Software Requirements Specification

Under the guidance of
Ms. Juhi Agarwal

For

Stock Market Prediction

15-12-2021

Prepared by

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DECLARATION

I/We hereby certify that the project work entitled **" Stock Market Prediction"** in partial fulfilment of the requirements for the award of the Degree of BACHELOR OF TECHNOLOGY in COMPUTER SCIENCE AND ENGINEERING specialization in Business Analytics and Optimization, submitted to the Department of Informatics, School of Computer Science, University of Petroleum & Energy Studies, Dehradun, is an authentic record of my/ our work carried out during a period from **Aug, 2021** to **Dec, 2021** under the supervision of **"Ms. Juhi Agarwal "**.

The matter presented in this project has not been submitted by me/ us for the award of any other degree of this or any other University.

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This is to certify that the above statement made by the candidate is correct to the best of my knowledge.

Date: <u>15/12/2021</u>   **Under the mentorship of**

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ACKNOWLEDGEMENT

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Revision History

Date	Change	Reason for Changes	Mentor Signature
25-11-2021	Added Implementation of the project	For complete analysis	
26-11-2021	Added new glossary terms	Came across new terms	

1. INTRODUCTION

Predictions in the stock market is layered with complexity and instability. As a result, numerous studies have been conducted on the stock-market prediction using technical or fundamental analysis. The aim of this proposed work is to accurately predict the future value of the financial stocks of a company. With the help of machine learning through this project, we aim to propose a novel method for the prediction of the stock market.

In this project, we are making use of Long Short-Term Memory (LSTM) deep learning model.

1.1 Purpose of Project

➢ In Stock Market Prediction, the aim is to predict the future value of the financial stocks of a company.

➢ In recent years, the stock market prediction technologies are the use of machine learning which makes predictions based on the worth of current stock market indices by training on their previous values.

➢ Machine learning itself employs different models to make prediction easier and authentic.

➢ Through this project we are going to present a more feasible method to predict the stock movement with higher level of accuracy.

➢ A correct prediction of stocks can lead to huge profits for the seller and the broker. The goal of the proposed work is to study and improve the supervised learning algorithms to predict the stock price.

1.2 Target Beneficiary

Forecasting stock market prices have always been a challenging task. However, through our project –

➢ Effective prediction systems indirectly help traders by providing supportive information such as the future market direction.

➢ With the help using machine learning through this project, we aim to propose a novel method for the prediction of the stock market.

➢ This project intends to determine the future movement of the stock value of a financial exchange with maximum accuracy.

➢ The accurate prediction of share price movement will lead to more profit investors can make.

1.3 <u>Project Scope</u>

In this project, we are making use of Long Short-Term Memory (LSTM). Long short-term memory (LSTM) is an artificial recurrent neural network (RNN) architecture used in the field of deep learning. We are making use of it as it has higher chances of producing more accurate results. With the help of LSTM, we are going to examine the feasibility and performance in stock market forecasting.

The vast majority of the stockbrokers while making the prediction makes use of various specialized, fundamental or the time series analysis. Overall, these techniques could not be trusted to their full potential as the efficiency of results are not great. Taking everything into consideration, we concluded that is a need to give a strong strategy to financial exchange prediction. To find the best accurate result, the methodology we chose to be implement was LSTM.
Goals –
➢ We intend to make proper use of machine learning techniques.
➢ Through this project, we aim to relate previous data to the given current data and train the machine to learn from it and make appropriate assumptions.
➢ We wish to use machine learning which makes predictions based on the worth of current stock market indices by training on their previous values.

Requirements –
As Machine Learning employs different predictive models and algorithms to predict and automate things of requirement, we thoroughly need to research for algorithms that best suit our project.
Machine learning has integrated itself into the picture for the deployment and prediction of training sets and data models. While going through all the previous works, many things came to our knowledge, and we decided on the LSTM algorithm.

2. PROJECT DESPRICTION

2.1 <u>Reference Algorithm</u>

Long short-term memory (LSTM) is an artificial recurrent neural network (RNN) architecture used in the field of deep learning. These networks are a type of recurrent neural network capable of learning order dependence in sequence prediction problems. This is a behavior required in complex problem domains like machine translation, speech recognition, and more. LSTM networks are well-suited to classifying, processing, and making predictions based on time series data. LSTM

networks sit well with our project since there can be lags of unknown duration between important events in a time series.

After going through various other papers, we observed that LSTMs have an edge over conventional feed-forward neural networks and RNN in many ways. It is because of their property of selectively remembering patterns for long durations of time.

2.2 Data/ Data structure

The majority of data structure that we are using –

- ➢ List
  A list is an ordered data structure with elements separated by a comma and enclosed within square brackets. The list data structure typically has two very distinctive implementations — array list and linked list.

