EXPERIMENTS

I. Data Preparation

We have used American Stocks data from Yahoo Finance. We have the stocks data for the following 10 companies, Boeing, Coca Cola, Ford, IBM, GE, JP Morgan, Microsoft, Nike, Walmart, and Exxon Mobil. Out of these ten, we decide to work with **M** stocks which are chosen randomly.

We have downloaded the data from March 24th, 1986 till March 22nd, 2019. This means we have 8319 data points to work with. The downloaded data contains the Date, Open Price, High Price, Low Price, Close Price, Adjusted Close Price, Volume and Stock Ticker. All the prices are in Dollars, while the volume is defined in the number of shares traded for that ticker on that day.

For training purposes we will be using 27 years of data, while for testing we plan to use 6 years worth of data.

For days, where we don’t have the stock data available, we maintain the time series by filling the empty price data with the close price of the previous day and we also set the volume to 0 to indicate that the market is closed on that day.

In order to come up with a general agent which is robust with different stocks, we will normalize the price data. We will divide the opening price, closing price, high price, and low price by the closing price of the last day of the total period. We would only be dealing with the four prices data only and will be excluding the volume information.

II. Network Structure

Our network structure is motivated by Jiang et. al., where they use the concept of Identical Independent Evaluators (IIE). IIE means that the networks flow independently for the assets while network parameters are shared among these streams. The network evaluates one stock at a time and evaluates its preference to invest in this stock. The total (**M+1**) stocks are then normalized by the softmax function and compressed into a weight vector as the next periods action.

We will be working with Deep Feed Forward Neural Networks and Convolutional Neural Networks as the portfolio management learning agents.