← Pairs Trading Strategy

# Pairs Trading Strategy 1 hour 15 minutes

1 Credit Rate Lab

## regardless of market conditions.

Overview

01:15:00

Start Lab

In this lab, some of the concepts behind pairs trading will be explored by leveraging the Auquan Toolbox, a Python library that provides tools for developing trading algorithms. This lab is based on the Auquan blog post Pairs Trading using Data-Driven Techniques: Simple Trading Strategies Part 3.

Pairs trading is a strategy that attempts to take advantage of the divergence

between assets whose ratio or difference in price is typically constant over time.

One of the biggest advantages of pairs trading is that it enables traders to profit

**Objectives** 

In this lab, you will learn about the following: Define cointegration and perform statistical testing to check for it. · Find pairs of securities that are cointegrated.

# · Devise a trading strategy based on cointegrated securities.

· Backtest the trading strategy to check for overfitting.

Set up your environment

What you'll need To complete this lab, you'll need:

#### • Time. Note the lab's Completion time in Qwiklabs. This is an estimate of the time it should take to complete all steps. Plan your schedule so you have time to complete the lab. Once you start the lab, you will not be able to pause and return

later (you begin at step 1 every time you start a lab).

### • The lab's Access time is how long your lab resources will be available. If you finish your lab with access time still available, you will be able to explore the

Start your lab

Google Cloud Platform or work on any section of the lab that was marked "if you

activities in your personal GCP account.

have time". Once the Access time runs out, your lab will end and all resources will terminate.

Access to a standard internet browser (Chrome browser recommended).

 You DO NOT need a Google Cloud Platform account or project. An account, project and associated resources are provided to you as part of this lab. · If you already have your own GCP account, make sure you do not use it for this lab. . If your lab prompts you to log into the console, use only the student account

provided to you by the lab. This prevents you from incurring charges for lab

- When you are ready, click Start Lab. You can track your lab's progress with the status bar at the top of your screen. Important What is happening during this time? Your lab is spinning up GCP resources for you behind the scenes, including an account, a project, resources within the project, and permission
- begin learning more quickly. Find Your Lab's GCP Username and Password

for you to control the resources needed to run the lab. This means that instead of spending time manually setting up a project and building resources from scratch as part of your lab, you can

To access the resources and console for this lab, locate the Connection Details panel in Qwiklabs. Here you will find the account ID and password for the account you will use to log in to the Google Cloud Platform:

Open Google Console

Caution: When you are in the console, do not deviate

from the lab instructions. Doing so may cause your

qwiklabs-gcp-0855e773352d3560

#### Username google2876526\_student@qwiklabs.n

Password

TG959yrKDX

GCP Project ID

Google

Sign in

Enter your email

More options

lab:

Accept the terms and conditions.

· Do not add recovery options

· Do not sign up for free trials

next to "Google Cloud Platform".

API Manager

Cloud Launcher

Natural Language

Talent Solution

Translation

Vision

+ NEW INSTANCE

TensorFlow Enterprise 1.15

TensorFlow 2.0

PyTorch 1.2 pre-installed

Pytorch 1.2

different.