- ➢ Tuple
  A tuple is a collection of objects which ordered and immutable. They let you store an ordered sequence of items.

- ➢ Dictionary
  Dictionaries are used to store data values in key: value pairs.
  A dictionary is a collection which is ordered, changeable and does not allow duplicates.

- ➢ Set
  Sets are used to store multiple items in a single variable.
  Set is one of 4 built-in data types in Python used to store collections of data, the other 3 are List, Tuple, and Dictionary, all with different qualities and usage.

2.3 <u>SWOT Analysis</u>

SWOT Analysis – Strength, Weakness, Opportunities, Threat

SWOT

Strengths

- Machine learning makes prediction easier and authentic.
- Usage of the supervised algorithm produces better results.
- Friendly design
- Anyone with almost zero knowledge about stocks would be able to understand it

Weakness

- Slow pace or lack of research on many given topics
- There are a lot of already existing models to predict stock movement.
- Complex working environment

Opportunities

- The proposed model has the ability to adapt.
- With the use of machine learning more accurate results are derived
- The model is ideal for easier future evolution.

Threats

- There is heavy competition from already existing models to predict stock movement.
- Complexity of Algorithm
- Many issues pertaining to smooth working environment.

2.4 <u>Project Features</u>

- ➢ The project will foresee the stock costs for the desired exchanging day.
- ➢ The necessities and the usefulness of this project correspond to the class.
- ➢ The project will clearly foresee on day-to-day premise as the stocks changes to world events.
- ➢ The model is ideal for a more manageable future evolution.
- ➢ The model has been created in such a way that a person with almost zero knowledge about stocks would be able to understand and enjoy it.
- ➢ The user interface is friendly and easy to use

2.5 User Classes and Characteristics

A user class is a set of developer-defined attributes (characteristics) and methods (behaviors) that one can use to refer to multiple data items as a single entity.

The user class that we anticipate will use this product are –

Retailers –
A retailer is a person or business that one can purchase stocks from. A retailer would need ample amount of information to get their business going.

Investors –
An investor is a person who commits capital with the expectation of receiving financial returns. Investor's needs information and data to analyze opportunities from different angles to minimize risk while maximizing returns.

Viewer –
A viewer is a person who is neither a retailer nor an investor but someone who simply desires to view and learn more about stock movements.

Analysts –
Analysts usually focus on one particular industry or sector.
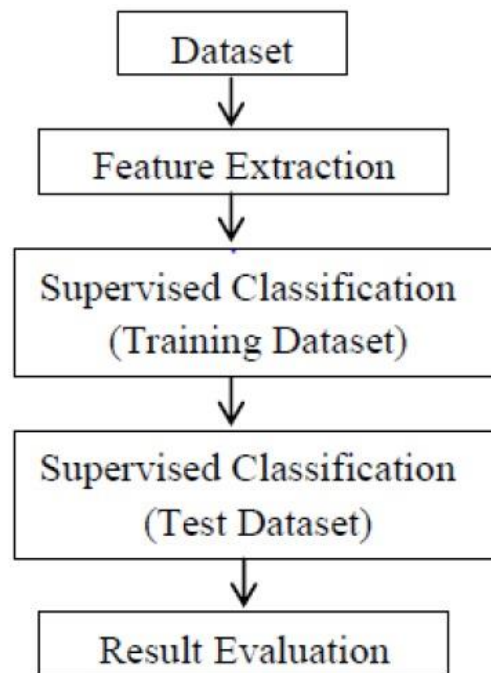
2.6 Design and Implementation Constraints

