CONNECTION INSTRUCTIONS

- Wi-Fi SSID: GTC_Hands_On
  Password: HandsOnGpu
- 登入 nvlabs.qwiklab.com
  尋找classroom:
  Deep Learning for Finance Trading Strategy
- 請先不要點選任何課程
- 需要任何協助，請詢問助教
- 講義下載點: https://goo.gl/zKuHbr

Algorithmic Trading using Deep Autoencoder based Statistical Arbitrage

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DEEP LEARNING INSTITUTE

DLI Mission

Helping people solve challenging problems using AI and deep learning.

- Developers, data scientists and engineers
- Self-driving cars, healthcare and finance
- Training, optimizing, and deploying deep neural networks

TOPICS

- Lab Overview
- Financial Terminology
- A Simple Mean-Reversion Based Algorithmic Trading Example
- Lab
  - Deep Autoencoder
  - Stat-Arb
  - Backtesting
  - Performance Evaluations
  - Next Steps

LAB OVERVIEW

WHAT THIS LAB IS

- An introduction to:
  - Financial Terminology
  - Financial Time Series Data
  - Keras with TensorFlow backend
  - Algorithmic Trading
- Hands-on exercises use Pandas Dataframe to process stock data
- Hands-on exercises using Keras with TensorFlow backend for algorithmic trading
- Complete trading strategy that generates profit and loss curve (P&L)

WHAT THIS LAB IS NOT

- Intro to machine learning from first principles
- Rigorous mathematical formalism of neural networks
- Survey of all the features and options of TensorFlow, Pandas or other tools

ASSUMPTIONS

- You are familiar with Autoencoders
- Helpful to have:
  - Keras experience
  - Python experience

TAKE AWAYS

- Understanding the methods for algorithmic trading
- Ability to setup backtesting and train a autoencoder network
- Enough info to start using Keras with TensorFlow backend to learn from your own data

Financial Terminologies

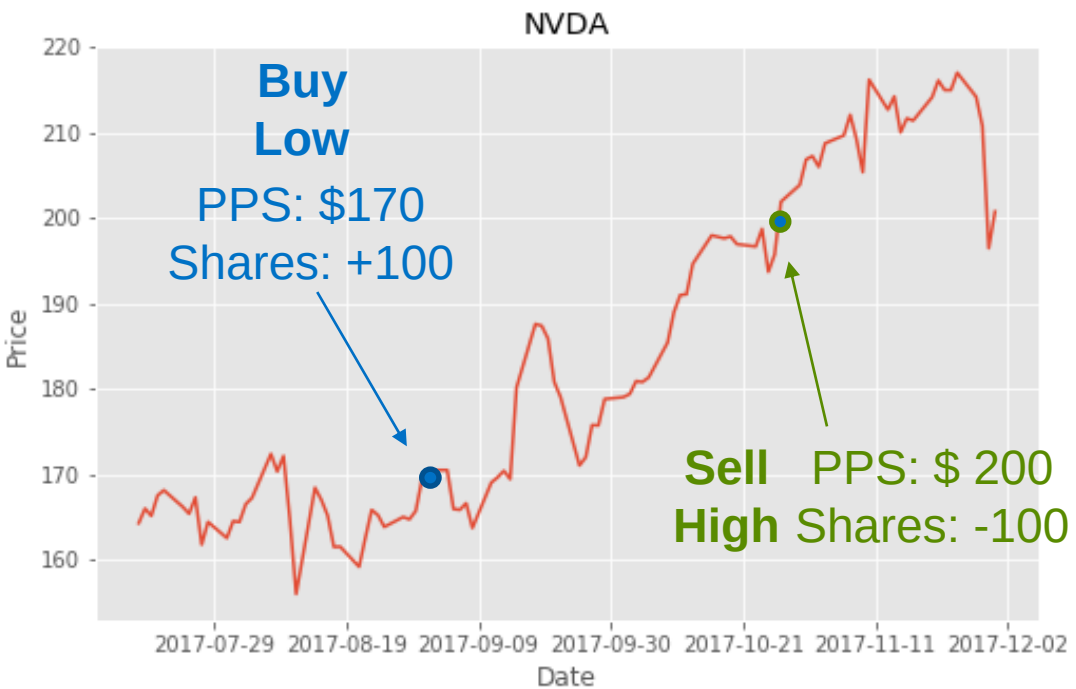
- Algorithmic Trading
- Stock
- Share
- Portfolio
- Long
- Short