Step 2

Tables

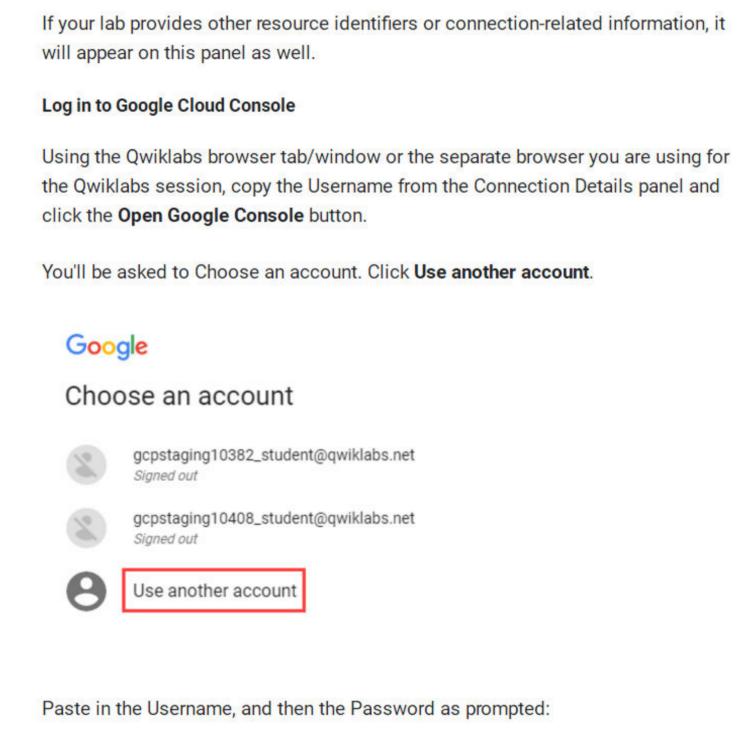
Support

to continue to Google Cloud Platform

gcpstaging277-student@qwiklabs.net

account to be blocked. Learn more.

New to labs? View our introductory video!



NEXT

Since this is a temporary account, which you will only have to access for this one

DASHBOARD

Project info

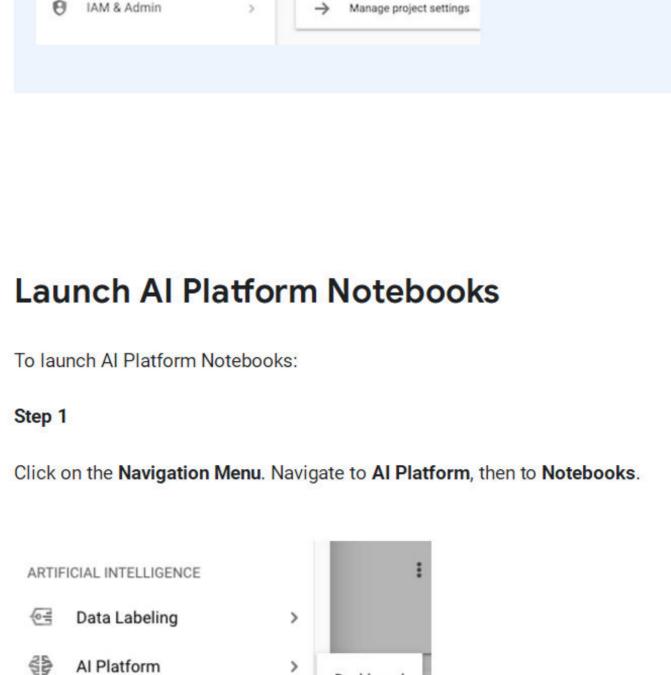
#916654314173

qwiklabs-gcp-064ca0

Project ID: qwiklabs-gcp-064

Note: You can view the list of services by clicking the GCP Navigation menu button at the top-left

Google Cloud Platform qwiklabs-gcp-064ca0bf1f... •



Dashboard

Notebooks

Al Hub

Jobs

Models

On the Notebook instances page, click + NEW INSTANCE. Select a 1.XX version of

TensorFlow (not a 2.0) without GPUs. In the following example, you would select

▶ START

■ STOP

C RESET

**DELETE** 

Without GPUs

With 1 NVIDIA Tesla K80

#### Customize instance nc ₽d R 3.6 R 3.6 and key libraries pre-installed

TensorFlow Enterprise 1.15 pre-installed with support for Keras

TensorFlow 2.0 pre-installed with support for Keras

tensorflow-20191107-145738

Image: TensorFlow Enterprise 1.15

Machine type: 4 vCPUs, 15 GB RAM

Region and zone: us-west1-b

Boot disk: 100 GB Disk

default(10.138.0.0/20)

External IP: Ephemeral(Automatic)

Compute Engine default service account

Networking:

Permission:

Step 3

Estimated cost:

\$99.89 monthly, \$0.137 hourly

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

Subnetwork \*

**Environment:** 

Python 2 and 3 with Pandas, SciKit Learn and other key packages pre-installed

C REFRESH

Tensorflow Enterprise 1.15 > Without GPUs:

New notebook instance Instance name \* -

Packages: python2, python3, scikit-learn, pandas, and nltk.