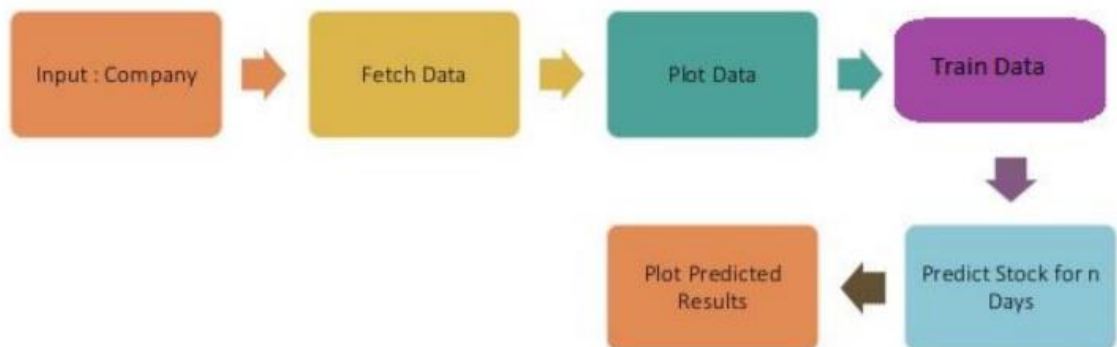Fig 2.6.1 System Flow

2.7 Design diagrams
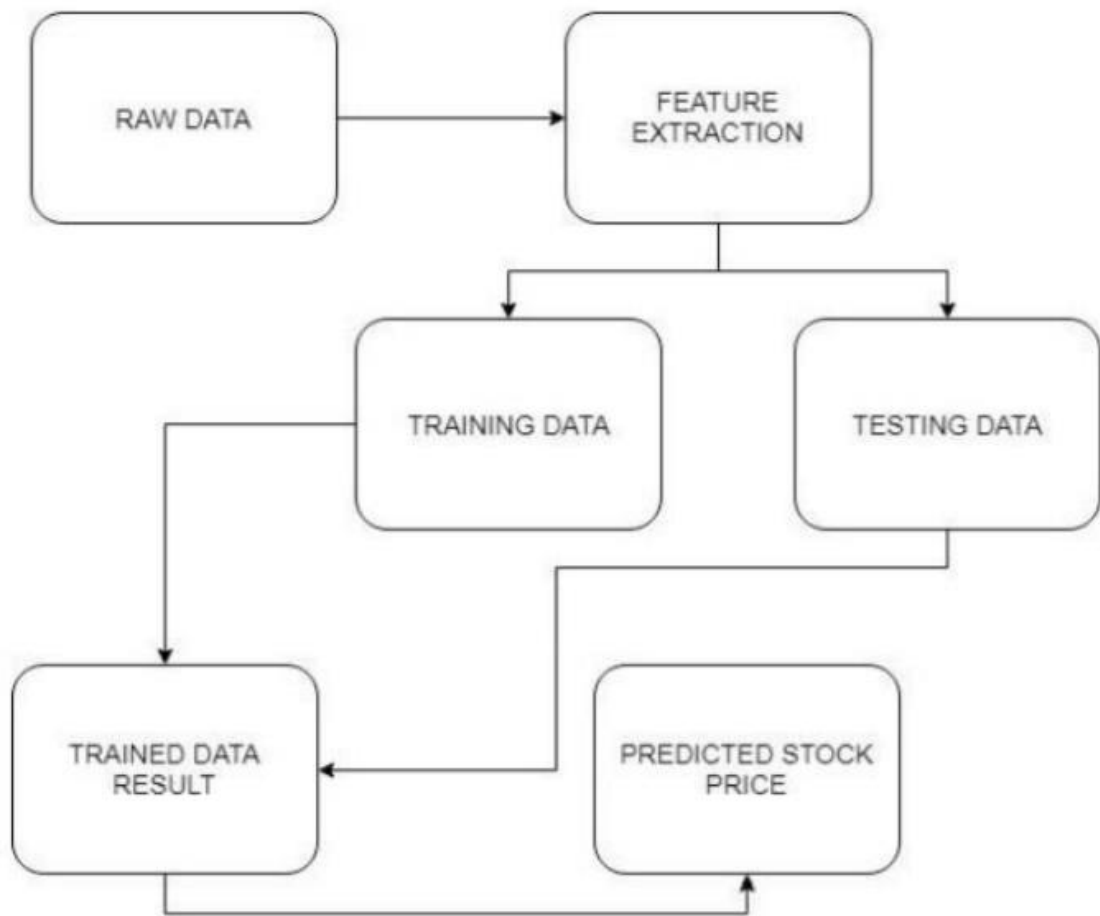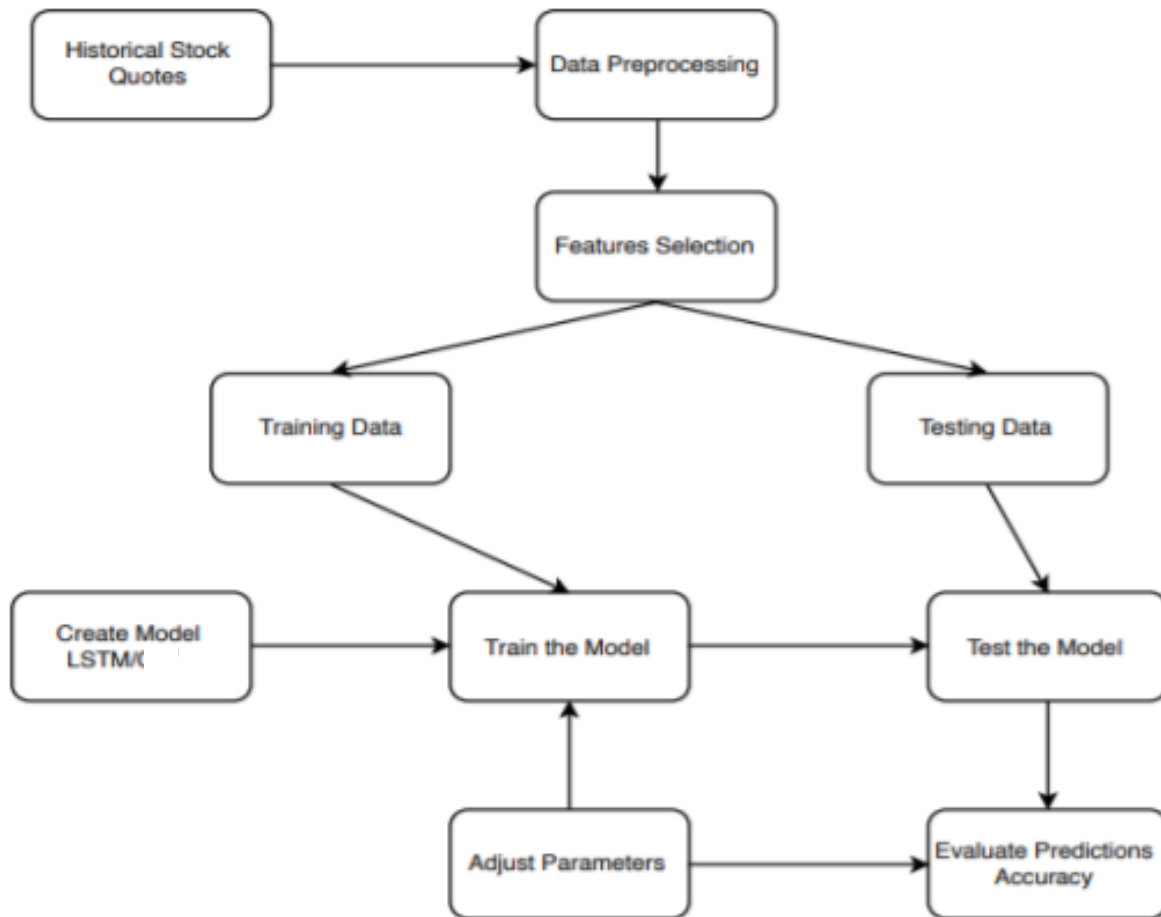

Fig 2.7.1 Data flowchart

Fig 2.7.2 System Architecture

2.8 Assumption and Dependencies

- ➢ Controlling risk is as considerable to a robust investment strategy project.
- ➢ The stock market is almost unpredictable, which makes it very difficult to predict stock market movement.
- ➢ A viable machine learning investment strategy should consider both stock selection and portfolio construction.
- ➢ Prudently constructed portfolios are well diversified as it is one of the most important sources of risk control.
- ➢ The distribution of stock prices changes from year to year, so we have to carefully model the project to remove some of the non-favorable properties of stock prices.
- ➢ The project heavily depends upon the data used and would give results according to the data.

3. SYSTEM REQUIREMENTS

3.1 User Interface

User interfaces enable users to effectively control the computer or device they are interacting with. A successful user interface should be intuitive, efficient, and user-friendly. It is a reliable means through which users can become familiar with elements acting in a certain way, so choosing to utilize those elements will aid with task achievement, efficiency, and satisfaction.

Some of the user interface elements that we have incorporated in our project are –

- ➢ Input Controls: checkboxes, radio buttons, dropdown lists, list boxes, buttons, toggles, text fields, date field.

- ➢ Navigational Components: breadcrumb, slider, search field, pagination, slider, tags, icons.

- ➢ Informational Components: tooltips, icons, progress bar, notifications.

3.2 Software Interface

Retailer studies the market trends and makes their predictions through a stock market prediction model. An investor who is keen on investing in some desired stocks after their own after research communicates to the retailer for investing in those stocks.
Through this proposed project, we intend to make communication easy and doable. The users can easily make that access the information they need, for example, rates X stocks for certain dates or periodical graph showing the status of X stocks for the past few years. This can also help a person who is very new to the whole world of stocks and can easily use its functionality without any troubles.
A prediction model is generated from the high dependencies set that increases the expectancy. With this, it gets the user closer to the proximate values for the stocks.

It provides the best figure of constraint dependencies with one another. It makes it far easier for the user to understand and see the conversion of the same. The project aims to introduce and democratize the project with the help of machine learning for all the users. The upper bound and lower bound of the stock prices will be displayed to illustrate the trading range the users should be looking at. This application serves as an additional quantitative tool for users to see the market from a different perspective with the help of technology.