Positions

Buy Low & Sell High

Long

Own and Hold -> Sell for profit



Profit: 200*100 – 170*100 ~= 3000

Short

Borrow and Sell -> Buy for Profit

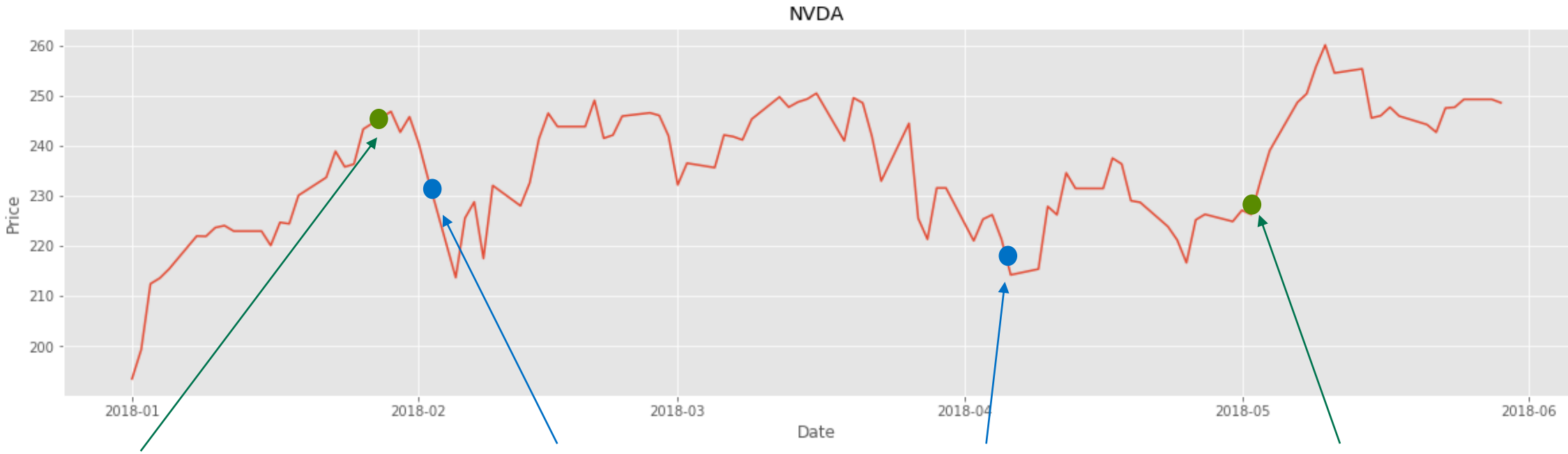
Profit: 29*100 – 26*100 ~= 300

Financial Terminologies

- Return
- Sharpe Ratio
- Mean Reversion
- Paris Trading
- Stat-Arb
  - Ratio of STMA and LTMA
  - PCA
  - Auto Encoder

Mean reversion

220 - 230 - 240



higher enough than average
Open a short position

Close enough to average
Close the short position

Short

Borrow and Sell -> Buy for Profit

lower enough than average
Open a long position

Close enough to average,
Close the long position

Long

Own and Hold -> Sell for profit

Get the data

- !pip install pandas_datareader
- Read in stock data
- Locate through stock symbol index / timestamps / features

		Close	High	Low	Open	Volume
Symbol	**Date**					
NVDA	**2010-01-01**	18.680	18.9500	18.660	18.79	0
	2010-01-04	18.490	18.6200	18.110	18.51	20008817
	2010-01-05	18.760	18.9600	18.420	18.50	18217439
	2010-01-06	18.880	18.9200	18.570	18.68	16229167
	2010-01-07	18.510	18.8600	18.370	18.78	13694746
	2010-01-08	18.550	18.6821	18.250	18.43	11954399

