTAL]

IDE with notebook support including scikit-learn, pandas, and more

Smart Analytics Frameworks

BigQuery, Apache Beam, Apache Spark, Apache Hive, and more

Without GPUs

Without GPUs

With 1 NVIDIA Tesla T4

TensorFlow Enterprise 1.15 (with LTS)

TensorFlow Enterprise 2.1 (with LTS)

TensorFlow Enterprise 2.3 (with LTS)

TensorFlow Enterprise 2.5

Info panel

DOCUMENTATION

LABELS

[Notebook instances](#)

You don't have any notebook instances in this project yet





Migrate your notebooks to AI Platform and provides additional API. [Learn more](#)

[ENABLE NOTEBOOKS](#)

Create and use Jupyter Notebooks with JupyterLab pre-installed and various frameworks. [Learn more](#)

[Filter](#) Enter property name

☐ ☒ Instance

## New notebook instance

Instance name

tensorflow-2-3-20210618-171635

63-char limit with lowercase letters, digits, or '-' only. Must start with a letter. Cannot end with a '-'.

Region \*

us-central1 (Iowa)

Zone \*

us-central1-a

### Instance properties

Environment ?

TensorFlow Enterprise 2.3 (with LTS and Intel® MKL-DNN/MKL)

Machine type

4 vCPUs, 15 GB RAM

Boot disk

100 GB Standard persistent disk

Subnetwork

default(10.128.0.0/20)

External IP

Ephemeral(Automatic)

Extensions ?

[SELECT EXTENSIONS](#)

None selected

Permission

Compute Engine default service account

Estimated cost ?

\$102.69 monthly, \$0.141 hourly



New features of Shielded VM have been enabled for better security. To customize, click "Advanced Options". [Learn more](#)

[ADVANCED OPTIONS](#)

[CANCEL](#)

[CREATE](#)

## Info panel

[DOCUMENTATION](#)

[LABELS](#)

[Notebook instances](#)

[Notebook API](#)

You don't have any notebook instances in this project yet



## AI Platform



Dashboard



Data Labeling



Notebooks



Pipelines



Jobs



Models

## Notebooks

+ NEW INSTANCE

REFRESH

▶ START

■ STOP

RESET

DELETE

HIDE INFO PANEL



Migrate your notebook instances to the new **Notebooks API**, which manages your AI Platform Notebooks and provides additional functionality with no change in pricing. To get started, click "Enable Notebooks API". [Learn more](#)

[ENABLE NOTEBOOKS API](#)

Create and use Jupyter Notebooks with a notebook instance. Notebook instances have JupyterLab pre-installed and are configured with GPU-enabled machine learning frameworks. [Learn more](#)

Filter Enter property name or value

<input type="checkbox"/>	<input checked="" type="radio"/>	Instance name ↑	Zone	Environment Version	Auto-upgrade
<input type="checkbox"/>	<input checked="" type="radio"/>	tensorflow-2-3-20210618-171635 <a href="#">OPEN JUPYTERLAB</a>	us-central1-a		—

## Info panel

[DOCUMENTATION](#)[LABELS](#)[Notebook instances](#)[Notebook API](#)

## ← Explore Machine Learning Models with Explainable AI: Challenge Lab



End Lab 01:22:39

**Caution:** When you are in the console, do not deviate from the lab instructions. Doing so may cause your account to be blocked. [Learn more.](#)

[Open Google Console](#)

**Username**  
student-04-938bdb8bb408@

**Password**  
9pntxL4TFCy7

**GCP Project ID**  
qwiklabs-gcp-04-deab0c85

5. In the **new notebook instance** dialog, accept the default options and click **Create**.

After a few minutes, the AI Platform console will display your instance name, followed by **Open JupyterLab**.

A notification should pop up asking you to migrate your notebook instance to the new **Notebooks API**. Click **Enable Notebooks API** to give your notebook additional functionality.

6. Click **Open JupyterLab**. Your notebook is now set up.

Click *Check my progress* to verify the objective.

Start a JupyterLab Notebook Instance

[Check my progress](#)

Assessment Completed!

If you don't see a green check mark, click the **Score** fly-out in the upper right, and then click **Run Step** on the relevant step. A hint pop-up will display advice.

- GSP324
- Overview
- Challenge scenario
- Start a JupyterLab Notebook instance
- Download the Challenge Notebook
- Build and train your models
- Deploy the models to AI Platform
- Use the What-If Tool to explore biases
- Congratulations!

0/100

## ← Explore Machine Learning Models with Explainable AI: Challenge Lab

End Lab

01:22:38

Caution: When you are in the console, do not deviate from the lab instructions. Doing so may cause your account to be blocked. [Learn more.](#)

[Open Google Console](#)

Username

student-04-938bdb8bb408@



Password

9pntxL4TFCy7



GCP Project ID

qwiklabs-gcp-04-deab0c85



## Download the Challenge Notebook

1. In your notebook, click the **terminal**.

2. Clone the repo:

```
git clone https://github.com/GoogleCloudPlatform/training-data-analyst
```



3. Go to the enclosing folder: `training-data-analyst/quests/dei`.

4. Open the notebook file `what-if-tool-challenge.ipynb`.

5. Download and import the dataset `hmda_2017_ny_all-records_labels`.

All the code to download and pre-process the dataset has been provided for you. The rest of the steps will be inside the notebook file. You should refer back to this lab guide to check your progress and get some hints.