In the pop-up, confirm the name of the deep learning VM and click Create.

Tensorflow 1.XX versions change semi-frequently, so the version you pick may be

```
Click Open JupyterLab. A JupyterLab window will open in a new tab.
               Run Kernel Git Tabs Settings Help
                                  Notebook
    src src
                 3 hours ago
                 3 hours ago
                                               Python 2
                                    Python 3
                                  >_ Console
                                    Python 3
                                               Python 2
                                     $_
                                               Text File
                                                         Tensorboard
Clone Auquan Tutorials
To clone the Auquan tutorial notebooks into your JupyterLab instance:
Step 1
In JupyterLab, click the Terminal icon to open a new terminal.
 Launcher
```

Notebook

Python 2

Python 2

Text File

git clone https://github.com/Auquan/Tutorials.git

directory and ensuring that you can see its contents.

Tensorboard

Python 3

Python 3

Terminal

Other

Step 2

Step 3

Step 2

Step 3

Step 4

Step 5

corner of the notebook.

File Edit View Run Kernel Gh Tabs Settings Help

 Last Modified 8 bours sgo

8 hours ago Covariance, Correlation. Shours ago | | 1 import numby as no

Console

CUSTOMIZE

CANCEL

CREATE

### **Pairs Trading** Step 1 Navigate to the Tutorials directory and open Pairs Trading.ipynb.

1 🛍 ± ♂ ♂ 🖀 jubyter#stensorflow-20191 × 🖻 Pairs Tracing.bynb

a + K □ □ + = 0 Code - 0 p\*

the top of the notebook and execute the following code:

%pip install statsmodels --user %pip install tensorboardX --user

%pip install -U auquan\_toolbox --user

File Edit View Run Kernel Git Tabs Settings Help

Read the narrative and execute each cell in turn.

Blogpost on pairs trading by Bart Chrzaszcz

Auquan blogpost on pairs trading

Interrupt Kernel

9 hours ago

%pip install bs4 --user

Long-Short Strategies...

We'll start by constructing an artificial example.

■ C Code ∨ ⊙ git m / Tutorials / 0,0 Restart Kernel... Restart Kernel and Clear All Outputs... Restart Kernel and Run All Cells... yahooData ading Strategy ARIMA + GARCH to m. Shut Down Kernel Covariance, Correlatio Shut Down All Kernels... s a nice example of a strategy based on mathema download.png Change Kernel... Expected Value and S. s as follows: Let's say you have a pair of securitie companies that manufacture the same product, for example Pe Integration, Cointegra... 9 hours ago

In the notebook interface, click on Kernel > Restart Kernel and Clear All Outputs.

1 X Pairs Trading.ipynb

these two to remain constant with time. However, from time to

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

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

...helps you make the most of Google Cloud technologies. Our classes include technical skills and best practices to help you get up to speed quickly and continue your learning journey. We offer fundamental to advanced level training, with ondemand, live, and virtual options to suit your busy schedule. Certifications help you validate and prove your skill and expertise in Google Cloud technologies.

Pairs Trading Next Steps / Learn More End your lab

Overview

Set up your environment

Clone Auguan Tutorials

Launch Al Platform Notebooks

Ensure you're using the Python 3 kernel by selecting Python 3 from the upper right Python 3 C You'll need to install some libraries to complete the notebook. Create a new cell at

Manual Last Updated November 4, 2019 Lab Last Tested November 4, 2019

**Q** 在线交谈

At the command-line prompt, type in the following command and press Enter. Confirm that you have cloned the repository by double clicking on the Tutorials

**Next Steps / Learn More** Official documentation on Al Platform Notebooks

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

The number of stars indicates the following:

number of stars, type a comment, and then click Submit.

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