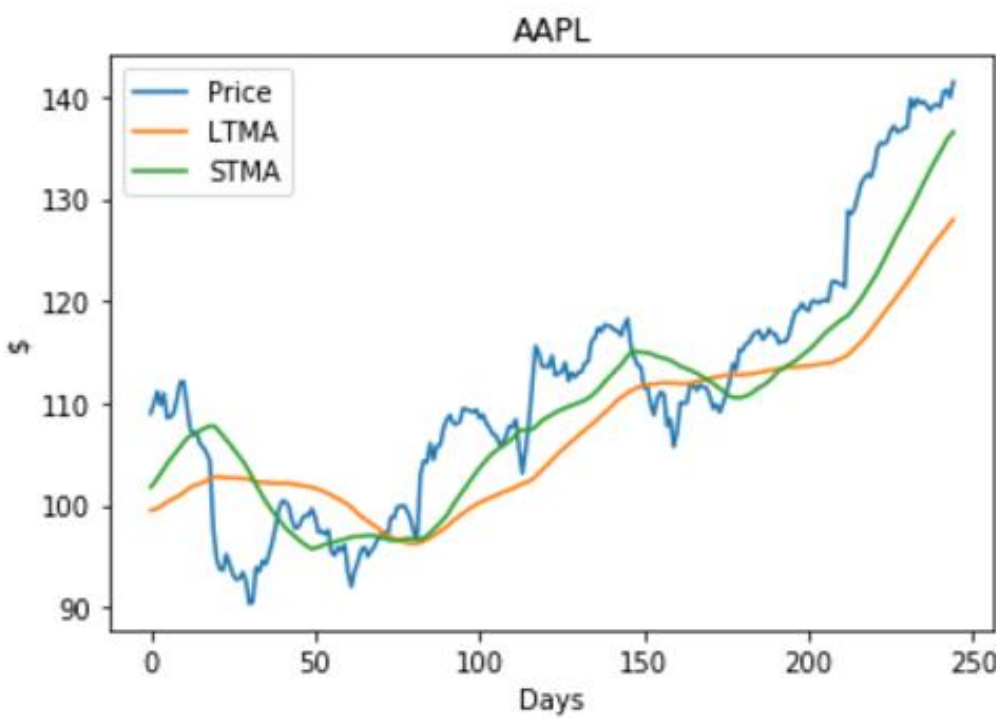
Some datafram operation

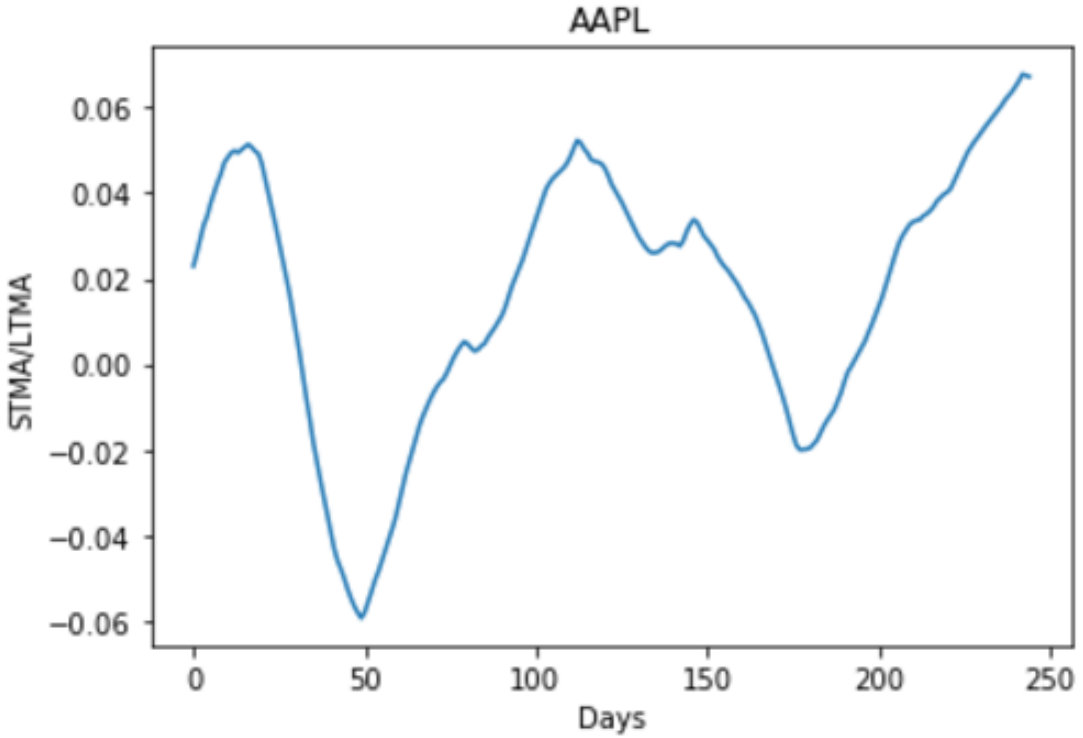
- Plot the stock price dataframe with matplotlib
- Mean Average
- Stock Return