Click *Check my progress* to verify the objective.



Download the notebook and import the dataset

[Check my progress](#)

GSP324

0/100

Overview

Challenge scenario

Start a JupyterLab Notebook instance

**Download the Challenge Notebook**

Build and train your models

Deploy the models to AI Platform

Use the What-If Tool to explore biases

Congratulations!

Explore Machine Learning x

Notebooks – AI Platform x

JupyterLab - tensorflow-2 x

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← → ↺

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File Edit View Run Kernel Git Tabs Settings Help AI Platform Notebooks

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Name	Last Modified
src	2 minutes ago
tutorials	2 minutes ago


Launcher


Notebook

Python 3


Python [conda env:root] \*


Console


Python 3


Python [conda env:root] \*

Other



Terminal

Text File

Markdown File

Show Contextual Help

0

 0 

tensorflow-2-3-20210618-171635 | qwiklabs-gcp-04-deab0c858996 Git: idle

Launcher

Explore Machine Learning x Notebooks - AI Platform - x JupyterLab - tensorflow-2 x +

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File Edit View Run Kernel Git Tabs Settings Help AI Platform Notebooks

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Name	Last Modified
src	2 minutes ago
tutorials	2 minutes ago

jupyter@tensorflow-2-3-202 x

```
jupyter@tensorflow-2-3-20210618-171635:~$ git clone https://github.com/GoogleCloudPlatform/training-data-analyst
```

1 0 tensorflow-2-3-20210618-171635 | qwiklabs-gcp-04-deab0c858996 Git: idle jupyter@tensorflow-2-3-20210618-171635: ~

Explore Machine Learning x

Notebooks - AI Platform - x

JupyterLab - tensorflow-2 x

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Name	Last Modified
src	3 minutes ago
training-data-analyst	seconds ago
tutorials	3 minutes ago

jupyter@tensorflow-2-3-202 x

```
jupyter@tensorflow-2-3-20210618-171635:~$ git clone https://github.com/GoogleCloudPlatform/training-data-analyst
Cloning into 'training-data-analyst'...
remote: Enumerating objects: 49195, done.
remote: Counting objects: 100% (1506/1506), done.
remote: Compressing objects: 100% (666/666), done.
remote: Total 49195 (delta 824), reused 1320 (delta 722), pack-reused 47689
Receiving objects: 100% (49195/49195), 576.21 MiB | 31.74 MiB/s, done.
Resolving deltas: 100% (30728/30728), done.
Checking out files: 100% (10011/10011), done.
jupyter@tensorflow-2-3-20210618-171635:~$
```

1 0 🔍 🌐 tensorflow-2-3-20210618-171635 | qwiklabs-gcp-04-deab0c858996 Git: idle

jupyter@tensorflow-2-3-20210618-171635: ~


[CC BY-NC-ND 4.0](#)

 what-if-tool-challenge.ipynb

Python 3 ●

```
[*]: !wget https://files.consumerfinance.gov/hmda-historic-loan-data/hmda_2017_ny_all-records_labels.zip
[*]: !unzip hmda 2017 ny all-records labels.zip
```

```
hmda 2017 ny all-re 100%[=====>] 16.66M 25.8MB/s in 0.6s
```

2021-06-18 09:22:03 (25.8 MB/s) - 'hmda 2017 ny all-records labels.zip' saved [17466285/17466285]

```
Archive:  hmda_2017_ny_all-records_labels.zip
inflating: hmda_2017_ny_all-records_labels.csv
```

In this section, you **don't need to write any code**. We suggest you read through the cells to understand how the dataset is processed.

Here, we start by importing the dataset into a Pandas dataframe. Then we process the data to exclude incomplete information and make a simple binary classification of loan approvals. We then create two datasets, one complete and one where 90% of female applicants are removed.

```
[1]: # Set column dtypes for Pandas
column_names = collections.OrderedDict({
    'as_of_year': np.int16,
    'agency_abbr': 'category',
    'loan_type': 'category'
```



## Explore Machine Learning Models with Explainable AI: Challenge Lab



### Download the Challenge Notebook

End Lab 01:21:48

Caution: When you are in the console, do not deviate from the lab instructions. Doing so may cause your account to be blocked. [Learn more.](#)

[Open Google Console](#)

Username

student-04-938bdb8bb408@



Password

9pntxL4TFCy7



GCP Project ID

qwiklabs-gcp-04-deab0c85



1. In your notebook, click the **terminal**.

2. Clone the repo:

```
git clone https://github.com/GoogleCloudPlatform/training-data-analyst
```

3. Go to the enclosing folder: `training-data-analyst/quests`

4. Open the notebook file `what-if-tool-challenge.ipynb`.

5. Download and import the dataset `hmda_2017_ny_all-records_labels`.

All the code to download and pre-process the dataset has been provided for you. The rest of the steps will be inside the notebook file. You should refer back to this lab guide to check your progress and get some hints.

