

Machine Learning Project Proposal

Using Recurrent Neural Networks to Predict Stock Prices

PROJECT DESCRIPTION

1 Introduction

The world of stock exchange is very volatile and lucrative. Investors are constantly monitoring varying factors in order to determine when to buy and sell stocks. Naturally, with machine learning we can remove the human aspect of this process and considerably reduce the amount of time and resources needed to determine the worth of stocks.

There are many machine learning models we can use to accomplish this task but for this project, we propose to use a Recurrent Neural Network (RNN) due to it performing well with time series datasets.

In the short term, we hope that our models will help investors make a more educated decision when it comes to buying and selling stocks as well as help greatly reduce the time and money needed to do so. In the long term, we hope that our research will help introduce stock exchange to the wider general public. This will open an avenue for better financial stability to lower income groups as well as lead to greater investment into our economy which in turn will lead to a rise in living standard among the population.

In the remainder of the proposal we will discuss work done by fellow researchers in the field. We will then outline the methodology we plan to use in our research, our management plan, and the significance of our proposed work..

2 Related Work

Using machine learning models to predict stock prices is a fairly common research topic in the field. Pasupulety et. al propose a technique for analyzing and predicting stock prices of companies using Support Vector Machine (SVM) and Random Forest based regression models as an ensemble [2]. Their experiments indicated that in some scenarios, their ensemble model performed better than the constituent models and is highly dependent of the nature and size of the training data. Roondiwala et. al present a Recurrent Neural Network (RNN) and Long Short-Term Memory (LSTM) approach to predict stock market indices, and use the root mean squared error (RMSE) as their evaluation metric [3]. Their results show a remarkably low RMSE score which indicates that the models used were able to produce results very close to the actual stock market indices.

3 Methodology and Evaluation

We will be using a dataset obtained from Kaggle which contains the 5 year stock values of SP 500 companies [1]. We will then use the first 4 years of the dataset to train our model and have our model predict the stock prices for the next year. We will then compare the produced results to the actual stock prices by using the root-mean squared error (RMSE) as an evaluation metric. In order to evaluate the effectiveness of the Recurrent Neural Network, we will compare it to another machine learning model, namely Linear Regression, to see which one performs better.

4 Time Line and Management Plan

June 12th - 18th: Complete Project Proposal and clean dataset to be used for training.

June 19th - 25th: Train the Recurrent Neural Network and note down the results.

June 26th - August 1st: Finish project report and demo results.

The main challenge with this project will be to familiarize myself with Tensorflow in order to train the Recurrent Neural Network. The resources needed are Python, Jupyter Notebook, and a computer that is capable of handling the machine learning models.

5 Summary: Significance of proposed work

5.1 Intellectual Merit

Machine learning is getting more and more prevalent in our daily lives with many companies using them to compartmentalize tasks which would have normally consumed a lot of time and effort. In this way, machine learning models can also be used in the stock market to help investors make decisions. The ease of use of these models will also help bring the field of stock exchange to a wider audience, thus giving this research significant merits.

5.2 Broader Impacts

By doing this project, we hope to build on already existing research. We hope that our research will help one day lead to an actual product that can be used by people of all classes worldwide.

6 References

- [1] Nugent, C. (2018, February 10). S&P 500 stock data. Kaggle. <https://www.kaggle.com/camnugent>
- [2] U. Pasupulety, A. Abdullah Anees, S. Anmol and B. R. Mohan, "Predicting Stock Prices using Ensemble Learning and Sentiment Analysis," 2019 IEEE Second International Conference on Artificial Intelligence and Knowledge Engineering (AIKE), 2019, pp. 215-222
- [3] M. Roondiwala, H. Patel, and S. Varma, "Predicting Stock Prices using LSTM," 2015 International Journal of Science and Research (IJSR), 2015, pp. 1754-1756.