

# Stock Price Forecasting

## *Project Review*

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## Seminar Outline

- 1 Introduction
  - Motivation
  - Problem Statement
- 2 Selected Literature Survey
- 3 Proposed Work
  - Work Done
- 4 Conclusion and Future Scope



# Motivation

- Stock price forecasting helps investors to use their capital wisely and get a better look at their return of investment.
- Stock price forecasting can be assisted by various Machine Learning techniques and algorithms.
- Forecasting stock price depends on numerous factors such as daily news impacting the organization, dividend announcements, bonus announcements, stock splits, etc. All these factors make stock price prediction extremely difficult.
- Moving Average and Regression methods fail to forecast stock prices as the variables are dependent on each other.



# Problem Statement

- To forecast the stock prices using historical data only.
- To reduce the training time without compromising the accuracy of the model
- To reduce the RMSE error
- To analyze the performance of our model with various stock tickers.



# Selected Literature Survey I

Batres-Estrada, B., 2015

Deep Learning for multivariate financial time series

Raut Sushrut Deepak, Shinde Isha Uday, Dr. D. Malathi, 2017

MAchine Learning Approach in Stcok Market Prediction, IJPAM

T. Kim and H. Y. Kim, 2019

Forecasting stock prices with a feature fusion LSTM-CNN model using different representations of the same data, PloS



## Selected Literature Survey II

Loke.K.S, 2017

Impact Of Financial Ratios And Technical Analysis On Stock Price Prediction Using Random Forests, IEEE

X. Shao, D. Ma, Y. Liu, Q. Yin., 2017

Short-term forecast of stock price of multi-branch LSTM based on K-means, ICSAI

K. Chen, Y. Zhou, and F. Dai, 2015

LSTM-based method for stock returns prediction: a case study of China stock market, IEEE



## Selected Literature Survey III

S. Hochreiter and J. Schmidhuber, 1997

Long short-term memory

Yaohu Lin, Shancun Liu, Haijun Yang, Harris Wu, 2019

Deep Learning Framework for Stock Prediction Using LSTM,  
DECON



## Data Extraction Phase

- Stock symbol and the stock exchange where the stock is listed is taken as input.
- The historical data is scraped from Yahoo Finance website using Selenium package.
- The scraped data is parsed using BeautifulSoup module in Python.
- The parsed data is then converted into their respective datatypes and stored as a Dataframe.
- The number of days to forecast is taken as input.





## Preprocessing Phase

- A script is written to remove the NULL value records to ensure a clean dataset.
- To predict the closing price, Date and Close columns are retained. The other columns are dropped from the Dataframe.
- The Dataframe is then sorted based on the date in ascending order since stock price is dependent on time.
- The dataset is scaled down using MinMaxScaler module with the feature range between  $[0, 1]$ .
- The dataset is split into 90% training data and 10% testing data.



## Training Phase

- The LSTM model consists of two layers with 50 neurons in each layer. The model is trained for 200 epochs.
- Early stopping with patience=5 is used to prevent the model from being overfitted as the model began to diverge from the minima after certain number of iterations..
- MSE is used as loss function since it is not classification problem. RMSE is used to validate the test results.



# Training Loss

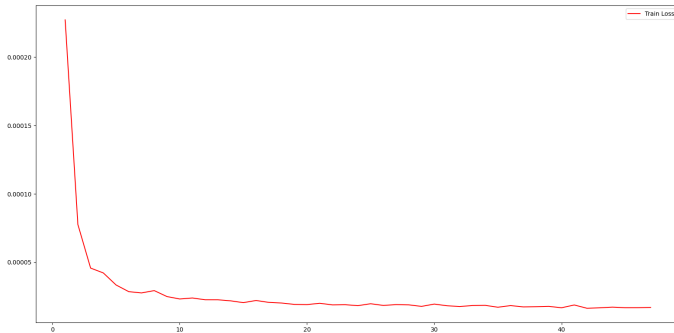


Figure: Training Loss



# Testing Loss

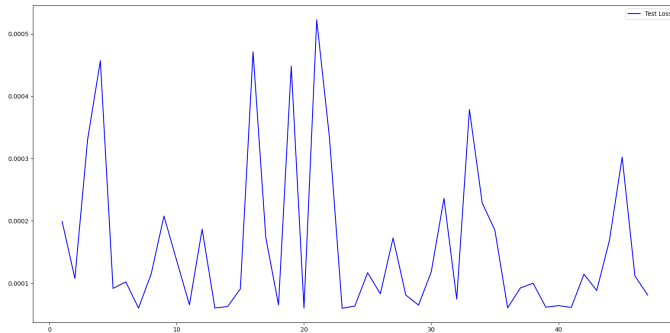


Figure: Testing Loss



# Stock Price - Actual vs Forecast

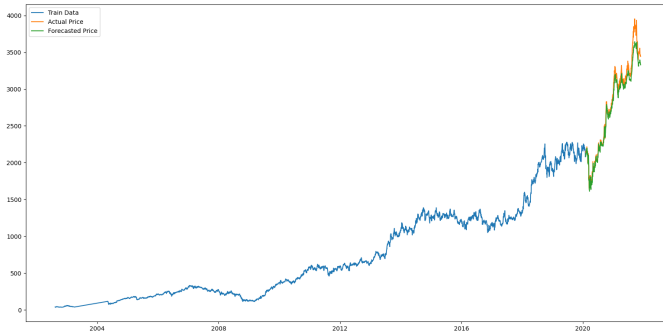


Figure: Stock Price - Actual vs Forecast



## Conclusion and Future Scope

- First and last session of training gave RMSE values of 826.32 and 101.07 respectively.
- The model could be trained for more number of epochs by increasing patience value in Early Stopping.
- The number of units in each layer or the number of hidden layers can be increased.
- Dropout can be added to avoid overfitting.
- Sentiment analysis on daily news can greatly enhance the accuracy of the model as stock prices are affected by human emotions in the short term.
- Stock price forecasting on a daily basis can be improved if the dataset used contains tick-by-tick data instead of 1D interval data.



## Selected References

- [1] Batres-Estrada, B. : 'Deep Learning for multivariate financial time series', 2015
- [2] Raut Sushrut Deepak, Shinde Isha Uday, Dr. D. Malathi. : 'Machine Learning Approach in Stock Market Prediction', IJPAM 2017
- [3] T. Kim and H. Y. Kim. : 'Forecasting stock prices with a feature fusion LSTM-CNN model using different representations of the same data', PloS 2019
- [4] Loke K.S. : 'Impact Of Financial Ratios And Technical Analysis On Stock Price Prediction Using Random Forests', IEEE 2017
- [5] X. Shao, D. Ma, Y. Liu, Q. Yin. : 'Short-term forecast of stock price of multi-branch LSTM based on K-means', ICSAI 2017
- [6] K. Chen, Y. Zhou, and F. Dai. : 'LSTM-based method for stock returns prediction: a case study of China stock market, IEEE 2015
- [7] S. Hochreiter and J. Schmidhuber. : 'Long short-term memory', 1997
- [8] Yaohu Lin, Shancun Liu, Haijun Yang, Harris Wu. : 'Deep Learning Framework for Stock Prediction Using LSTM, DECON 2019



Thank You

