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A PROJECT REPORT ON

"ANALYZING STOCK PRICE USING ARTIFICIAL NEURAL NETWORKS"

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CERTIFICATE

This is to certify that the Project entitled **"ANALYZING STOCK PRICE USING ARTIFICIAL NEURAL NETWORKS"** is a bonafide work carried out by **BHARATH.R** (4VV17CS123), **SHANKARNARAYAN.P (**4VV17CS085), **SHRINIVAS B BHAVIHAL (**4VV17CS122) of 8th semester Computer Science and Engineering in partial fulfillment for the award of the degree of **Bachelor of Engineering** in **Computer Science & Engineering** of the **Visvesvaraya Technological University**, **Belgavi** during the academic year 2020-2021. It is certified that all the suggestions and corrections indicated for the internal assessment have been incorporated in the report deposited in the department library. The project report has been approved as it satisfies the requirements in respect of project work prescribed for the said degree.

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ABSTRACT

Presently, all over the world, an enormous amount of investment is being made to the Stock Markets. Nationwide economic systems are sturdily associated and closely inclined to the achievement of their Stock Markets. Additionally, nowadays, trading has become too reachable capital expenditure medium, for both planned investors as well as common man also. Artificial neural networks (ANN), which is a subset of Artificial Intelligence (AI), is a way that is anticipated to select out samples (styles) and gain an information model. Significant dispositions of ANN are its capability for precise troubles with step by step analyzing and input-output mapping. The neural network is a superior big approach to categorize anonymous, unnoticed samples in input values that is suitable to are looking for the inventory market. Feedforward neural networks with Backpropagation schooling algorithms were taken via way of the use of way humans to make predictions.

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CHAPTER 1

INTRODUCTION

A correct prediction of stocks can lead to huge profits for the seller and the broker. Frequently, it is brought out that prediction is chaotic rather than random, which means it can be predicted by carefully analyzing the history of respective stock market. Machine learning is an efficient way to represent such processes. It predicts a market value close to the tangible value, thereby increasing the accuracy. Introduction of machine learning to the area of stock prediction has appealed to many researches because of its efficient and accurate measurements. The vital part of machine learning is the dataset used. The dataset should be as concrete as possible because a little change in the data can perpetuate massive changes in the outcome.

The price of the stocks is an important indicator for a company and many factors can affect their values. Different events may affect public sentiments and emotions differently, which may have an effect on the trend of stock market prices. Because of dependency on various factors, the stock prices are not static, but are instead dynamic, highly noisy and nonlinear time series data. Due to its great learning capability for solving the nonlinear time series prediction problems, machine learning has been applied to this research area. Learning-based methods for stock price prediction are very popular and a lot of enhanced strategies have been used to improve the performance of the learning based predictors. However, performing successful stock market prediction is still a challenge.

Stock market analysis is a widely studied problem as it offers practical applications for signal processing and predictive methods and a tangible financial reward. Creating a system that yields consistent returns is extremely challenging and is currently an open problem as stock market prices are extremely volatile and vary widely both within a given stock and comparatively amongst many stocks. Further, stock market data is influenced by a large number of factors including foreign and domestic economies, trade agreements, wars, seasons, and even day of the week.

1.1 Problem Statement

These days the financial exchange has gotten extremely famous, everyone needs to purchase an offer at an organization and on the off chance that they could transform that share into benefit it would be useful for them, however the forecast of stocks cost is an exceptionally dreary and incomprehensible occupation for a solitary individual. So we present our stock price prediction system.

1.2 Project description:

1.2.1 Objective:

The main objective of the existing system is to overcome the disadvantages of the existing system and build a portal for buyer and seller to predict stock price.

1.2.2 Purpose:

The purpose of this project is to create application to keep a track on stock market system and keep a track of the prediction of the stock.

1.2.3 Scope:

Stock price prediction refers to the system which could help in predicting the price of the stock based on the given data to help the buyers and sellers.