Click *Check my progress* to verify the objective.



Download the notebook and import the dataset

Check my progress

Assessment Completed!

#### Checkpoints



Start a JupyterLab Notebook Instance

Check my progress

20 / 20

Download the Challenge Notebook

Check my progress

10 / 20

Build and Train your Models

Check my progress

0 / 30

Deploy Model to AI Platform

Check my progress

0 / 30

Congratulations!

If you don't see a green check mark, click the **Score** fly-out in the upper right, and

Explore Machine Learning x Notebooks – AI Platform x JupyterLab - tensorflow-2 x +

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File Edit View Run Kernel Git Tabs Settings Help AI Platform Notebooks

+

...

quests

dei

Name	Last Modified
census	3 minutes ago
hmda_2017_ny_all-r...	2 years ago
hmda_2017_ny_all-r...	2 years ago
what-if-tool-challenge...	a minute ago
WIT_Smile_Detector...	3 minutes ago
xgboost_caip_e2e.ip...	3 minutes ago

jupyter@tensorflow-2-3-202 x what-if-tool-challenge.ipynb

Python 3

```
# model.add(layers.Dense(200, input_shape=(input_size,), activation='relu'))
# model.compile
# model.fit
model = Sequential()
model.add(layers.Dense(200, input_shape=(input_size,), activation='relu'))
model.add(layers.Dense(50, activation='relu'))
model.add(layers.Dense(20, activation='relu'))
model.add(layers.Dense(1, activation='sigmoid'))
model.compile(loss='mean_squared_error', optimizer='adam', metrics=['accuracy'])
model.fit(train_data, train_labels, epochs=10, batch_size=2048, validation_split=0.1)

Epoch 1/10
95/95 [=====] - 4s 39ms/step - loss: 0.1606 - accuracy: 0.7813 - val_loss: 0.1520 - val_accuracy: 0.7863
Epoch 2/10
33/95 [=====>.....] - ETA: 2s - loss: 0.1512 - accuracy: 0.7905

[ ]: # Save your model
!mkdir -p saved_complete_model
model.save('saved_complete_model')

[ ]: # Get predictions on the test set and print the accuracy score (Model 1)
y_pred = model.predict(test_data)
acc = accuracy_score(test_labels, y_pred.round())
print("Model 1 Accuracy: %.2f%%" % (acc * 100.0))
```

### Train your second model on the limited dataset.

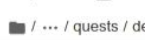
- Important:** your second model should be saved in the location `saved_limited_model/saved_model.pb`.
- The data will come from `limited_train_data` and `limited_train_labels`.

If you get stuck, you can view the documentation [here](#).

```
[ ]: # Train your second model on the limited dataset. Use 'limited_train_data' for your data and 'limited_train_labels' for y
# Use the same input_size for the limited_model

# ---- TODO ----
# create the limited_model = Sequential()
```

1 1 tensorflow-2-3-20210618-171635 | qwiklabs-gcp-04-deab0c858996 Git: idle Python 3 | Busy Mode: Command Ln 3, Col 36 what-if-tool-challenge.ipynb



Name	Last Modified
census	4 minutes ago
hmda_2017_ny_all-r...	2 years ago
hmda_2017_ny_all-r...	2 years ago
what-if-tool-challenge...	2 minutes ago
WIT_Smile_Detector...	4 minutes ago
xgboost_caip_e2e.lp...	4 minutes ago

jupyter@tensorflow-2-3-202 x

 what-if-tool-challenge.ipynbPython 3 ☐

```
Epoch 4/10
95/95 [=====] - 4s 37ms/step - loss: 0.1503 - accuracy: 0.7924 - val_loss: 0.1502 - val_accuracy: 0.7928
y: 0.7928
Epoch 5/10
95/95 [=====] - 3s 30ms/step - loss: 0.1500 - accuracy: 0.7927 - val_loss: 0.1498 - val_accuracy: 0.7928
y: 0.7928
Epoch 6/10
95/95 [=====] - 4s 45ms/step - loss: 0.1498 - accuracy: 0.7930 - val_loss: 0.1496 - val_accuracy: 0.7941
y: 0.7941
Epoch 7/10
95/95 [=====] - 4s 39ms/step - loss: 0.1495 - accuracy: 0.7934 - val_loss: 0.1496 - val_accuracy: 0.7932
y: 0.7932
Epoch 8/10
95/95 [=====] - 4s 46ms/step - loss: 0.1495 - accuracy: 0.7937 - val_loss: 0.1494 - val_accuracy: 0.7936
y: 0.7936
Epoch 9/10
95/95 [=====] - 3s 33ms/step - loss: 0.1495 - accuracy: 0.7939 - val_loss: 0.1495 - val_accuracy: 0.7939
y: 0.7939
Epoch 10/10
95/95 [=====] - 4s 44ms/step - loss: 0.1493 - accuracy: 0.7940 - val_loss: 0.1503 - val_accuracy: 0.7921
y: 0.7921
[15]: <tensorflow.python.keras.callbacks.History at 0x7efdd16d7650>
```

```
[ ]: # Save your model
      !mkdir -p saved_complete_model
      model.save('saved_complete_model1')

[ ]: # Get predictions on the test set and print the accuracy score (Model 1)
      y_pred = model.predict(test_data)
      acc = accuracy_score(test_labels, y_pred.round())
      print("Model 1 Accuracy: %.2f%%" % (acc * 100.0))
```

Train your second model on the limited dataset.

