

[Start Lab](#)

03:00:00

Machine Learning for Finance Freestyle

3 hours Free

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Overview

In this specialization you've learned a number of machine learning algorithms and tools. This lab gives you the opportunity to apply what you have learned to SP500 daily data. There's no prescription. We give you the data and encourage you to be creative.

Objectives

In this lab, you will:

- Pull daily SP500 data using BigQuery
- Train a machine learning model to predict directional movement of stocks
- Compare your model to several benchmarks, including AutoML Tables

Once you're ready, scroll down and follow the steps below to get your lab environment set up.

Set up your environment

For each lab, you get a new Google Cloud project and set of resources for a fixed time at no cost.

1. Make sure you signed into Qwiklabs using an **incognito window**.
2. Note the lab's access time (for example, **02:00:00**) and make sure you can finish in that time block.

There is no pause feature. You can restart if needed, but you have to start at the beginning.

3. When ready, click **START LAB**.
4. Note your lab credentials. You will use them to sign in to the Google Cloud Console.

[Open Google Console](#)

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](#).

Username

google2876526_student@qwiklabs.n

**Password**

TG959yrKDX



GCP Project ID
qwiklabs-gcp-0855e773352d3560

New to labs? View our introductory video!

5. Click **Open Google Console**.

6. Click **Use another account** and copy/paste credentials for **this lab** into the prompts.

If you use other credentials, you'll get errors or **incur charges**.

7. Accept the terms and skip the recovery resource page.

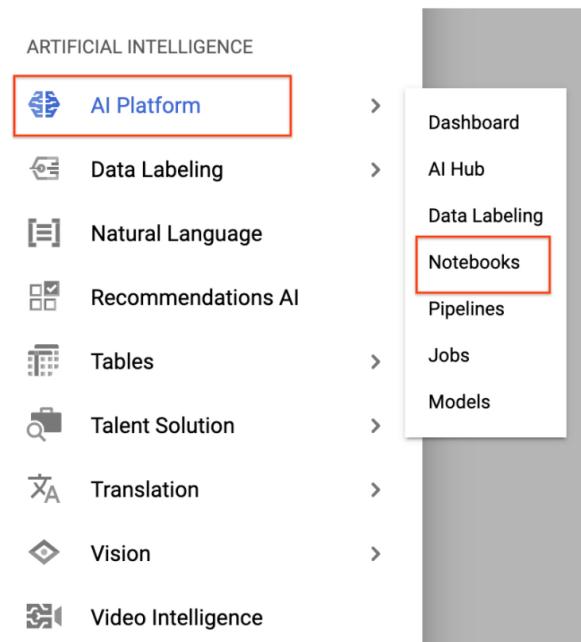
Do not click **End Lab** unless you are finished with the lab or want to restart it.
This clears your work and removes the project.

Launch AI Platform Notebooks

To launch AI Platform Notebooks:

Step 1

Click on the **Navigation Menu**. Navigate to **AI Platform**, then to **Notebooks**.



Step 2

On the Notebook instances page, click **+ NEW INSTANCE**. Select the latest version of TensorFlow Enterprise 2.x *Without GPUs*.

AI Platform Notebooks Customize instance

R 3.6

Migrate your code to Python 3

Python 3

Python 3 (CUDA Toolkit 11.0)

TensorFlow Enterprise 1.15

TensorFlow Enterprise 2.1

PyTorch 1.6

PyTorch 1.6 (CUDA Toolkit 11.0)

RAPIDS (TensorFlow) [EXPERIMENTAL]

Scikit-learn

Swift [BETA]

Kaggle Python [BETA]

TensorFlow Enterprise Notebooks, supporting hundreds of machine learning libraries popular on Kaggle

Smart Analytics Frameworks

SHOW INFO PANELS

Without GPUs

With 1 NVIDIA Tesla T4

In the pop-up, confirm the name of the deep learning VM, move to the bottom of the window and click **Create**.

New notebook instance

Instance name Lowercase letters, digits, or '-' only. Must start with a letter. Cannot end with a '-'.

