MMAI 823 – AI in Finance Project Proposal
Team Richardson

Prediction of Stock Returns using Long Short Term Memory (LSTM) Deep Learning Network

1.0 Business Background

Traditional time series model is a linear time series that needs to deal with autocorrelation, volatility, clustering non – Gaussianity (normal) cycles and regimes.

2.0 Business Objective

Every time there is a technology disruption, it creates a new opportunity (or threat). In this case, we are planning to use the new machine learning model i.e. Long Short Term Memory (LSTM) Deep Learning Network to improve the stock price predictability, which then can help fund manager to buy, hold or sell a stock. Here, LSTM offers a non-linear model with exogenous variables in stock price momentum prediction.

3.0 Planned Approach

Here is the planned approach to solve this problem:

- Train a LSTM model for each stock, test its power to predict the moving direction (up or down)
  - Processing sequential (time series) data in the Recurrent Neural network (RNN)
  - Use LSTM network model to solve gradients problem of RNN
  - Gradients of RNN can grow without bound or vanish through backpropagation
- Compare this neural network model with SVM
- Train a LSTM model and use it to predict a portfolio's return in different independent period to test the profitability of LSTM model.

4.0 Dataset

Stock Historical Data will be sourced from Quandl.com

- 50 stocks from the S&P500.
- Input is stock returns up to time
- The prediction is the stock returns from the LSTM model at time t+1

5.0 Reference

- Chapter 13 from "Big Data and machine learning in Quantitative Investment" Book.