- **Important:** your second model should be saved in the location `saved_limited_model/saved_model.pb`.
- The data will come from `limited train data` and `limited train labels`.











 Code
 

 git

Python 3 ☐

```
[15]: <tensorflow.python.keras.callbacks.History at 0x7efdd16d7650>
```

```
WARNING:tensorflow:From /opt/conda/lib/python3.7/site-packages/tensorflow/python/training/tracking/tracking.py:111: Model
l.state_updates (from tensorflow.python.keras.engine.training) is deprecated and will be removed in a future version.
Instructions for updating:
This property should not be used in TensorFlow 2.0, as updates are applied automatically.
WARNING:tensorflow:From /opt/conda/lib/python3.7/site-packages/tensorflow/python/training/tracking/tracking.py:111: Layer
r.updates (from tensorflow.python.keras.engine.base_layer) is deprecated and will be removed in a future version.
Instructions for updating:
This property should not be used in TensorFlow 2.0, as updates are applied automatically.
INFO:tensorflow:Assets written to: saved complete model/complete model/assets
```

```
[ ]: # Get predictions on the test set and print the accuracy score (Model 1)
y_pred = model.predict(test_data)
acc = accuracy_score(test_labels, y_pred.round())
print("Model 1 Accuracy: %.2f%%" % (acc * 100.0))
```

Train your second model on the limited dataset.



what-if-tool-challenge.ipynb ●









 Code
 

 git

Python 3

```
# - - - - TODO - - - - -
```

```
# create the limited model = Sequential()
```

```
# limited model.add (your layers)
```

```
# limited model.compile
```

```
# limited model.fit
```

```
limited_model = Sequential()
```

```
limited_model.add(layers.Dense(200, input_shape=(input_size,), activation='relu'))
```

```
limited_model.add(layers.Dense(50, activation='relu'))
```

```
limited_model.add(layers.Dense(20, activation='relu'))
```

```
limited_model.add(layers.Dense(1, activation='sigmoid'))
```

```
limited_model.compile(loss='mean_squared_error', optimizer='adam', metrics=['accuracy'])
```

```
limited_model.fit(limited_train_data, limited_train_labels, epochs=10, batch_size=2048, validation_split=0.1)
```

Epoch 1/10

```
74/74 [100%] - 3s 46ms/step - loss: 0.1649 - accuracy: 0.7665 - val_loss: 0.1543 - val_accuracy: 0.7828
```

Epoch 2/10

```
74/74 [.....] - 3s 42ms/step - loss: 0.1532 - accuracy: 0.7862 - val_loss: 0.1531 - val_accuracy: 0.7869
```

Epoch 3/10

```
74/74 [=====] - 3s 39ms/step - loss: 0.1523 - accuracy: 0.7881 - val_loss: 0.1524 - val_accuracy: 0.7866
```

Epoch 4/10

```
74/74 [=====] - 3s 34ms/step - loss: 0.1519 - accuracy: 0.7881 - val_loss: 0.1521 - val_accuracy: 0.7857
```

Epoch 5/10

```
57/74 [=====>.....] - ETA: 0s - loss: 0.1522 - accuracy: 0.7878
```

```
[ ]: # Save your model
!mkdir -p saved_limited_model
limited_model.save('saved_limited_model')
```

```
[ ]: # Get predictions on the test set and print the accuracy score (Model 2)
    limited_y_pred = limited_model.predict(limited_test_data)
    acc = accuracy_score(limited_test_labels, limited_y_pred.round())
```



Explore Machine Learning x Notebooks - AI Platform - x JupyterLab - tensorflow-2 x +

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File Edit View Run Kernel Git Tabs Settings Help AI Platform Notebooks

what-if-tool-challenge.ipynb

Python 3

Name	Last Modified
census	5 minutes ago
saved_complete_mo...	seconds ago
hmda_2017_ny_all-r...	2 years ago
hmda_2017_ny_all-r...	2 years ago
what-if-tool-challenge...	seconds ago
WIT_Smile_Detector...	5 minutes ago
xgboost_calp_e2e.ip...	5 minutes ago

```
jupyter@tensorflow-2-3-202 x what-if-tool-challenge.ipynb
[ ]: y: 0.7869
Epoch 3/10
74/74 [=====] - 3s 39ms/step - loss: 0.1523 - accuracy: 0.7881 - val_loss: 0.1524 - val_accurac
y: 0.7866
Epoch 4/10
74/74 [=====] - 3s 34ms/step - loss: 0.1519 - accuracy: 0.7881 - val_loss: 0.1521 - val_accurac
y: 0.7857
Epoch 5/10
74/74 [=====] - 3s 39ms/step - loss: 0.1516 - accuracy: 0.7889 - val_loss: 0.1523 - val_accurac
y: 0.7877
Epoch 6/10
74/74 [=====] - 3s 36ms/step - loss: 0.1515 - accuracy: 0.7892 - val_loss: 0.1519 - val_accurac
y: 0.7877
Epoch 7/10
48/74 [=====>.....] - ETA: 1s - loss: 0.1508 - accuracy: 0.7903

[ ]: # Save your model
!mkdir -p saved_limited_model
limited_model.save('saved_limited_model/limited_model')

[ ]: # Get predictions on the test set and print the accuracy score (Model 2)
limited_y_pred = limited_model.predict(limited_test_data)
acc = accuracy_score(limited_test_labels, limited_y_pred.round())
print("Model 2 Accuracy: %.2f%%" % (acc * 100.0))

# ---- TODO -----
# Fill out this information:
GCP_PROJECT = '#TODO'
```