Region * us-west1 (Oregon) Zone * us-west1-b

Environment TensorFlow 2.3 (with Intel® MKL-DNN/MKL)
Machine type 4 vCPUs, 15 GB RAM
Boot disk 100 GB Disk
Subnetwork default(10.138.0.0/20)

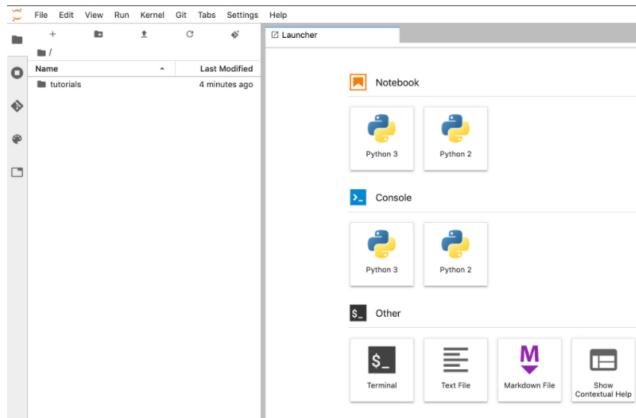
External IP Ephemeral(Automatic)
Extensions None selected

Permission Compute Engine default service account
Estimated cost \$99.89 monthly, \$0.137 hourly

The new VM will take 2-3 minutes to start.

Step 3

Click **Open JupyterLab**. A JupyterLab window will open in a new tab.

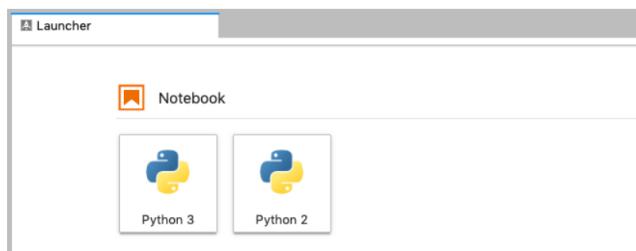


Clone Code

To clone the relevant notebook into your JupyterLab instance:

Step 1

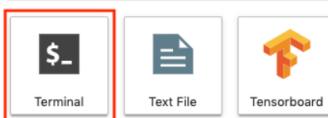
In JupyterLab, click the Terminal icon to open a new terminal.



Console



Other



Step 2

At the command-line prompt, type in the following command and press Enter.

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

Step 3

Confirm that you have cloned the repository by double clicking on the `training-data-analyst` directory and ensuring you can see its contents.

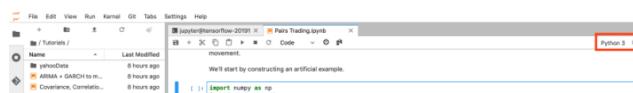
Run Through the Notebook

Step 1

From the left-hand menu, select `training-data-analyst > courses > ai-for-finance > practice > freestyle.ipynb`. This will open a new tab.

Step 2

Ensure you're using the Python 3 kernel by selecting `Python 3` from the upper right corner of the notebook.



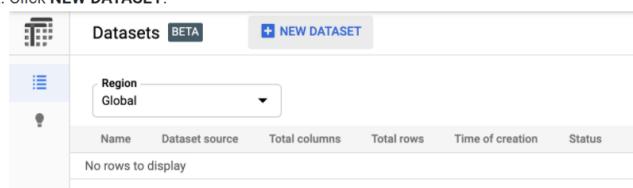
Step 3

Read through the notebook's contents and run all code blocks with **Shift + Enter**.
Return here after you have completed the instructions in the notebook. You can try building a model using AutoML Tables to serve as a benchmark. AutoML will take only a few minutes to get going and around an hour to train. While training, you can work on developing your own model.

Build a Model Using AutoML Tables

1. In the GCP console, select **Tables > Datasets** under the **ARTIFICIAL INTELLIGENCE** section. Click **Enable API** to turn on the Cloud AutoML API if it is not already enabled.

2. Click **NEW DATASET**.



3. Give your dataset a name like `SP500` and then click on **CREATE DATASET**.

Create new dataset

Dataset name *
sp500
Use letters, numbers and underscores up to 32 characters.

Region
Global

CANCEL CREATE DATASET

4. In the interface select the following options:

- Import data from BigQuery
- BigQuery Project ID = cloud-training-prod-bucket
- BigQuery Dataset ID = ml4f
- BigQuery Table or View ID = percent_change_sp500

sp500 BETA

IMPORT TRAIN MODELS EVALUATE TEST & USE

Import your data

AutoML Tables uses tabular data that you import to train a custom machine learning model. Your dataset must contain at least one input feature column and a target column. Optional columns can be added to configure parameters like the data split, weights, etc. [Preparing your training data](#)

Import data from BigQuery
 Select a CSV file from Cloud Storage
 Upload files from your computer

Import data from BigQuery

The table or view from BigQuery must be in the US regional location

BigQuery Project ID *
cloud-training-prod-bucket

BigQuery Dataset ID *
ml4f

BigQuery Table or View ID *
percent_change_sp500

IMPORT

5. Click on **Import**. You may have to wait around 10 minutes.

sp500 BETA

IMPORT TRAIN MODELS EVALUATE TEST & USE

Your data is being imported

Data import can take up to one hour. You can close this window. You'll receive an email when your data is ready to use.