1.3 Existing and Proposed System

1.3.1Existing System

In the existing system the user can't predict the price of the stocks manually. A stock market, equity market or share market is the aggregation of buyers and sellers of stocks (also called shares), which represent ownership claims on businesses; these may include securities listed on a public stock exchange, as well as stock that is only traded privately. It is not easy to predict the price of the stocks.

Disadvantages:

- Can't predict the stock price
- Performance is low
- Time consuming

1.3.2 Proposed System

This project is developed for stock market analysis and prediction of stock price. Stocks are categorized in various ways. One way is by the country where the company is domiciled. For example, Nestlé and Novartis are domiciled in Switzerland, so they may be considered as part of the Swiss stock market, although their stock may also be traded on exchanges in other countries, for example, as American depository receipts (ADRs) on U.S. stock markets. A stock exchange is an exchange (or bourse) where stock brokers and traders can buy and sell shares of stock, bonds, and other securities. Many large companies have their stocks listed on a stock exchange. This makes the stock more liquid and thus more attractive to many investors. Our framework will help the client in expectation of stock value as if the cost will go up or down and dependent on the forecast client can purchase or sell the stocks.

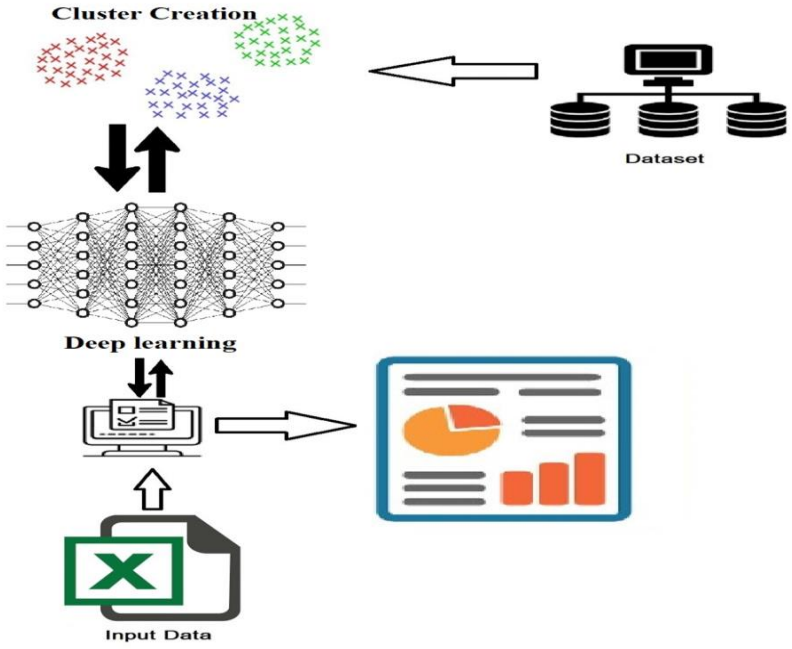


Fig 1.1: Proposed System Architecture

Advantages:

- Can predict the value of stocks
- Performance is increased
- Time consumption is reduced

CHAPTER 2

LITERATURE SURVEY

2.1 Introduction

Every Software development requires the survey process. The Survey process is needed to get the requirement for the software. The Survey also consists of studying the present system and also studying about the tools needed for the development of the software. A proper understanding of the tools is very much essential. Following is an extract of the information of the material collected during literature survey.Literature survey is a methodology of identifying the problems in the existing system through research and proposing the development of the system to solve the problems of existing system.

2.2 Problem Survey

In this chapter a brief discussion is done based on the various methods and techniques which are used in Predicting Stock Price. This survey done will be used to implement the proposed by considering these problems

1. Stock Market Prediction Using Machine Learning

Authors: Ishita Parmar, Navanshu Agarwal

Year: 2018

Findings

In Stock Market Prediction, the aim is to predict the future value of the financial stocks of a company. The recent trend in stock market prediction technologies is the use of machine learning which makes predictions based on the values of current stock market indices by training on their previous values. Machine learning itself employs different models to make prediction easier and authentic. The paper focuses on the use of Regression and LSTM based Machine learning to predict stock values. Factors considered are open, close, low, high and volume.