## Deploy your models to the AI Platform

In this section, you will first need to create a Cloud Storage bucket to store your models, then you will use gcloud commands to copy them over.

You will then create two AI Platform model resources and their associated versions.

```
[ ]: # ---- TODO -----
# Fill out this information:
GCP_PROJECT = '#TODO'
```

1 1 tensorflow-2-3-20210618-171635 | qwiklabs-gcp-04-deab0c858996 Git: refreshing... Python 3 | Busy Mode: Edit Ln 3, Col 57 what-if-tool-challenge.ipynb

Explore Machine Learning x

Notebooks – AI Platform x

Browser – Cloud Storage x

JupyterLab - tensorflow x

+

console.cloud.google.com/storage/browser?project=qwiklabs-gcp-04-deab0c858996&prefix=

Google Cloud Platform

qwiklabs-gcp-04-deab0c858996

Search products and resources

SHOW INFO PANEL

Cloud Storage

Browser

CREATE BUCKET

DELETE

REFRESH

Filter

Filter buckets

☐

Name

↑

Created

Location type

Location

Default storage class


Updated

Public access

Access control

Lif

No rows to display



Store and retrieve your data

Get started by creating a bucket – a container where you can organize and control access to your data and files in Cloud Storage.

CREATE BUCKET

TAKE QUICKSTART

Release Notes

<1

Explore Machine Learning x

Notebooks – AI Platform x

Create a bucket – Cloud Storage x

JupyterLab - tensorflow x

+

← → ↺

console.cloud.google.com/storage/create-bucket?project=qwiklabs-gcp-04-deab0c858996

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Google Cloud Platform

qwiklabs-gcp-04-deab0c858996

Search products and resources

▼

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Cloud Storage

Browser

Monitoring

Settings

← Create a bucket

• Name your bucket

Pick a globally unique, permanent name. [Naming guidelines](#)

qwiklabs-gcp-04-deab0c858996

Tip: Don't include any sensitive information

CONTINUE

• Choose where to store your data

• Choose a default storage class for your data

• Choose how to control access to objects

• Advanced settings (optional)

CREATE

CANCEL

Monthly cost estimate

Enter values below to check this bucket's monthly cost. For guidance only. [Pricing details](#)

Storage and retrieval

Storage size

GB

\$0.026 per GB-month

Data retrieval size

GB

Free

Operations ?

Class A operations

per-month

\$0.005 per 1,000 ops

Class B operations

per-month

\$0.0004 per 1,000 ops

Availability SLA: 99.95%

Monthly cost: \$0.00

Currency: US Dollar (\$) ▼

Release Notes

<1



Explore Machine Learning x

Notebooks - AI Platform x

Create a bucket - Cloud Storage x

JupyterLab - tensorflow x

+

console.cloud.google.com/storage/create-bucket?project=qwiklabs-gcp-04-deab0c858996

Google Cloud Platform

qwiklabs-gcp-04-deab0c858996

Search products and resources

Cloud Storage

Browser

Monitoring

Settings

Create a bucket

✓

Name your bucket

•

Choose where to store your data

This permanent choice defines the geographic placement of your data and affects cost, performance, and availability. [Learn more](#)

Location type

☒ Multi-region

Highest availability across largest area

☐ Dual-region

High availability and low latency across 2 regions

☐ Region

Lowest latency within a single region

Location

us (multiple regions in United States)

CONTINUE

•

Choose a default storage class for your data

•

Choose how to control access to objects

•

Advanced settings (optional)

CREATE

CANCEL

Monthly cost estimate

Enter values below to check this bucket's monthly cost. For guidance only. [Pricing details](#)

Storage and retrieval

Storage size

GB

\$0.026 per GB-month

Data retrieval size

GB

Free

Operations ?

