Title: Stock Price Prediction using Ensemble Learning

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Machine Learning (ML) and Artificial Intelligence (AI) are a strategical capability in the world of finance. With the vast amounts of data available today, the investment industry is turning towards the future, implementing ML and AI to minimize loss and maximize profits. Spending on Information Technology (IT) by financial firms (worldwide) was $440 billion in 2018 and is expected to increase by 2021. With the amount of money being invested, it is indicative that these financial firms are benefitting from implementing ML and AI into their trading strategies. On this context, our goal for this study is to accurately predict stock prices using predictive modelling. Our previous work [1] shows a correlation between the sentiments of the recent past news articles of a financial organization and its immediate stock prices, however we were not able to achieve higher accuracy in that study. This study aims to implement ensemble learning techniques to achieve higher accuracy in predicting stock prices. Ensemble methods are techniques that create multiple models and then combine them to produce improved prediction. As the first method in the ensemble, we used our previous news article-based sentiment analysis and prediction. As our second method in the ensemble, we utilized a model that analyzes the sentiments of the recent tweets about a financial organization in order to predict its stock price in the immediate future. As our third method, we used the Long Short-Term Memory (LSTM) recurrent neural network that makes predictions based on the historical stock price data. LSTMs are used in the field of deep learning and unlike standard feedforward neural networks, LSTM has feedback connections. LSTMs are very powerful in sequence prediction problems because they are able to store past information. This is important in our case because the previous price of a stock is crucial in predicting its future price. Once the abovementioned three prediction models are developed, we used Majority Voting and Weighted Averaging Based Ensemble Methods to combine the results of the predictions. Our preliminary results verified our hypothesis and with the ERN conference on February, 2020, we hope to make our ensemble model stronger and to present the results of our detailed study based on that.

1. David Rodrigues-Romero, Debzani Deb, "Using Sentiment of News Articles to Predict Stock Price Performance", Poster presentation at NSF ERN conference, February, 2019, Washington D.C.

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