2. Stock Market Prediction Analysis by Incorporating Social and News Opinion and Sentiment
Authors: Zhaoxia Wang, Seng-Beng Ho, Zhiping Lin

Year: 2018

Findings

This paper aims to successfully predict stock price through analyzing the relationship between the stock price and the news sentiments. A novel enhanced learning-based method for stock price prediction is proposed that considers the effect of news sentiments. Compared with existing learning-based methods, the effectiveness of this new enhanced learning-based method is demonstrated by using the real stock price data set with an improvement of performance in terms of reducing the Mean Square Error (MSE).

3. Stock market prediction
Authors: Radulacomin

Year: 2018

Findings

In a financially volatile market, as the stock market, it is important to have a very precise prediction of a future trend. Because of the financial crisis and scoring profits, it is mandatory to have a secure prediction of the values of the stocks. Predicting a non-linear signal requires advanced algorithms of machine learning. The literature contains studies with different machine learning algorithms such as ANN (artificial neural networks) with different feature selection. The results of this study will show that the algorithm of classification SVM (Support Vector Machines) with the help of feature selection PCA (Principal component analysis) will have the success of making a profit.

4. Stock Market Prediction using Machine Learning Algorithms: A Classification Study
Authors :MeghnaMisra, Ajay Prakash Yadav, Harkiran Kaur

Year : 2018

Findings

This paper focuses on categorizing various methods used for predictive analytics in different domains to date, their shortcomings. Further, the authors of this paper have suggested some improvements that could be incorporated to achieve better accuracy in these approaches.

5. Stock Market Forecasting using Machine Learning: Today and Tomorrow
Authors: Sukhman Singh; Tarun Kumar Madan; Jitendra Kumar

Year: 2019

Findings

This paper focuses on portraying distinct machine learning algorithms such as support vector machine, deep learning, random forest, boosted decision trees, ensemble methods and a few hybrid methods which have been used to build prediction model and predict the stock prices for different stock exchanges. This paper also covers the various challenges that are encountered while building prediction models.

2.3 FEASIBILITY STUDY

The feasibility study proposes one or more feasible conceptual solutions to the problem set of the project. The conceptual solutions give an idea of what the new system will Look like. They indicate what inputs are needed by the system and what outputs will be produced. Three things to be done to established feasibility. First, it must be checked that the project is technically feasible. Second, operational feasibility must be established. For this, it is necessary to consult the system users to see if the proposed solution satisfies user objectives and can be fitted in to current system operation. Third, economic feasibility must be checked. The study must determine whether the project's goal can be achieved within the resource limits allocated to it. It must also determine whether it is worthwhile to proceed with the project at all or whether the benefits obtained from the new system are not worth the cost, in which case the project will be terminated.

Feasibility study is necessary to determine whether the proposed system is feasible considering the technical, operational and economic factors. By having detailed feasibility study one can have a clear view of the proposed system with respect to its benefits and draw backs.

For a successful feasibility study of system feasibility, the existing systems and proposed system are studied carefully.

2.3.1 TECHNICAL FEASIBILITY

Technical feasibility is the study of resource availability that may affect the ability to achieve an acceptable system. Technical feasibility is the most difficult area to ensure at initial stages. Since the objectives functions and performance cannot be predicted to its fullest, everything seems possible provided proper assumptions are made. It is essential that the process of technical feasibility. The consideration that is normally associated with technical feasibility included resource availability at the organization where the project is to be developed and implemented.

2.3.2 ECONOMIC FESIBILITY

An evaluation of development cast weighted against the ultimate income or benefit derived from the developed system. Economical economic justification includes a broad range of concerns that include cost-benefit analysis. Cost benefit delineates costs for project development and weighs them against tangible and intangible benefits of a system. Regarding the cost and benefits, the project, which is to man-hours with compared to man that are required to record data about activity task report manually and also in terms of money benefits by the selling of this system as a product. Thus this project work is economically feasible for the development in any company. We have used open-source software's like python and pycharm to build our system Stock Price Prediction so cause of that the cost of project is very less and can be deployed without any economic issues.