6. After the data is imported, the **TRAIN** tab should display this:

sp500 BETA

IMPORT TRAIN MODELS EVALUATE TEST & USE

Summary
Total columns: 28
Total rows: 2,763,113
Numeric: 20 (76.92%)
Categorical: 3 (11.54%)
Timestamp: 1 (3.85%)
Array: 1 (3.85%)
Text: 1 (3.85%)

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

Additional parameters:
Data split: Automatic
Edit additional parameters

TRAIN MODEL

Column name	Data type	Nullability	Missing% (Count)	Invalid values	Distinct values	Correlation with Target
Close	Numeric	Nullable	0% (0)	0% (0)	32,049	—
close_AVG_prior_20_days	Numeric	Nullable	0% (0)	0% (0)	2,777,069	—
close_AVG_prior_260_days	Numeric	Nullable	0% (0)	0% (0)	2,750,260	—
close_AVG_prior_5_days	Numeric	Nullable	0% (0)	0% (0)	1,803,430	—
close_MAX_prior_20_days	Numeric	Nullable	0% (0)	0% (0)	1,181,658	—
close_MAX_prior_260_days	Numeric	Nullable	0% (0)	0% (0)	1,488,402	—
close_MAX_prior_5_days	Numeric	Nullable	0% (0)	0% (0)	997,774	—
close_MIN_prior_20_days	Numeric	Nullable	0% (0)	0% (0)	1,198,600	—
close_MIN_prior_260_days	Numeric	Nullable	0% (0)	0% (0)	1,432,736	—
close_STOKEV_prior_20_days	Numeric	Nullable	0% (0)	0% (0)	1,013,646	—
close_STOKEV_prior_260_days	Numeric	Nullable	0% (0)	0% (0)	2,762,349	—
close_STOKEV_prior_5_days	Numeric	Nullable	0% (0)	0% (0)	2,579,248	—
close_values_min_260	Array	Nullable	0% (0)	0% (0)	2,763,113	—
company	Text	Nullable	0% (0)	0% (0)	416	—

Date	Timestamp	Nullable	0% (0)	0% (0)	12,702	—
days_on_market	Numeric	Nullable	0% (0)	0% (0)	12,600	—
direction	Categorical	Nullable	0% (0)	0% (0)	3	—
industry	Categorical	Nullable	0% (0)	0% (0)	10	—
normalized_change	Numeric	Nullable	0.022% (66)	0% (0)	2,616,42	—
Open	Numeric	Nullable	0% (0)	0% (0)	30,437	—
s_p_scaled_change	Numeric	Nullable	0.04% (11)	0% (0)	12,544	—
scaled_change	Numeric	Nullable	0.01% (49)	0% (0)	957,635	—
symbol	Categorical	Nullable	0% (0)	0% (0)	49	—
tomorrow_close	Numeric	Nullable	0.01% (49)	0% (0)	15,244	—
tomorrow_close	Numeric	Nullable	0.01% (49)	0% (0)	32,047	—

Select **direction** for Target column.

7. Click on **TRAIN MODEL**.

8. Input 1 node hour for the training budget. For **Input feature selection** click on only the following features:

- symbol
- close_MIN_prior_5_days
- close_MIN_prior_20_days
- close_MIN_prior_260_days
- close_MAX_prior_5_days
- close_MAX_prior_20_days
- close_MAX_prior_260_days
- close_AVG_prior_5_days
- close_AVG_prior_20_days
- close_AVG_prior_260_days
- close_STDDEV_prior_5_days
- close_STDDEV_prior_20_days
- close_STDDEV_prior_260_days

9. Click **TRAIN MODEL**. The model will take around an hour to train.

sp500 BETA

IMPORT TRAIN MODELS EVALUATE TEST & USE

Models

sp500_20200205103451

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

You will be emailed once training completes.

Training model...

CANCEL

10. Inspect the evaluation metrics generated by AutoML Tables. Is this model any good? Can you build a better model?



End your lab

When you have completed your lab, click **End Lab**. Qwiklabs removes the resources you've used and cleans the account for you.

You will be given an opportunity to rate the lab experience. Select the applicable number of stars, type a comment, and then click **Submit**.

The number of stars indicates the following:

- 1 star = Very dissatisfied
- 2 stars = Dissatisfied
- 3 stars = Neutral
- 4 stars = Satisfied
- 5 stars = Very satisfied

You can close the dialog box if you don't want to provide feedback.

For feedback, suggestions, or corrections, please use the **Support** tab.

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