Class A operations

per-month

\$0.005 per 1,000 ops

Class B operations

per-month

\$0.0004 per 1,000 ops

Availability SLA: 99.95%

Monthly cost: \$0.00

Currency: US Dollar (\$) ▼

Release Notes

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Cloud Storage

Browser  
Monitoring  
Settings

Bucket details REFRESH

qwiklabs-gcp-04-deab0c858996

OBJECTS CONFIGURATION PERMISSIONS RETENTION LIFECYCLE

Buckets > qwiklabs-gcp-04-deab0c858996

UPLOAD FILES UPLOAD FOLDER CREATE FOLDER MANAGE HOLDS DOWNLOAD DELETE

Filter by name prefix only Filter Filter objects and folders

<input type="checkbox"/>	Name	Size	Type	Created time	Storage class	Last modified	Public access	Encryption	Retention
--------------------------	------	------	------	--------------	---------------	---------------	---------------	------------	-----------

Loading contents

Release Notes

Created bucket qwiklabs-gcp-04-deab0c858996

Explore Machine Learning x Notebooks - AI Platform - x qwiklabs-g...b0c858996 - x JupyterLab - tensorflow-2 x +

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File Edit View Run Kernel Git Tabs Settings Help AI Platform Notebooks

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...

quests / del /

Name	Last Modified
census	7 minutes ago
saved_complete_mo...	3 minutes ago
saved_limited_model	2 minutes ago
hmda_2017_ny_all-r...	2 years ago
hmda_2017_ny_all-r...	2 years ago
what-if-tool-challenge...	a minute ago
WIT_Smile_Detector....	7 minutes ago
xgboost_calp_e2e.ip...	7 minutes ago

jupyter@tensorflow-2-3-202 x what-if-tool-challenge.ipynb

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Code

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🔄

git

Python 3

## Deploy your models to the AI Platform

In this section, you will first need to create a Cloud Storage bucket to store your models, then you will use gcloud commands to copy them over.

You will then create two AI Platform model resources and their associated versions.

```
[21]: # ---- TODO -----  
  
# Fill out this information:  
  
GCP_PROJECT = 'qwiklabs-gcp-04-deab0c858996'  
MODEL_BUCKET = 'gs://qwiklabs-gcp-04-deab0c858996'  
MODEL_NAME = 'saved_complete_model' #do not modify  
LIM_MODEL_NAME = 'saved_limited_model' #do not modify  
VERSION_NAME = 'v1'  
REGION = 'us-central1'
```

```
[ ]: # Copy your model files to Cloud Storage (these file paths are your 'origin' for the AI Platform Model)  
!gsutil cp -r ./saved_complete_model $MODEL_BUCKET  
!gsutil cp -r ./saved_limited_model $MODEL_BUCKET
```

```
[ ]: # Configure gcloud to use your project  
!gcloud config set project $GCP_PROJECT  
!gcloud config set ai_platform/region global
```

### Create your first AI Platform model: *saved\_complete\_model*

Navigate back to the Google Cloud Console to complete this task. See the lab guide for details.

### Create your second AI Platform model: *saved\_limited\_model*

Navigate back to the Google Cloud Console to complete this task. See the lab guide for details.

1 1 tensorflow-2-3-20210618-171635 | qwiklabs-gcp-04-deab0c858996 Git: refreshing... Python 3 | Idle Mode: Edit Ln 3, Col 50 what-if-tool-challenge.ipynb

Explore Machine Learning x Notebooks - AI Platform - x qwiklabs-g...b0c858996 - x JupyterLab - tensorflow-2 x +

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File Edit View Run Kernel Git Tabs Settings Help AI Platform Notebooks

+ / ... / quests / del /

Name	Last Modified
census	7 minutes ago
saved_complete_mo...	3 minutes ago
saved_limited_model	2 minutes ago
hmda_2017_ny_all-r...	2 years ago
hmda_2017_ny_all-r...	2 years ago
what-if-tool-challenge...	a minute ago
WIT_Smile_Detector....	7 minutes ago
xgboost_calp_e2e.ip...	7 minutes ago

jupyter@tensorflow-2-3-202 x what-if-tool-challenge.ipynb

Python 3

```
[22]: # Copy your model files to Cloud Storage (these file paths are your 'origin' for the AI Platform Model)
!gsutil cp -r ./saved_complete_model $MODEL_BUCKET
!gsutil cp -r ./saved_limited_model $MODEL_BUCKET

Copying file:///./saved_complete_model/complete_model/saved_model.pb [Content-Type=application/octet-stream]...
Copying file:///./saved_complete_model/complete_model/variables/variables.data-00000-of-00001 [Content-Type=application/oct
et-stream]...
Copying file:///./saved_complete_model/complete_model/variables/variables.index [Content-Type=application/octet-stream]...
- [3 files][332.9 KiB/332.9 KiB]
Operation completed over 3 objects/332.9 KiB.
Copying file:///./saved_limited_model/limited_model/saved_model.pb [Content-Type=application/octet-stream]...
Copying file:///./saved_limited_model/limited_model/variables/variables.data-00000-of-00001 [Content-Type=application/octe
t-stream]...
Copying file:///./saved_limited_model/limited_model/variables/variables.index [Content-Type=application/octet-stream]...
- [3 files][333.0 KiB/333.0 KiB]
Operation completed over 3 objects/333.0 KiB.

[ ]: # Configure gcloud to use your project
!gcloud config set project $GCP_PROJECT
!gcloud config set ai_platform/region global
```

### Create your first AI Platform model: *saved\_complete\_model*

Navigate back to the Google Cloud Console to complete this task. See the lab guide for details.

### Create your second AI Platform model: *saved\_limited\_model*

Navigate back to the Google Cloud Console to complete this task. See the lab guide for details.