3.3 Database Interface

Database Management Systems (DBMS) are software systems used to serve as an interface between an end-user and a database, allowing users to create, read, update, and delete data in the database.

Database Management Systems are vested with facilities to perform several kinds of operations on any such working model or system. They work on either manipulation of the data in the database or the management of the database structure itself. It is of great help when we are dealing with a huge amount of data. In the proposed project, we are dealing with a large amount of data. It becomes essential that the data is structured so that we may be able to obtain results with high accuracy.

3.4 Protocols

A prediction model is generated from the high dependencies set that increases the expectancy and gets the user closer to the proximate values. Many researchers have performed their research on the movement of future market evolution. While going through many previous papers, we concluded that it is possible to predict the stock market with more accuracy and efficiency using machine learning techniques. In the future, the stock market prediction system can be further improved by utilizing a much bigger dataset than the one being utilized currently. This would help to increase the accuracy of our prediction models.

The main purpose behind using Long Short-Term Memory in stock market prediction is that the predictions depend on large amounts of data. The predictions are also generally dependent on the long-term history of the market, as the LSTM consists of a remembering cell, input gate, output gate, and a forget gate. The cell remembers the value for long-term propagation, and the gates regulate them. So LSTM rules out any error by giving aid to the RNNs through retaining information for older stages making the prediction more accurate.

4. NON-FUNCTIONAL REQUIREMENTS

4.1 Performance requirements

The requirements needed to predict the stock market movement vary by exchange. It includes minimum stockholder's equity, a minimum share price, and a minimum number of shareholders. Such requirements are to ensure that only high-quality securities are traded on them. By doing so, it can uphold the exchange's reputation among investors.

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4.2 Security requirements

Users' account information will be stored in that they can only view their own profile for confidentiality reasons and security reasons. Login information will be stored in a secured manner, lest should it be tampered with from foreign substances. The language we are making use of – Django.

Django has built-in protection against most types of CSRF attacks. Cross-site request forgery allows a malicious user to execute actions using the credentials of another user without that user's knowledge or consent.

It is possible to disable the CSRF module globally or for particular views. This would make sure that the stored data along with the login credential of users are secured and privacy is maintained.

4.3 Software Quality Attributes

Availability –
It provides the best figure of constraint dependencies with one another. It makes it far easier for the user to understand and see the conversion of the same. The project aims to introduce and democratize the project with the help of machine learning for all the users.

Interoperability –
The Stock market check is an exceptionally fascinating errand that joins high substances of how the budgetary exchange limits, and what unconventionality can be prompted in a market in light of different conditions. The proposed model communicates to the user and acts in a manner to solve certain tasks.

Performance –
The objective of the proposed work is to study and improve the supervised learning algorithms to predict the stock price. The persuasion of the topic is to predict the stability in the future market stocks.

Testability –
Software testability indicates how well a software-driven system allows Software Testing professionals to conduct tests in line with predefined criteria.

Security –
A lot of thought is given to security purposes so that no malicious user can execute actions without the knowledge or consent of the concerned authority.
Usability –
The accurate prediction of share price movement will lead to more profit investors can make. Thus, this project can be directly beneficial to anyone who is new to the stock market as well as to someone who knows the market well.

Functionality –

Long-short term memory involves the use of memory cells. Each of which has a cell state that stores previously encountered information retaining information for older stages making the prediction that enhances the accuracy of prediction.