Moving Average – Mean Reversion

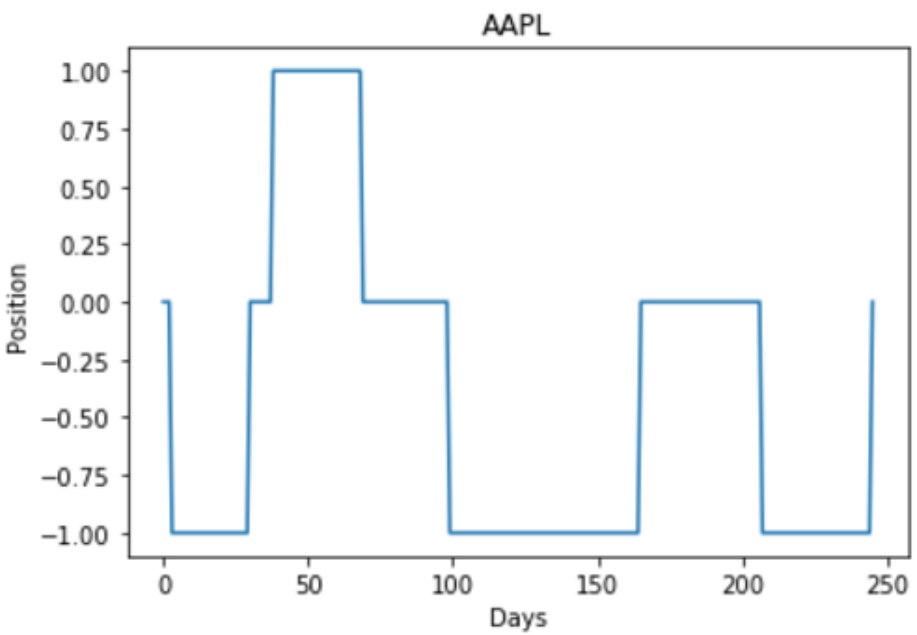
- Apple Inc.’s Stock Return
- Long Term Moving Average
- Short Term Moving Average
- Mean Reversion Signal
- Thresholds for opening and closing positions

