



Stock Price Visualizing and Forecasting Using Deep Learning, Machine Learning and Python Dash Framework

**¹Prof.B Prajna, ²Muddada Jothika Sumali, ³Mugi Vandana, ⁴Mutyala Uma Shankari,
⁵Nallaparaju B N Venkata Prabhavathi Devi**

¹Head of Department (Project guide), ²³⁴⁵Students

Department of Computer Science and Systems Engineering
Andhra University College of Engineering for Women, Visakhapatnam, Andhra Pradesh, India

Abstract: The stock market offers one of the biggest returns on the market, but it is exceedingly difficult to predict stock prices because there are no set guidelines for doing so. Although they are volatile in nature, share prices and other statistical factors may be seen, which aids savvy investors in carefully selecting the company they wish to put their profits in. We may create dynamic graphs of financial data for a particular company using tabular data provided by the yfinance Python module by using this straightforward project idea. In addition, we can forecast future stock prices using a machine learning system. The project is a wonderful introduction to Python/data science for newcomers and an useful refresher for experts who have experimented with Python/ML in the past.

Index Term: Stock price, yfinance, Machine learning, forecasting, prediction, visualizing, Dash framework python.

INTRODUCTION

Many models have been used by investment firms and individual investors to develop successful investments and have a better grasp of the market. There is a ton of data available for research and processing regarding changes in stock prices. Investors use data analysis to make educated estimates. In order to make a prediction, they read the news, research corporate histories, market trends, and other important factors. According to prevalent ideas, stock prices are incredibly volatile and random. This begs the question of why prestigious firms like Citigroup and Morgan Stanley would hire quantitative analysts to develop prediction algorithms. This study aims to forecast stock costs using LSTM Neural Networks, a type of Deep Learning model. RNNs are useful for data with time-frames, although recent studies have revealed that LSTM networks are the most popular and practical RNN versions. A company may become vulnerable to market changes that are outside of its control, such changes in market sentiment, the state of the economy, or trends in your industry.

NEED OF THE STUDY.

The majority of researchers in this field are fundamentally motivated by market prediction, which presents excellent profit margins. Most researchers either utilize technical analysis or fundamental analysis to forecast the market. Fundamental analysis relies on the analysis of unstructured textual data, such as financial news and earnings reports, whereas technical analysis concentrates on examining price direction to forecast future prices. Important market data is increasingly becoming more widely accessible online. This paints a picture of the importance of text mining techniques for extracting important data to study market behavior. The studies that focused on the use of deep learning methods were few in number, however several papers analyzed the prediction strategies based on technical analysis methods. This study compares numerous machine learning (ML) and deep learning (DL) methods used for visualizing and forecasting in order to determine which approach might be more accurate in making predictions and for what kinds and amounts of data, in contrast to other recent review articles that primarily discuss various techniques for stock market forecasting. By providing a thorough analysis of the visual graphs and prospective future prospects for each examined study, the study also clarifies the most recent research findings and their potential future directions i.e providing a comparison of predicted and actual value comparison.

Population and Sample

For this research project a Python package called Yfinance, offers simple access to the Yahoo Finance API. Users can download historical stock data from the site, get real-time stock quotes, and find out details about stock symbols, like the name of the company and the stock exchange. A straightforward and user-friendly interface for accessing the data and capabilities of the

API in a Python context is provided by yfinance, which is developed on top of the Yahoo Finance API. As Yfinance is on PyPI, installing it is simple with pip install yfinance.

Data and Sources of Data

For this study firstly we import Yahoofinance as yfinance in the program to use its functionalities. Then we use yfianace to retrieve stock data by calling the ticker function along with the stock code or stock name to collect financial data of the company from Yahoo. After retrieving the information from the company page of Yahoo we use machine learning and deep learning algorithmic tools to plot the predictions graphically and forecast future predictions.