## Using the What-if Tool to interpret your model

Once your models have deployed, you're now ready to connect them to the What-if Tool using the WitWidget.

1 1 tensorflow-2-3-20210618-171635 | qwiklabs-gcp-04-deab0c858996 Git: Idle Python 3 | Idle Mode: Edit Ln 3, Col 45 what-if-tool-challenge.ipynb

## Explore Machine Learning Models with Explainable AI: Challenge Lab



End Lab 01:15:29

Caution: When you are in the console, do not deviate from the lab instructions. Doing so may cause your account to be blocked. [Learn more.](#)

[Open Google Console](#)

Username  
student-04-938bdb8bb408@

Password  
9pntxL4TFCy7

GCP Project ID  
qwiklabs-gcp-04-deab0c85

If you don't see a green check mark, click the **Score** fly-out in the upper right, and then click **Run Step** on the relevant step. A hint pop-up will c

### Build and train your models

1. Use TensorFlow to build two models: one trained on the complete dataset and one on the limited dataset. You should use the model Sequential

**IMPORTANT:** To accurately check your progress, the first model should be saved in the location `saved_complete_model/saved_model.pb` and the second in `saved_limited_model/saved_model.pb`.

Click *Check my progress* to verify the objective.



Build and Train your models

Check my progress

Assessment Completed!

#### Checkpoints



Start a JupyterLab Notebook Instance

Check my progress

20 / 20

Download the Challenge Notebook

Check my progress

20 / 20

Build and Train your Models

Check my progress

30 / 30

Deploy Model to AI Platform

Check my progress

10 / 30

If you don't see a green check mark, click the **Score** fly-out in the upper right, and then click **Run Step** on the relevant step. A hint pop-up will display advice









 Code
 

 git

Python 3 ☐

```
[23]: # Configure gcloud to use your project
!gcloud config set project $GCP_PROJECT
!gcloud config set ai platform/region global
```

```
Updated property [core/project].
Updated property [ai_platform/region].
```

Navigate back to the Google Cloud Console to complete this task. See the lab guide for details.

```
[24]: !qcloud ai-platform models create $MODEL_NAME --regions $REGION
```

```
Using endpoint [https://ml.googleapis.com/]
Created ai platform model [projects/gwiklabs-gcp-04-deab0c858996/models/saved_complete_model].
```

```
[ ]: !gcloud ai-platform versions create $VERSION_NAME \
--model=$MODEL_NAME \
--framework='TensorFlow' \
--runtime-version=2.3 \
--origin=$MODEL_BUCKET/saved_complete_model/complete_model \
--staging-bucket=$MODEL_BUCKET \
--python-version=3.7 \
--project=$GCP_PROJECT
```

Navigate back to the Google Cloud Console to complete this task. See the lab guide for details.



Explore Machine Learning x Notebooks – AI Platform – x qwiklabs-g...b0c858996 – x JupyterLab - tensorflow-2 x +

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/ ... / quests / dei /

Name	Last Modified
census	12 minutes ago
saved_complete_mo...	8 minutes ago
saved_limited_model	7 minutes ago
hmda_2017_ny_all-r...	2 years ago
hmda_2017_ny_all-r...	2 years ago
what-if-tool-challenge...	seconds ago
WIT_Smile_Detector...	12 minutes ago
xgboost_calp_e2e.ip...	12 minutes ago

jupyter@tensorflow-2-3-202 x what-if-tool-challenge.ipynb

Markdown git Python 3

```
--runtime-version=2.3 \  
--origin=$MODEL_BUCKET/saved_complete_model/complete_model \  
--staging-bucket=$MODEL_BUCKET \  
--python-version=3.7 \  
--project=$GCP_PROJECT  
  
Using endpoint [https://ml.googleapis.com/]  
Creating version (this might take a few minutes).....done.
```

## Create your second AI Platform model: *saved\_limited\_model*

Navigate back to the Google Cloud Console to complete this task. See the lab guide for details.

```
[26]: !gcloud ai-platform models create $LIM_MODEL_NAME --regions $REGION  
  
Using endpoint [https://ml.googleapis.com/]  
Created ai platform model [projects/qwiklabs-gcp-04-deab0c858996/models/saved_limited_model].
```

```
[27]: !gcloud ai-platform versions create $VERSION_NAME \  
--model=$LIM_MODEL_NAME \  
--framework='TensorFlow' \  
--runtime-version=2.3 \  
--origin=$MODEL_BUCKET/saved_limited_model/limited_model \  
--staging-bucket=$MODEL_BUCKET \  
--python-version=3.7 \  
--project=$GCP_PROJECT  
  
Using endpoint [https://ml.googleapis.com/]  
Creating version (this might take a few minutes).....done.
```

## Using the What-if Tool to interpret your model

Once your models have deployed, you're now ready to connect them to the What-if Tool using the WitWidget.

We've provided the Config Builder code and a couple of functions to get the class predictions from the models, which are necessary inputs for the WIT.

If you've successfully deployed and saved your models, all you'll need to do is **add the WitConfigBuilder code in this cell**.