2.3.3 OPERATIONAL FEASILBILITY

The project is going to be used by the organization under different circumstances. Anyone can work with this application as it supports user-friendly approach. It provides graphical user interfaces to the user, so that user can easily interact with the system. Our system

Stock Price Prediction's UI is very user-friendly that user doesn't need knowledge about Python, HTML, CSS and Flask. The application is designed in such a way that it can be easily implemented in any version OS.

2.3.4 SCHEDULE FEASIBILITY

The time schedule required for the development of this project is 5 months and it is very important since over-runs result in escalated projects costs and also hinders in the development of the other systems.

30 days – Requirement gathering

20 days – System designing

55 days – Implementation

25 days – Testing and deployment

CHAPTER 3

SOFTWARE REQUIREMENT SPECIFICATION

Software Requirement Specification (SRS) is essential information, which shapes the establishment of the software development process. SRS records the necessities of a framework as well as has a depiction of its significant components.

The focus in this stage is one of the users of the system and not the system solutions. The result of the requirement specification document states the intention of the software, properties and constraints of the desired system. SRS constitutes the understanding amongst customers and designers with respect to the substance of the product that will be created. SRS should be precise and totally signify the framework prerequisites as it makes a colossal commitme2nt to the general development plan.

One of the most essential information is SRS(Software Requirement Specification). It gives the detailed information about establishment of software development process. It records the important necessities of the frame work also holds the depiction of the important components. These things will be in the IEEE standards. The recommendations would shape the explanation behind giving clear image of the item to be made filling in as measure for execution of an understanding among client and the developer. One of the important steps involved in the development process is system requirements. This SRS(Software Requirement Specification) is followed after resource analysis phase. Its main task is to decide what a software product does. In this stage the main focus is the user, and not the system solution. SRS(Software Requirement Specification) gives the results like intention of the software, properties and constraints of the desired system. The main advantage of SRS(Software Requirement Specification) is that it gives a clear understanding among the clients and the product developers with respect to the product that is developed. SRS(Software Requirement Specification) which is documented should accurate and the prerequisites of the frame work should be signified as it makes colossal commitment to the general development plan process.

Spiral model is one of the most important Software Development Life Cycle models, which provides support for Risk Handling. In its diagrammatic representation, it looks like a spiral with many loops. The exact number of loops of the spiral is unknown and can vary from project to project. Each loop of the spiral is called a Phase of the software development process. The exact number of phases needed to develop the product can be varied by the project manager depending upon the project risks. As the project manager dynamically determines the number of phases, so the project manager has an important role to develop a product using spiral model.

The Radius of the spiral at any point represents the expenses(cost) of the project so far, and the angular dimension represents the progress made so far in the current phase.