Theoretical framework

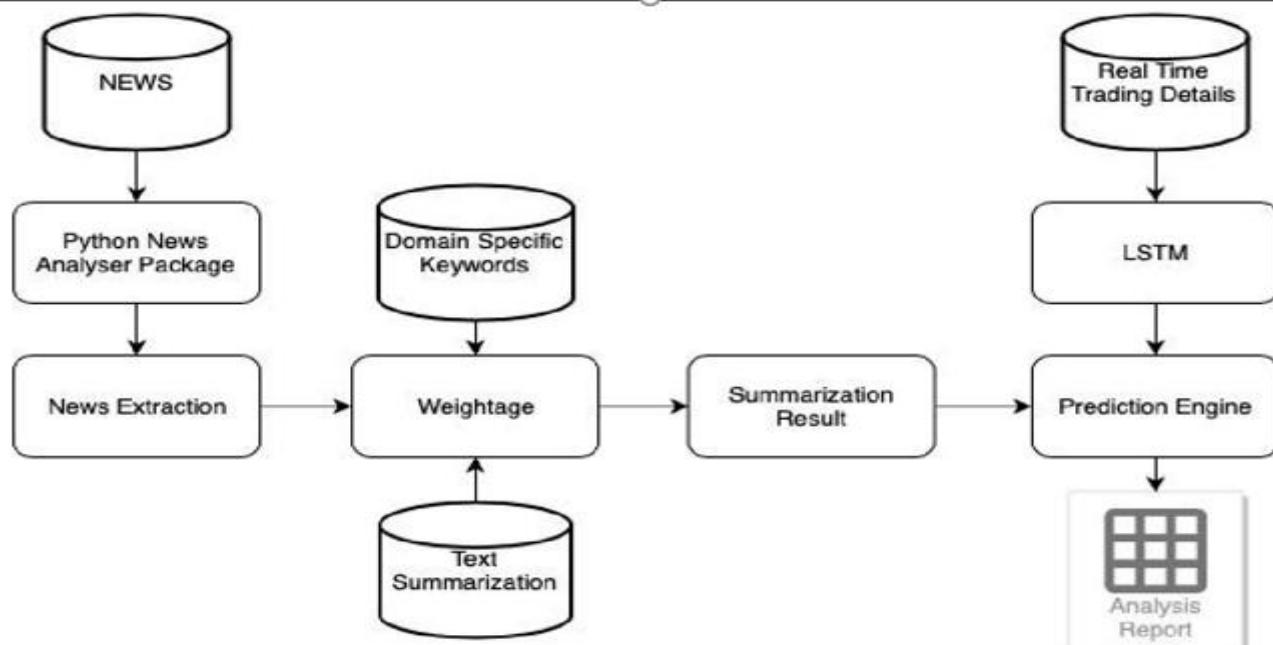
Variables of the study contains dependent and independent variable. The study used dynamic financial data that could predict and visualize exact values at any particular time. Using the independent variables open and close price the stock exchange value and EWA (Earned Wage Access) values. The study forecasts future predictions using the Exponential Moving Average and date factors as variables to the given input and using all the previous variables.

PROPOSED SYSTEM

We have utilized dash and machine learning algorithms to produce a single page web application. The major objective of this project is to accurately forecast the closing price of the stock over an extended period of time. In this project, the framework of the website was created using dash html components and dash core components, and the site's user interface was improved using CSS style. Data plots are produced using the Python plotting package, and the data is retrieved using yfinance. For estimating the stock price for the dates the user has specified, machine learning models have been incorporated.

METHODOLOGY

We saw that the new user was hesitant to invest in the stock market because he lacked the necessary information and resources, including a tool, to do so. Hence, using machine learning and deep learning, we developed a program that can accurately predict market direction using object analysis. We completed this task using data from yfinance. We used a machine learning model to assess this data after importing it using a library because this model performs this task quite precisely. We used the Deep Learning LSTM model in this, trained the data in our own method, and learnt how to use it because it is quite sophisticated and does this work very accurately, producing a more accurate outcome. We used this method because it allows us to train the data, which allows us to do our work very precisely and get closer to the real result with high accuracy. The downside is that it works the way we trained it. We have to face many difficulties to train the data, because the model cannot make changes by itself, for example, the data is copied, it works the same way.