5. OTHER REQUIREMENTS

   5.1 <u>Hardware</u>

A good computer with a good editor and you're ready to go, not much requirement of extra hardware specifications.
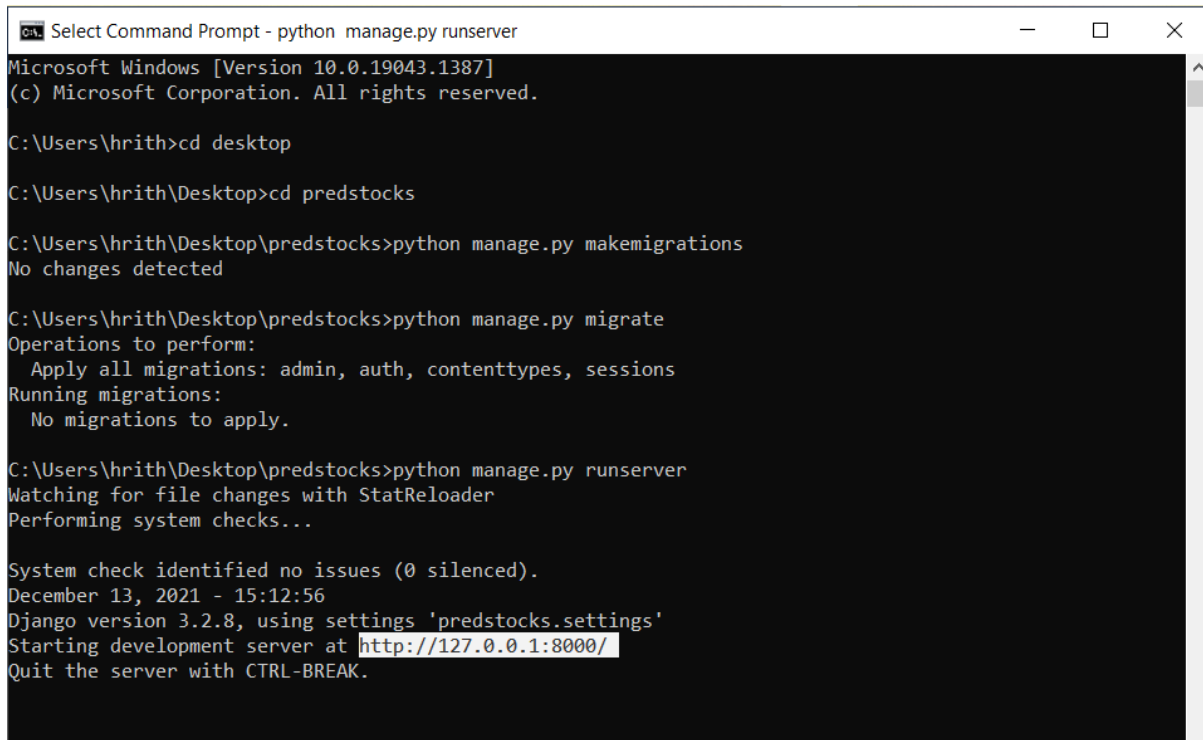
   5.2 <u>Software</u>

> Python 3.6 with machine learning libraries (e.g. pandas, numpy, scikit-learn, Keras, Tensorflow), Django 3.0
> Visual Studio Code / Atom for programming

   5.3 <u>Platforms</u>

> GitBash for running the server.
> Any Web Browser for debugging web applications.

6. IMPLEMENTATION

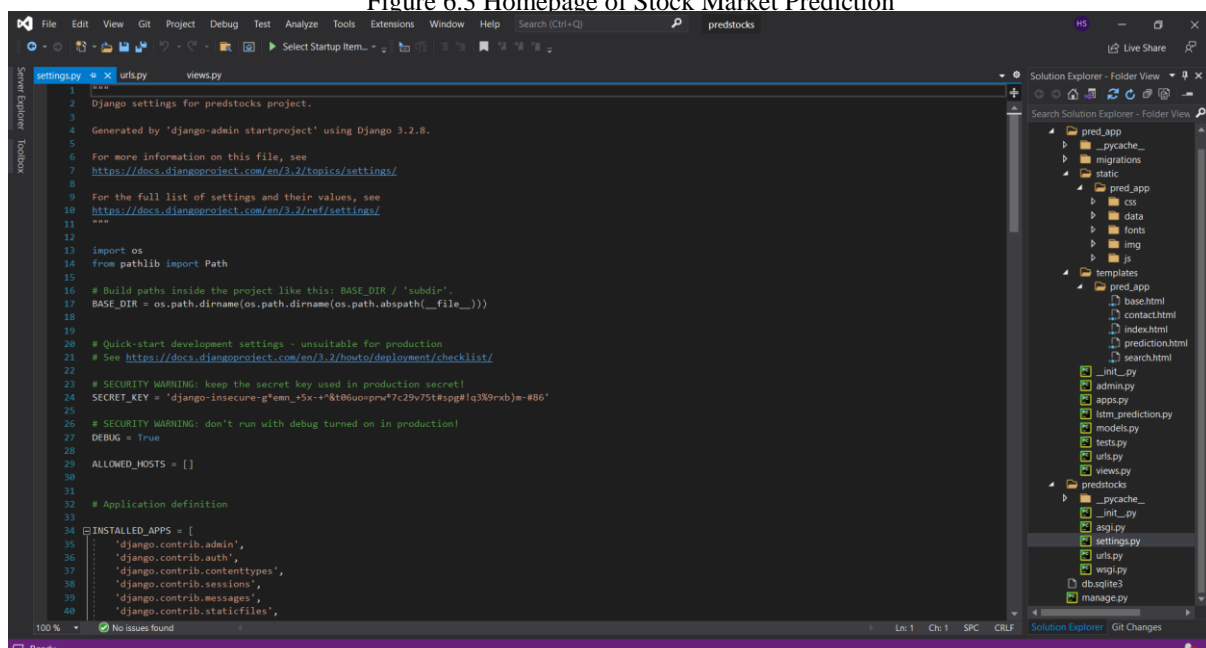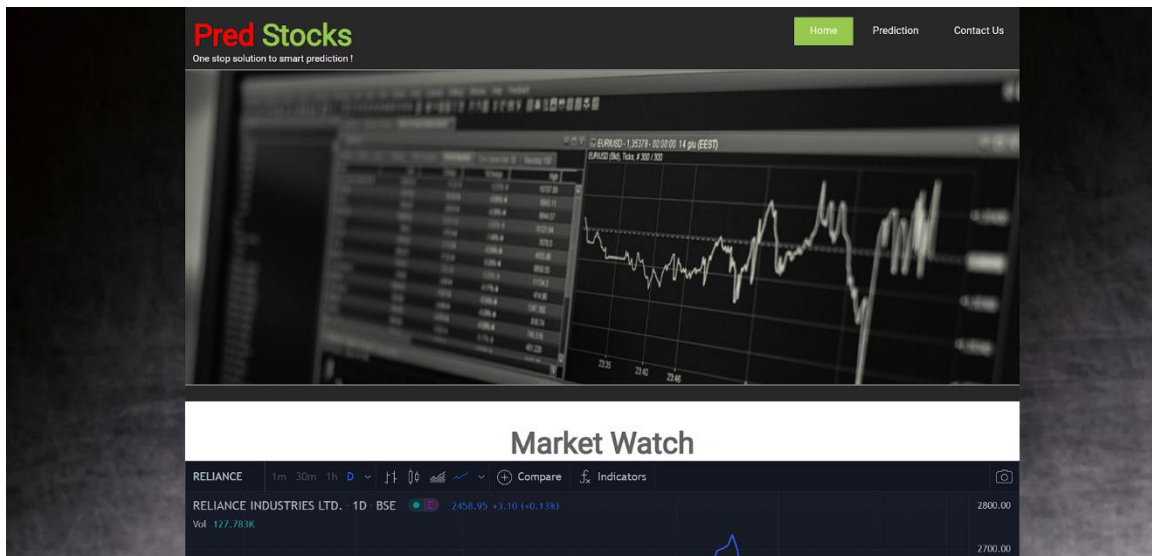Figure 6.1 Shows the usage of commands for running the local server

