Syllabus of ML Financial Markets

1. Goal of the course

1. Use ML to predict fraud event in China/US financial market. Predict behavior of stocks, options and other financial products world wide.

2. Learning outcome:

    - a detailed project of how to get data, clean data, apply ML model to predict outcome
    - a detailed writeup of the report

3. prerequisite and tools used in the course

    a. requirements

    - require understanding of matrix, basic concept of ML.
    - strong interests in data and financial markets
    - knowledge of basic python

    b. tools

    - python
    - Tensorflow
    - Pandas
    - Scikit-learn
    - Mac/Google Colab/AWS etc XaaS computation platform

2. Syllabus

The course is a *12-week* course designed to learn how to use MachineLearning concepts to understand the financial market's behavior. Using a state-of-the-art ML tool and concept of RNN, we are going to build a model that can

1. learn market behavior of certain type of fraud
2. predict price variation of certain markets
   There is going to be small *homework* at the end of each week.

WK 1

1. Introduction of time Machine learning, time series data
2. supervised learning, unsupervised Learning
3. Concept of deep learning
4. Python basic: python usage, packages

WK 2

1. Pandas, Numpy, Sklearn, Tensorflow
2. Simple NN structure
3. Weights and bias
4. train/test
5. forward and backward propagation

Wk 3

1. learning curve
2. optimizer, batch learning
3. overfitting and underfitting
4. tf realization
5. learning algo

WK 4

1. what is DeepLearning?
2. Time Series model
3. univariate and multivariate learning
4. Seasonality ,trend, autocorrelation
5. real time series data
6. Synthesis data modeling

WK 5

1. Finance data of stock and other markets
2. open, close, volumes
3. options, option pricing
4. (optional) PDEs, Black-Scholes

WK 6

1. Hands on project, data query and clearning
2. baseline model

3. ML model

WK 7

1. implementation of baseline and ML model
2. RNN model
3. sequence model fraud detection and price prediction

WK 8

1. Model tuning and improvement
2. Code the project by yourself

WK 9

1. Discussion of model and result
    - model performance
    - how to improve
2. get the best model to deploy

WK 10

1. write report
2. Q&A

WK 11

1. review of report
2. Q&A

WK 12

1. report wrap up with formatting
2. Q&A