A. Dash Framework

- Dash is an open-source Python framework for creating web applications with analytical capabilities. It is an effective library that makes the creation of data-driven applications easier. For Python data scientists who aren't very experienced in web development, it's especially helpful. With dash, users can build stunning dashboards right in their browser.
- Dash directly connects cutting-edge UI components like dropdowns, sliders, and graphs to your analytical Python code. Dash is built on top of Plotly.js, React, and Flask.

B.Dash Core Components

You have access to many interactive components, such as dropdowns, checklists, and sliders, through the Dash Core Components module (dash. dcc). Use the command: from dash import dcc to import dash.dcc. The source code for the dcc module can be found in the Dash GitHub repository.

C. Dash Html Components

The source code for the Dash HTML Components module can be found in the Dash GitHub repository. Advice: To style Dash HTML Components in production Dash apps, we advise using Dash Enterprise Design Kit.

D.YahooFinance (yf)

Yfinance is an open-source library developed to access companies' financial data. It offers stock data on stock exchange values, cryptocurrency and other data. The Ticker object is used to call the stock data using the yfinance function.

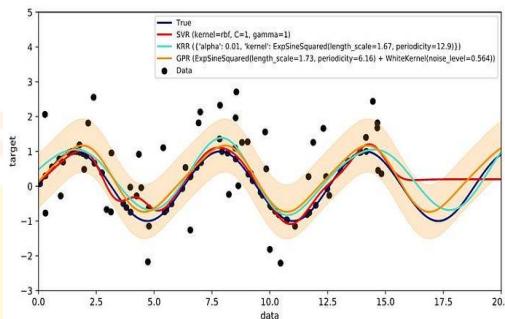
E. Why use yfinance?

- High Granularity of data
- Returns data directly in pandas dataframes
- Easy to setup
- No need to setup datasets and less memory required, only requires memory
- Uses ticker object to call the data to the learning model

F.Support Vector Machine

Support Vector Machines are supervised learning models with associated learning algorithms used in machine learning that examine data used for regression and classification analysis. A support vector machine algorithm seeks to locate an n-dimensional space hyperplane that clearly classifies the data points. Support Vectors are the closest-to-the-hyperplane data points on either side of the hyperplane. These affect the hyperplane's position and orientation, influencing how the SVM is constructed.

- Hyperplane-Decision boundaries known as hyperplanes are employed to forecast continuous output. Support Vectors are the closest-to-the-hyperplane data points on either side of the hyperplane. These are used to draw the necessary line that depicts the algorithm's predicted output.
- A kernel is a collection of mathematical operations that change input data into the desired form. In higher dimensional space, these are typically used to locate a hyperplane.
- These are the two lines that are drawn at a distance of from the hyperplane (epsilon). It serves as a buffer between the data points.

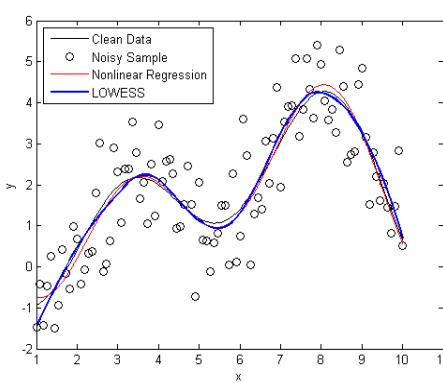


G.Support Vector Regression

• An algorithm for supervised learning called support vector regression is used to forecast discrete values. The SVMs and Support Vector Regression both operate on the same theory. Finding the best fit line is the fundamental tenet of SVR. The hyperplane with the most points is the best-fitting line in SVR.