In figure 6.1, we see where we can see our web application working.
And we've selected the given URL generated, which we'll paste onto our respective Browsers for further proceedings.

Figure 6.2 Insight of the code
Figure 6.3 Homepage of Stock Market Prediction

In figure 6.3 & 6.4, we see the home page of Stock Market Prediction (here, we'll try to show and implement the graph of given Stocks). As default, we've stored Reliance (NSE) into our code, so our code is showing "Reliance" at home page.

Figure 6.4

APPENDIX A: GLOSSARY

Stock market index	A stock market index, also known as stock index, is a statistical measure that reflects changes taking place in the market.
Supervised learning	Supervised learning is a process of providing input data as well as correct output data to the machine learning model
Unsupervised learning	Unsupervised learning is a type of machine learning in which models are trained using unlabeled dataset and are allowed to act on that data without any supervision.
Prediction model	Predictive modeling is the subpart of data analytics that uses data mining and probability to predict results.
Forecasting	Forecasting is a technique that uses historical data as inputs to make informed estimates that are predictive in determining the direction of future trends.
Profit	Profit describes the financial benefit realized when revenue generated from a business activity exceeds the expenses
Stockbroker	A stockbroker is someone who has the authority to buy and sell stocks and securities in a stock exchange on the investor's behalf. Stocks are traded through exchanges
Robust	The robustness is the property that characterizes how effective your algorithm is while being tested on the new independent (but similar) dataset
Stock market movement.	Stock market movement is defined as information that would cause any reasonable investor to make a buy or sell decision.
Intuition	Intuition is the ability to acquire knowledge without inference or the use of reason
User Interface	User Interface (UI), which enables business domain experts to train ML models without requiring expertise in coding.
Database	A database is an organized collection of structured information, or data, typically stored electronically in a computer system.
Accuracy	Accuracy is the measurement used to determine which model is best at identifying relationships and patterns between variables in a dataset