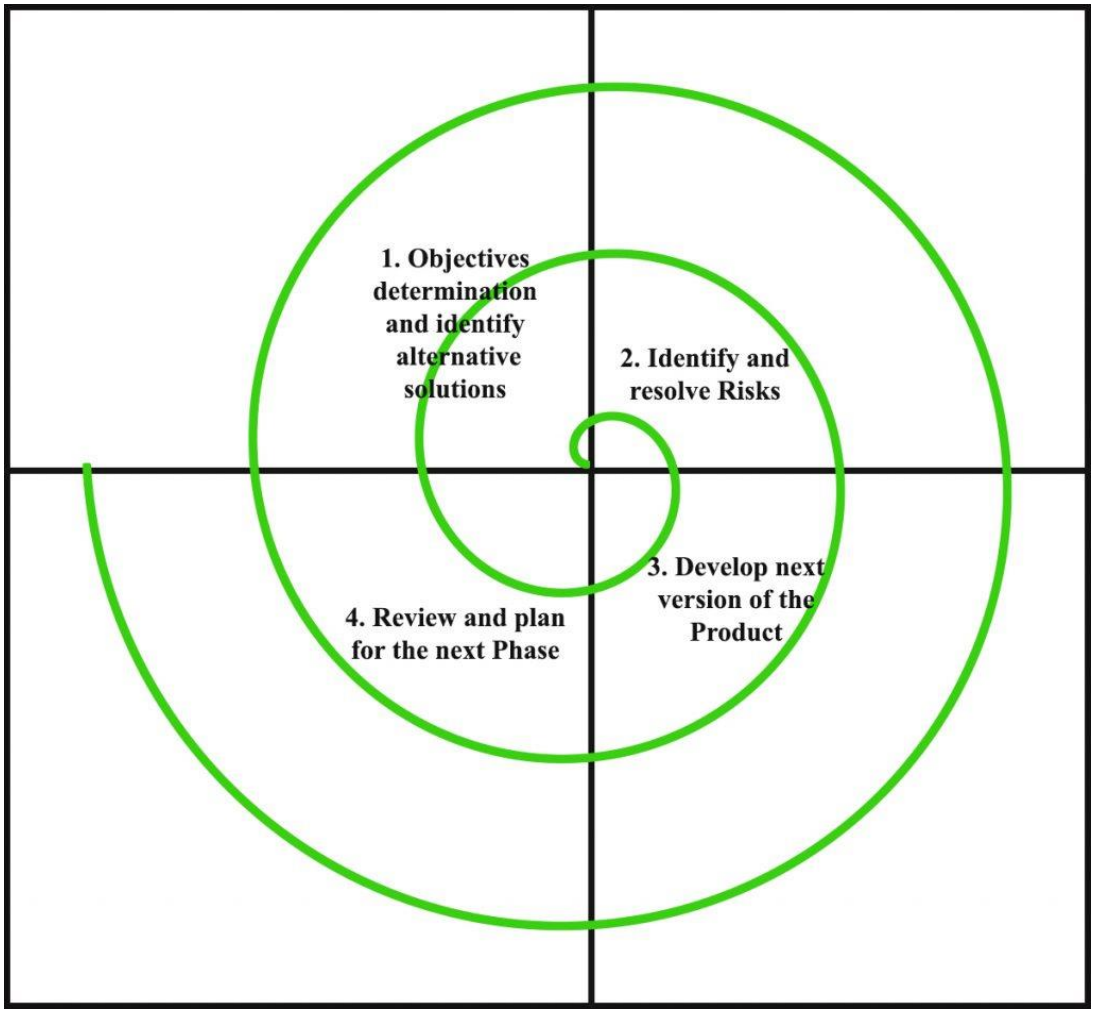


Fig 3.1: Spiral Model

Each phase of Spiral Model is divided into four quadrants as shown in the above figure. The functions of these four quadrants are discussed below-

1. Objectives determination and identify alternative solutions: Requirements are gathered from the customers and the objectives are identified, elaborated and analyzed at the start of every phase. Then alternative solutions possible for the phase are proposed in this quadrant.
2. Identify and resolve Risks: During the second quadrant all the possible solutions are evaluated to select the best possible solution. Then the risks associated with that solution is identified and the risks are resolved using the best possible strategy. At the end of this quadrant, Prototype is built for the best possible solution.
3. Develop next version of the Product: During the third quadrant, the identified features are developed and verified through testing. At the end of the third quadrant, the next version of the software is available.
4. Review and plan for the next Phase: In the fourth quadrant, the Customers evaluate the so far developed version of the software. In the end, planning for the next phase is started.

Risk Handling in Spiral Model

A risk is any adverse situation that might affect the successful completion of a software project. The most important feature of the spiral model is handling these unknown risks after the project has started. Such risk resolutions are easier done by developing a prototype. The spiral model supports coping up with risks by providing the scope to build a prototype at every phase of the software development.

Prototyping Model also support risk handling, but the risks must be identified completely before the start of the development work of the project. But in real life project risk may occur after the development work starts, in that case, we cannot use Prototyping Model. In each phase of the Spiral Model, the features of the product dated and analyzed and the risks at that point of time are identified and are resolved through prototyping. Thus, this model is much more flexible compared to other PDLC models.