• The SVR seeks to fit the best line within a threshold value, in contrast to other Regression models that aim to reduce the error between the real and predicted value. The distance between the boundary line and the hyperplane is the threshold value. SVR is difficult to scale to datasets with more than a few ten thousand samples because its fit time complexity is more than quadratic with the number of samples.

• SGD Regressor or Linear SVR are used for large datasets. While linear SVR only takes into account the linear kernel, it offers a faster implementation than SVR. Because samples whose prediction is close to their target are ignored by the cost function, the model created by Support Vector Regression only depends on a portion of the training data.



RESULTS AND DISCUSSION

A. Outcome

By now, you ought to have the foundational web page setup as shown in the second image below, which can be seen by launching a local server as shown in the first image below.

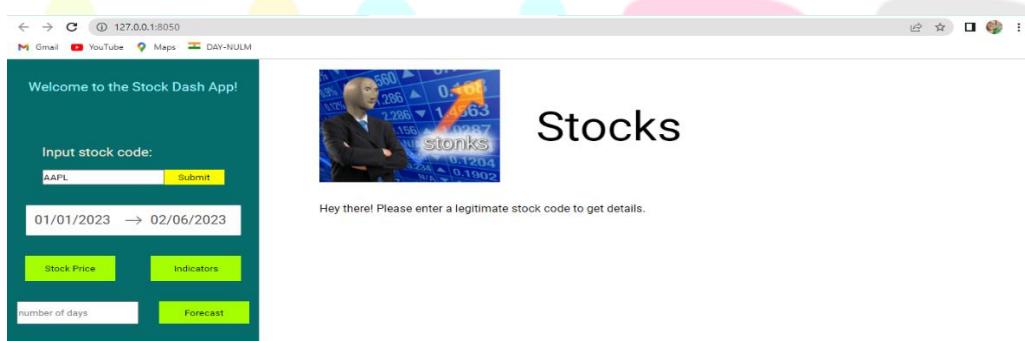
```
sujay@sujay-VivoBook-ASUSLaptop-X412FAC-X412FA ~/D/M/stock-dash (master)>
/usr/bin/python3 ~/home/sujay/Documents/My Projects/stock-dash/app.py
Dash is running on http://127.0.0.1:8050/

* Serving Flask app "app" (lazy loading)
* Environment: production
  WARNING: This is a development server. Do not use it in a production deployment.
  Use a production WSGI server instead.
* Debug mode: on
```



B. Using Python Dash Framework Styling the application

Your website should look much better at this point than it did before. You can use the web page below as a starting point and generating Stock Price and predicting in terms of graphs by giving inputs (stock code and date)



C. After applying Machine Learning or Deep Learning model to the stock data

After applying the algorithm on the stock data retrieved the graphs are represented depicting the stock value, date, closed price and EWA values. The graph plotted elucidates the results such that the decisions can be made through the analysis slope at a particular day, time and stock value.



D. Extracting plots for particular day and time in the same graph using the model



E. Forecasting the upcoming stock value using the previous data.



F. Comparing Actual and Predicted closing price



FUTURE SCOPE

In the world of the stock market, the potential for stock visualization and forecasting is enormous. A system of visualizing and forecasting stocks is necessary to help investors make thoughtful stock investments because, according to a recent report, the number of investors investing in the stock market grows annually. Because of how many variables it depends on, visualizing stocks is a

risky trend that frequently results in incorrect value estimates. With the assistance of a subject matter expert, this project can be expanded and modified in the future by training the model on more features and adding some significant non-numeric features as well.

CONCLUSION

Stock exchange, since trading is the most desired activity, its popularity is rising, and researchers should discover new methods of forecasting. Investors and individuals can manage the stock market with the aid of stock forecasting and visualizing techniques. The forecasting model needs to be extremely precise in order to accurately predict stock prices. To accurately predict stock prices in this project, we used deep learning models, LSTMs, and RNN units, which provides investors and other individuals with accurate knowledge about the state of the stock market.

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