APPENDIX B: ANALYSIS MODEL
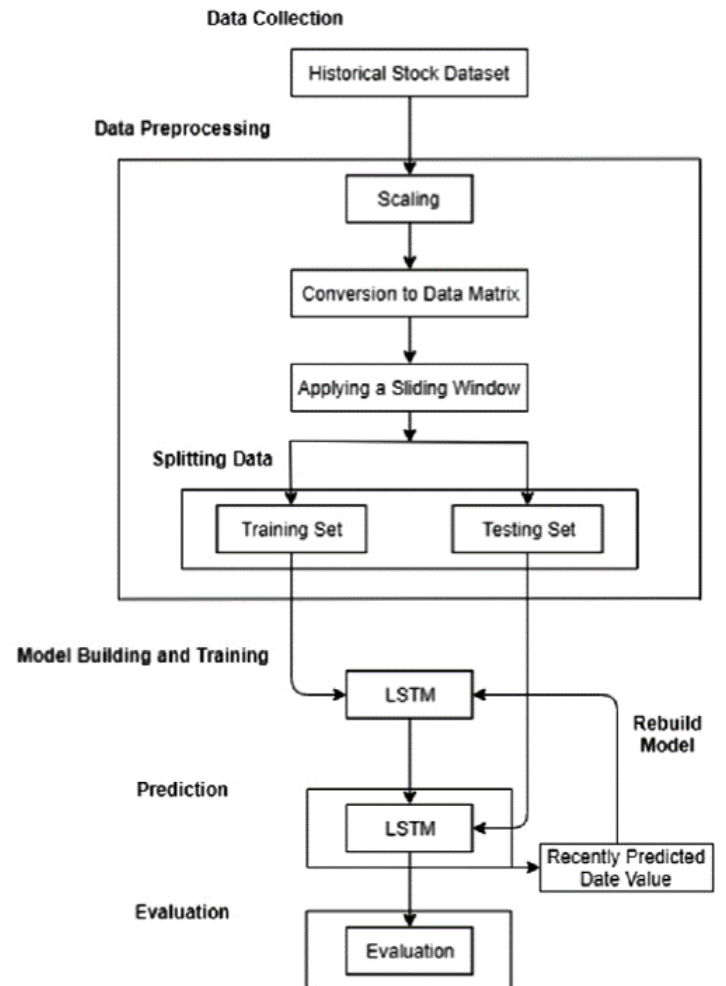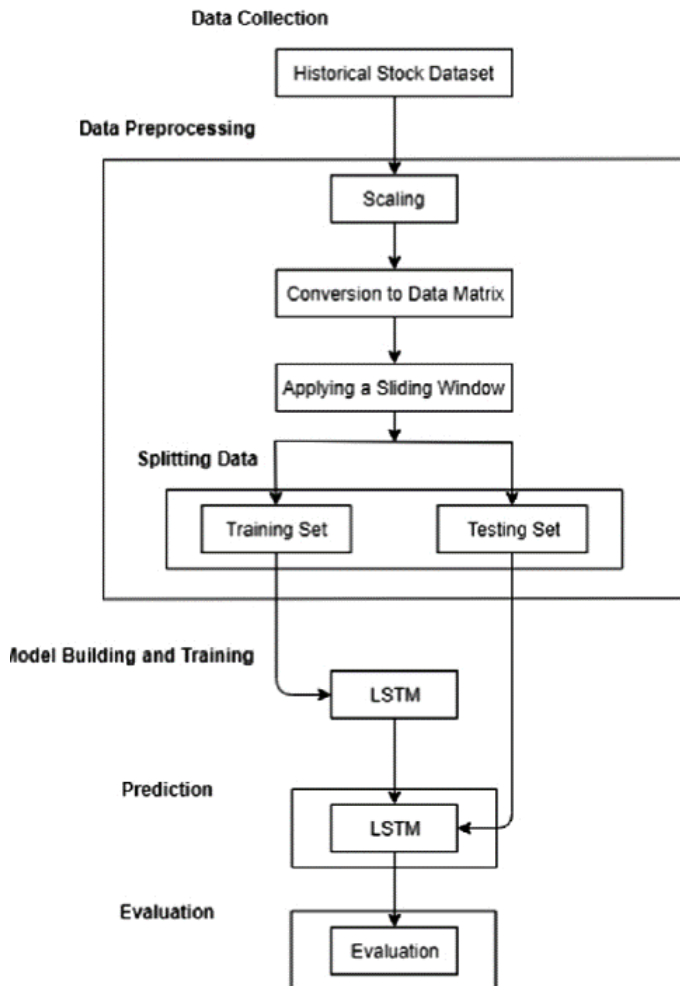
Model Analysis

APPENDIX C: LIST ISSUES

SR No	Issues
1	Work Planning – not having a proper business plan due to excessive workload.
2	Lack of communication and difference in onions leads to wastage of time and energy.
3	Lack of research at points leading to repeated errors.
4	Technical issue – Breakdown of computer at numerous times leading to loss of data and information.
5	Failing to deliver a timely decision might lead derail the sequence of work ethics.

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