Why Spiral Model is called Meta Model?

The Spiral model is called as a Meta Model because it subsumes all the other SDLC models. For example, a single loop spiral actually represents the Iterative Waterfall Model. The spiral model incorporates the stepwise approach of the Classical Waterfall Model. The spiral model uses the approach of Prototyping Model by building a prototype at the start of each phase as a risk handling technique. Also, the spiral model can be considered as supporting the evolutionary model – the iterations along the spiral can be considered as evolutionary levels through which the complete system is built.

Advantages of Spiral Model: Below are some of the advantages of the Spiral Model.

- Risk Handling: The projects with many unknown risks that occur as the development proceeds, in that case, Spiral Model is the best development model to follow due to the risk analysis and risk handling at every phase.
- Good for large projects: It is recommended to use the Spiral Model in large and complex projects.
- Flexibility in Requirements: Change requests in the Requirements at later phase can be incorporated accurately by using this model.
- Customer Satisfaction: Customer can see the development of the product at the early phase of the software development and thus, they habituated with the system by using it before completion of the total product.

Disadvantages of Spiral Model: Below are some of the main disadvantages of the spiral model complex:

- The Spiral Model is much more complex than other PDLC models.
- Expensive: Spiral Model is not suitable for small projects as it is expensive.
- Too much dependable on Risk Analysis: The successful completion of the project is very much dependent on Risk Analysis. Without very highly experienced expertise, it is going to be a failure to develop a project using this model.

Difficulty in time management: As the number of phases is unknown at the start of the project, so time estimation is very difficult.

3.1 Users

Type of users:

End User:

Register

User will register by providing his information. The user will be prompted with an alert message if user enter any wrong information.

Login

Here user will login to the system by making use of his credentials like email, password.

Search Stocks

After login user will search for the stocks in the search page.

View Prediction

Here, user will view the prediction of stocks.

3.2 Functional requirements

Data Gathering from NSE

Data will be gathered from the national stock exchange (NSE) platform.

Data preprocessing

When the system gets the raw data as input from the user it will perform data preprocessing on it and transform the data.

Data cleansing

In Data cleansing duplicate data and damaged data will be removed.

Comparison of test data with trained data

In the final step the data acquired from the data cleansing will be compared with the trained data.

Prediction of result

Based on the given data the system will give the prediction by using neural network.

3.3 Non-functional Requirements

The product should support the end users requirements. The product is capable of processing when the large numbers of files are provided as input and also it must be interactive and the delays involved should be less .So in every action-response of the system, there are no immediate delays.

Performance Requirements:

The product should support the end users requirements. The product is capable of processing when the large numbers of files are provided as input and also it must be interactive and the delays involved should be less. So in every action-response of the system, there are no immediate delays.

Safety and Security Requirements:

The system should be designed in a secured way by applying safety measures. Information transmission should be securely transmitted to nodes without any changes in information. Special exception handling mechanism should be in place to avoid system errors.

Software Quality Attribute Availability:

The application will not hang and opens quickly and with 99.9% uptime.

Reliability:

The system should not crash and should identify invalid input and produce suitable error message.

Usability:

The interface should be intuitive and easily navigable and user friendly.

Integrity:

The software does not store any cache data or doesn't use system resources in background.

3.4 Hardware and Software requirements

Hardware Requirements

- Processor : Intel i5 2.53GHz
- Hard Disk : 30GB
- RAM : 4 GB or above

Software Requirements

- Operating system : Windows 8 and above
- Front End : HTML5, CSS3, JavaScript
- Coding Language : Python
- Database : MYSQL
- IDE : Pycharm

3.5 Tools and Technologies used

3.5.1 Overview of python

Python is an interpreted, high-level, general-purpose programming language. Created by Guido van Rossum and first released in 1991, Python's design philosophy emphasizes code readability with its notable use of significant whitespace. Its language constructs and object-oriented approach aim to help programmers write clear, logical code for small and large-scale projects.

