Stock Market Analysis and Prediction

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Abstract

Stock price and stock index price forecasting system, used by investors and financial managers to describe the market and compare the return on specific investments, has been a topic of research for very long now. When in the stock market, there are more buyers than there are sellers, the price must adapt or no trades are made. This tends to drive the price upwards, increasing the market quotation at which investors can sell their shares, enticing investors who had previously not been interested in selling and vice versa. These demands and supplies are ever changing, resulting in highly-fluctuating, non-linear stock prices which poses a threat against the credibility of those prediction systems which only view the market from one perspective. For a reliable system, it is therefore important to explore the market on multiple grounds, basically through Technical, Fundamental and News Analysis. Under Technical Analysis, SMA (Simple Moving Average) is used as a preliminary data smoothing technique, which helps reduce the fluctuations substantially. Artificial Neural Networks (ANNs) is then employed to analyze the nonlinear relationships between the stock closed price and various technical indexes, and to capture the knowledge of trading signals that are hidden in historical data. Features like traded share, traded volume, opening price, closing price, high price and low price are fed as an input parameter in Neural Network. Backpropagation algorithm is then implemented to train the given Network model. The neural network layers and neuron numbers in hidden layers are then tuned by training and validating the data set iteratively.

The fundamental analysis involves thorough study of financial statements of companies, also known as quantitative analysis. This involves looking at assets, liabilities, revenue, expenses and all other financial aspects of a company. It gives insight on the company's future performance. The results moreover reflect the company's success or failure over the long term than immediate future. Hence, unlike technical analysis, it helps predicting stock price on a long run. In news analysis, we focus on understanding the news sentiment and its affects which may cause the investors to either buy or sell the shares based on positivity or negativity of the news. The news analysis problem can be mapped into similarity based classification. A set of vectors are created from analysis of historical news, where each component of a vector represents the features in data set. The required labeling are done based on historical rise/fall of stock prices. The increase or decrease of the trend is then predicted based on similarity measures. In short, news analysis predicts the price of share of the following day by comparing the most recent news with past news using K-nearest neighbor algorithm.

Thus, through the circumstantial application of the above-mentioned analysis, the paper proposes to predict the stock market in a more generalized manner.

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