1 1 tensorflow-2-3-20210618-171635 | qwiklabs-gcp-04-deab0c858996 Git: idle Python 3 | Idle Mode: Command Ln 1, Col 1 what-if-tool-challenge.ipynb

## ← Explore Machine Learning Models with Explainable AI: Challenge Lab



End Lab

01:09:56

Caution: When you are in the console, do not deviate from the lab instructions. Doing so may cause your account to be blocked.  
[Learn more.](#)

[Open Google Console](#)

Username

student-04-938bdb8bb408@



Password

9pntxL4TFCy7



GCP Project ID

qwiklabs-gcp-04-deab0c85



### Create the Limited AI Platform model

Use the following to create your second AI Platform model:

- Model Name = `limited_model`
- Version Name = `v1`
- Python version = `3.7`
- Framework = `TensorFlow`
- Framework version = `2.3.1`
- ML Runtime version = `2.3`

Click *Check my progress* to verify the objective.



Deploy the models to AI Platform

[Check my progress](#)

*Assessment Completed!*

If you don't see a green check mark, click the **Score** fly-out in the upper right, and then click **Run Step** on the relevant step. A hint pop-up will display advice.

GSP324

Overview

Challenge scenario

Start a JupyterLab Notebook instance

Download the Challenge Notebook

Build and train your models

**Deploy the models to AI Platform**

Use the What-If Tool to explore biases

Congratulations!

100/100





Name	Last Modified
census	13 minutes ago
saved_complete_mo...	9 minutes ago
saved_limited_model	8 minutes ago
hmda_2017_ny_all-r...	2 years ago
hmda_2017_ny_all-r...	2 years ago
what-if-tool-challenge...	a minute ago
WIT_Smile_Detector...	13 minutes ago
xgboost_calp_e2e.ip...	13 minutes ago

jupyter@tensorflow-2-3-202 x

 what-if-tool-challenge.ipynbPython 3 ☐

```
np.array(examples_to_infer), columns_not_for_model_input, axis=1).tolist()
# Get the class predictions from the model.
preds = limited_model.predict(model_inputs)
preds = [[1 - pred[0], pred[0]] for pred in preds]
return preds
```

```
examples_for_wit = test_data_with_labels.values.tolist()
column_names = test_data_with_labels.columns.tolist()
```

```
# - - - - TODO - - - - -
```

```
## Add WitConfigBuilder code here
```

```
config_builder = (WitConfigBuilder(
    examples_for_wit[:num_datapoints], feature_names=column_names)
    .set_custom_predict_fn(limited_custom_predict)
    .set_target_feature('loan_granted')
    .set_label_vocab(['denied', 'accepted'])
    .set_compare_custom_predict_fn(custom_predict)
    .set_model_name('limited')
    .set_compare_model_name('complete'))
WitWidget(config_builder, height=800)
```

[illegible]

```
<ipython-input-28-8a53c468b7c> in <module>
    35 config_builder = (WitConfigBuilder(
    36     examples for wit[[:num_datapoints]],feature_names=column_names)
--> 37     .set_custom_predict_fn(limited_custom_predict)
    38     .set_target_feature('loan_granted')
    39     .set_label_vocab(['denied', 'accepted'])
```

```
NameError: name 'limited_custom_predict' is not defined
```

[ ]:

Explore Machine Learning x Notebooks - AI Platform - x qwiklabs-gcp-04-deab0c858996 x JupyterLab - tensorflow-2 x +

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File Edit View Run Kernel Git Tabs Settings Help AI Platform Notebooks

+ / ... / quests / dei /

Name	Last Modified
census	14 minutes ago
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saved_limited_model	9 minutes ago
hmda_2017_ny_all-r...	2 years ago
hmda_2017_ny_all-r...	2 years ago
what-if-tool-challenge...	2 minutes ago
WIT_Smile_Detector...	14 minutes ago
xgboost_calp_e2e.ip...	14 minutes ago

jupyter@tensorflow-2-3-202 x what-if-tool-challenge.ipynb

Python 3

```
return preds

# Return 'limited' model predictions.
def bad_custom_predict(examples_to_infer):
    # Delete columns not used by model
    model_inputs = np.delete(
        np.array(examples_to_infer), columns_not_for_model_input, axis=1).tolist()
    # Get the class predictions from the model.
    preds = limited_model.predict(model_inputs)
    preds = [[1 - pred[0], pred[0]] for pred in preds]
    return preds

examples_for_wit = test_data_with_labels.values.tolist()
column_names = test_data_with_labels.columns.tolist()

# ---- TODO -----

## Add WitConfigBuilder code here
config_builder = (WitConfigBuilder(
    examples_for_wit[:num_datapoints], feature_names=column_names)
    .set_custom_predict_fn(bad_custom_predict)
    .set_target_feature('loan_granted')
    .set_label_vocab(['denied', 'accepted'])
    .set_compare_custom_predict_fn(custom_predict)
    .set_model_name('limited')
    .set_compare_model_name('complete'))
WitWidget(config_builder, height=800)
```

[ ]:

1 1 tensorflow-2-3-20210618-171635 | qwiklabs-gcp-04-deab0c858996 Git: refreshing... Python 3 | Busy Mode: Command Ln 1, Col 1 what-if-tool-challenge.ipynb