Python is dynamically typed and garbage-collected. It supports multiple programming paradigms, including procedural, object-oriented, and functional programming. Python is often described as a "batteries included" language due to its comprehensive standard library.

Python was conceived in the late 1980s as a successor to the ABC language. Python 2.0, released in 2000, introduced features like list comprehensions and a garbage collection system capable of collecting reference cycles. Python 3.0, released in 2008, was a major revision of the language that is not completely backward-compatible, and much Python 2 code does not run unmodified on Python 3.The Python 2 language, i.e. Python 2.7.x, was officially discontinued on January 1, 2020 (first planned for 2015) after which security patches and other improvements will not be released for it. With Python 2's end-of-life, only Python 3.5.x and later are supported.

Python interpreters are available for many operating systems. A global community of programmers develops and maintains Python, an open source reference implementation. A non-profit organization, the Python Software Foundation, manages and directs resources for Python and Python development.

Pandas

Pandas is an open source Python package that is most widely used for data science/data analysis and machine learning tasks. It is built on top of another package named Numpy, which provides support for multi-dimensional arrays. As one of the most popular data wrangling packages, Pandas works well with many other data science modules inside the Python ecosystem, and is typically included in every Python distribution, from those that come with your operating system to commercial vendor distributions like ActiveState's ActivePython.

Numpy

NumPy is a library for the Python programming language, adding support for large, multi-dimensional arrays and matrices, along with a large collection of high-level mathematical functions to operate on these arrays. The ancestor of NumPy, Numeric, was originally created by Jim Hugunin with contributions from several other developers. In 2005, Travis Oliphant created NumPy by incorporating features of the competing Numarray into Numeric, with extensive modifications. NumPy is open-source software and has many contributors.

The Python programming language was not originally designed for numerical computing, but attracted the attention of the scientific and engineering community early on. In 1995 the special interest group (SIG) matrix-sig was founded with the aim of defining

an array computing package; among its members was Python designer and maintainer Guido van Rossum, who extended Python's syntax (in particular the indexing syntax) to make array computing easier.

3.5.2 HTML5

HTML5 is a core technology markup language of the Internet used for structuring and presenting content for the World Wide Web. It is the fifth revision of the HTML standard (created in 1990 and standardized as HTML 4 as of 1997) and, as of December 2012, is a candidate recommendation of the World Wide Web Consortium (W3C).Its core aims have been to improve the language with support for the latest multimedia while keeping it easily readable by humans and consistently understood by computers and devices (web browsers, parsers, etc.). HTML5 is intended to subsume not only HTML 4, but also XHTML 1 and DOM Level 2 HTML.

Following its immediate predecessors HTML 4.01 and XHTML 1.1, HTML5 is a response to the fact that the HTML and XHTML in common use on the World Wide Web are a mixture of features introduced by various specifications, along with those introduced by software products such as web browsers, those established by common practice, and the many syntax errors in existing web documents. It is also an attempt to define a single markup language that can be written in either HTML or XHTML syntax. It includes detailed processing models to encourage more interoperable implementations; it extends, improves and rationalizes the markup available for documents, and introduces markup and application programming interfaces (APIs) for complex web applications. For the same reasons, HTML5 is also a potential candidate for cross-platform mobile applications. Many features of HTML5 have been built with the consideration of being able to run on low-powered devices such as smart phones and tablets. In December 2011, research firm Strategy Analytics forecast sales of HTML5 compatible phones would top 1 billion in 2013.

In particular, HTML5 adds many new syntactic features. These include the new <video>, <audio> and <canvas> elements, as well as the integration of scalable vector graphics (SVG) content (that replaces the uses of generic `<object>` tags) and MathML for

mathematical formulas. These features are designed to make it easy to include and handle multimedia and graphical content on the web without having to resort to proprietary plugins and APIs. Other new elements, such as `<section>`, <article>, `<header>` and `<nav>`, are designed to enrich the semantic content of documents. New attributes have been introduced for the same purpose, while some elements and attributes have been removed. Some elements, such as `<a>`, `<cite>` and `<menu>` have been changed, redefined or standardized. The APIs and Document Object Model (DOM) are no longer afterthoughts, but are fundamental parts of the HTML5 specification.HTML5 also defines in some detail the required processing for invalid documents so that syntax errors will be treated uniformly by all conforming browsers and other user agents.