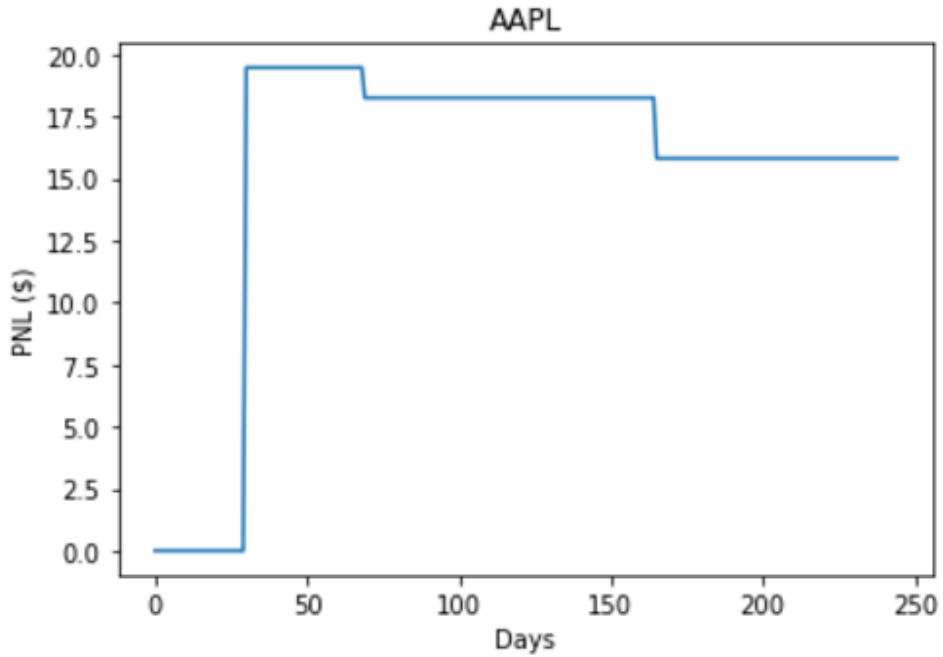
Moving Average - Mean Reversion





Moving Average - Mean Reversion



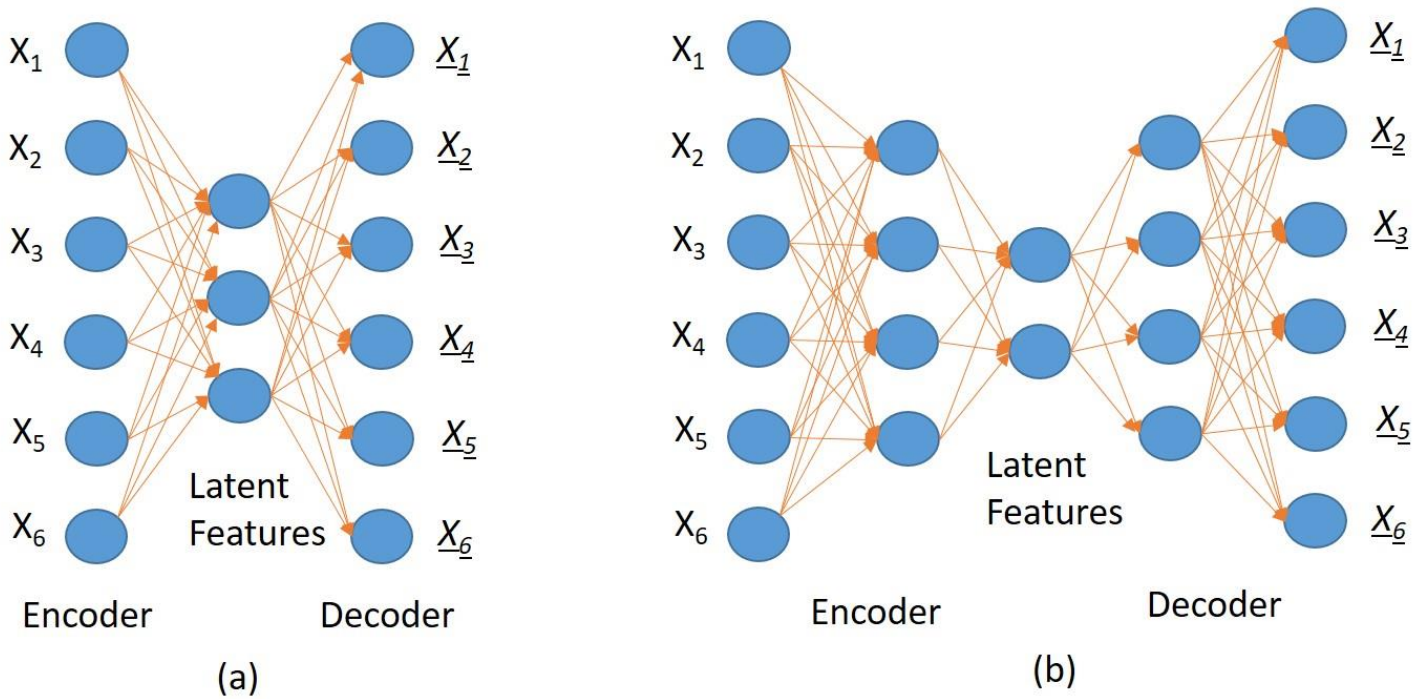


LAB

Deep Autoencoder based Stat-Arb

- Autoencoder
- Backtesting
- Data
- Performance Evaluation
- Hyperparameters

Autoencoder



Dataset

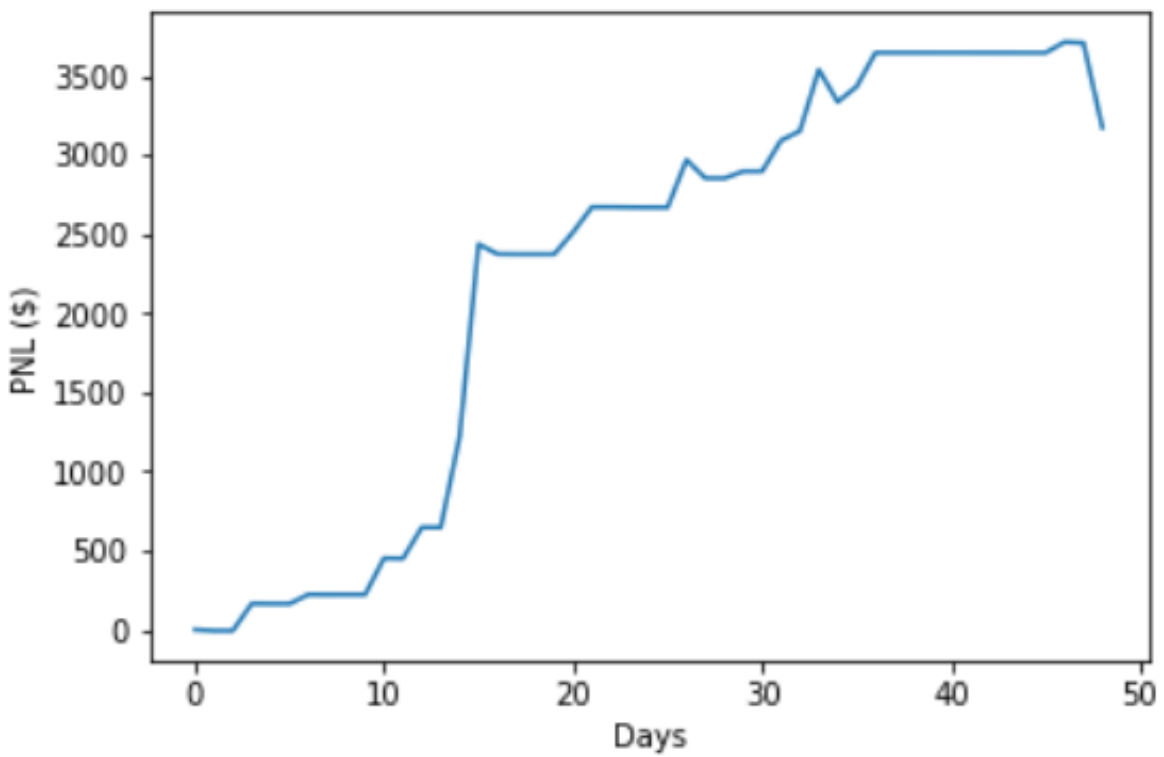
LAB EVALUATION

Hyperparameters

- Set Ts['T1'] to 1.2 in the three above cell. Then re-run everything using Kernel->Restart & Run All.
- If you have enough time, you can try different hyperparameters to see if the Sharpe ratio is improving.
- Is the Sharpe ration you are getting above 3.0?

P&L

- Sharpe Ratio: 4.58



Next Steps

After the lab, we recommend you doing the following options;

- Build a HPC system with multiple GPUs for overnight or real-time hyperparameter search.
- Develop the multi-GPU version of the code.
- Perform hyperparameter search periodically and use the best performing hyperparameters for a period (a day, a week, etc)
- Try deeper autoencoders and see the performance.

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請掃描右方QR code填寫問券

保留填寫完成畫面於離場
前換取精美禮物

Instructor: Andrew Liu, Ph.D.

www.nvidia.com/dli