STOCK PRICE PREDICTION USING DEEP LEARNING TECHNIQUES (ID:88)

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ABSTRACT. Stock market analysis and prediction using deep learning has been more important and popular in the economy. However, because of the numerous parameters which influence the market, prediction of the stock market is one of the most difficult analyses. In this project, multiple models to increase the accuracy of event driven stock price prediction will be implemented and tested. For the stock price prediction, historical stock prices, events, and quantitative information are used. In the dataset, each stock data contains the information about the certain events which are related to their price, and the data will be preprocessed according to the correlation between each parameter. A recurrent neural network(RNN), gated recurrent units(GRU), long short term memory network(LSTM), and convolutional neural network(CNN) will be implemented and compared.

1. INTRODUCTION

Following the well-known Efficient Market Hypothesis, it has long been stated that the prediction of stock markets is an impossible task. The number of potential variables influencing the resultant stock or index value drive the behavior of markets explains why stock prediction is not an easy task.

However, if we follow the semi-strong efficient hypothesis of the stock market and assume that there are no inside stories for publicly listed companies, we're able to predict the stock price by referencing the news and past financial performance. Considering the complicated relation between stock price and public information (news reports combined with financial performance), we'd like to use neural networks to tackle the problem of stock price prediction.

This work serves to implement three popular artificial neural network models, namely the CNN, GRU and LSTM, and try to compare their performances in order for demonstrating the superiorities of each of them (CNNs are more invariable to volatility in the data and RNNs are better at capturing time-related patterns, etc.).

2. RELATED WORK

The changing trend of the stock price has always been seen as a very important problem in the finance and economic field. The traditional analysis uses the fundamental analysis method and technical analysis method. Recent studies have shown that Natural Language Processing(NLP) techniques are used to predict market volatility [1][2]. Also, researchers have applied some machine

learning techniques such as Decision Tree, Adaptive Boosting, and Artificial Neural Network(ANN) to make future predictions of stock market performance [4].

3. Methods

In this project, we will apply different deep learning techniques to predict the stock market. Specifically, we will use GRU, RNN, LSTM, and CNN, and then we will compare predictions of these deep neural networks.

4. Timeline and splitting of work

What sub-parts will John, Jane and Jack individually work on? Create a rough timeline for one month, e.g.,

- Week 1: Prepare the data (led by Yizhe Hang),
- Week 2: Explore RNN and LSTM (led by Jihan Zhang and Wontae Jeong),
- Week 3: Explore GRU and CNN (led by Wontae Jeong and Yizhe Hang),
- Week 4: Consolidate, write project report (led by Jihan Zhang)

5. Reference

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[3] M, H., E.A., G., Menon, V. K., & K.P., S. (2018). NSE stock market prediction using deep-learning models. Procedia Computer Science. Retrieved November 16, 2021, from https://www.sciencedirect.com/science/article/pii/S1877050918307828.

[4] Nabipour, M., Nayyeri, P., Jabani, H., Mosavi, A., Salwana, E., & S., S. (2020). Deep learning for stock market prediction. Entropy, 22(8), 840. https://doi.org/10.3390/e22080840