Technical Report

Course Number: CS 4982

Proposal Title

Comparing Machine Learning Algorithms on Time Series Data

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Abstract

The goals of the project is to create three machine learning models that can be used to predict the stock prices of BlackBerry. The methodology the project is going to use is Long Short Term Memory (LSTM), Gated Recurrent Units (GRU) and Gated Adversarial Networks (GAN). The problem the project is going to address is accurate stock price prediction. The existing resources I will depend on are various python packages for data science such as tensor flow, pandas and stock data from Yahoo Finance. The contribution I intend to make is a comparison of the three different models where I look at the compilation time, accuracy and errors. Then drawing conclusions about predicting financial data. The evaluation of the project will be training the models on BlackBerry stock data recorded daily from February 4 1999 to September 27 2021 to predict September 28 2021. Some of the recent work that has already been done in the area is stock price prediction for S&P 500 Companies by Zhong and Hitchcock; work on Stock Price Movement Predictions by Bhardwaj and Stock price prediction using BERT and GAN by Sonkiya, Bajpai and Bansal. Through these papers I was able to reduce the set of models down to these 3 since they were commonly applied. The plans for the project are to research and create all three models using the training data and then test on the following days results; which can be verified using Yahoo Finance historical data tool then tweak and compare.

Project Schedule

Week #	Hours	Total Hours
Week 1 (Sept 26 – Oct 2)	5 for Research; 5 for Technology Setup	10
Week 2 (Oct 3 – Oct 9)	1 for Research; 10 for Coding	21
Week 3 (Oct 10 – Oct 16)	2 for Progress Report; 8 for Coding; 1 Research	32
Week 4 (Oct 17 – 23)	11 for Coding	43
Week 5 (Oct 24 – Oct 30)	2 for Progress Report; 9 for Coding	54
Week 6 (Oct 31 – Nov 6)	11 for Coding	65
Week 7 (Nov 7 – Nov 13)	3 for Coding; 8 for Writing	76
Week 8 (Nov 14 – Nov 20)	10 for Writing; 1 for Coding	87
Week 9 (Nov 21 – Nov 27)	11 for Presentation	98
Week 10 (Nov 28 – Dec 4)	6 for Tweaking Paper; 5 Presentation Prep	109
Week 11 (Dec 5 – Dec 9)	11 for Tweaking Paper	120

Total Hours: 120

References

https://en.wikipedia.org/wiki/Long_short-term_memory
https://finance.yahoo.com/quote/BB/history?period1=918086400&period2=1632787200&interval=1d&filter=history&frequency=1d&includeAdjustedClose=true
https://www.analyticsvidhya.com/blog/2017/12/fundamentals-of-deep-learning-introduction-to-lstm/
https://machinelearningmastery.com/time-series-prediction-lstm-recurrent-neural-networks-python-keras/
Stock price prediction using BERT and GAN, Priyank Sonkiya and Vikas Bajpai and Anukriti Bansal, 2021,2107.09055,arXiv,q-fin.ST
Design and Analysis of Robust Deep Learning Models for Stock Price Prediction, Jaydip Sen and Sidra Mehtab,2021,2106.09664,arXiv,q-fin.ST
Convolutional Neural Network(CNN/ConvNet) in Stock Price Movement Prediction, Kunal Bhardwaj, 2021,2106.01920,arXiv,cs.NE
S&P 500 Stock Price Prediction Using Technical, Fundamental and Text Data,Shan Zhong and David B. Hitchcock,2021,2108.10826,arXiv,stat.ML
https://neptune.ai/blog/predicting-stock-prices-using-machine-learning
https://towardsdatascience.com/synthetic-time-series-data-a-gan-approach-869a984f2239