3.5.3 CSS3

Cascading Style Sheets (CSS) is a style sheet language used for describing the presentation of a document written in a markup language such as HTML. CSS is a cornerstone technology of the World Wide Web, alongside HTML and JavaScript.

CSS is designed to enable the separation of presentation and content, including layout, colors, and fonts. This separation can improve content accessibility, provide more flexibility and control in the specification of presentation characteristics, enable multiple web pages to share formatting by specifying the relevant CSS in a separate .css file which reduces complexity and repetition in the structural content as well as enabling the .css file to be cached to improve the page load speed between the pages that share the file and its formatting.

Separation of formatting and content also makes it feasible to present the same markup page in different styles for different rendering methods, such as on-screen, in print, by voice (via speech-based browser or screen reader), and on Braille-based tactile devices. CSS also has rules for alternate formatting if the content is accessed on a mobile device.

The name *cascading* comes from the specified priority scheme to determine which style rule applies if more than one rule matches a particular element. This cascading priority scheme is predictable.

The CSS specifications are maintained by the World Wide Web Consortium (W3C). Internet media type (MIME type) text/css is registered for use with CSS by RFC 2318 (March 1998). The W3C operates a free CSS validation service for CSS documents.

In addition to HTML, other markup languages support the use of CSS including XHTML, plain XML, SVG, and XUL.

3.5.4 Javascript

JavaScript often abbreviated as JS, is a programming language that conforms to the ECMA Script specification. JavaScript is high-level, often just-in-time compiled, and multi-paradigm. It has curly-bracket syntax, dynamic typing, prototype-based object-orientation, and first-class functions.

Alongside HTML and CSS, JavaScript is one of the core technologies of the World Wide Web. Over 97% of websites use it client-side for web page behavior, often incorporating third-party libraries. All major web browsers have a dedicated JavaScript engine to execute the code on the user's device.

As a multi-paradigm language, JavaScript supports event-driven, functional, and imperative programming styles. It has application programming interfaces (APIs) for working with text, dates, regular expressions, standard data structures, and the Document Object Model (DOM).

The ECMA Script standard does not include any input/output (I/O), such as networking, storage, or graphics facilities. In practice, the web browser or other runtime system provides JavaScript APIs for I/O.

JavaScript engines were originally used only in web browsers, but they are now core components of other software systems, most notably servers and a variety of applications.

3.5.5 MYSQL

MySQL is an open-source relational database management system (RDBMS). Its name is a combination of “My”, the name of co-founders Michael Widenius's daughter, and "SQL", the abbreviation for Structured Query Language. A relational database organizes data into one or more data tables in which data types may be related to each other; these relations help structure the data. SQL is a language programmers use to create, modify and extract data from the

relational database, as well as control user access to the database. In addition to relational databases and SQL, an RDBMS like MySQL works with an operating system to implement a relational database in a computer's storage system, manages users, allows for network access and facilitates testing database integrity and creation of backups.

MySQL is free and open-source software under the terms of the GNU General Public License, and is also available under a variety of proprietary licenses. MySQL was owned and sponsored by the Swedish company MySQL AB, which was bought by Sun Microsystems (now Oracle Corporation). In 2010, when Oracle acquired Sun, Widenius forked the open-source MySQL project to create MariaDB.

MySQL has stand-alone clients that allow users to interact directly with a MySQL database using SQL, but more often MySQL is used with other programs to implement applications that need relational database capability. MySQL is a component of the LAMP web application software stack (and others), which is an acronym for Linux, Apache, MySQL, Perl/PHP/Python. MySQL is used by many database-driven web applications, including Drupal, Joomla, phpBB, and WordPress. MySQL is also used by many popular websites, including Facebook, Flickr,MediaWiki, Twitter, and YouTube.

The MySQL server software itself and the client libraries use dual-licensing distribution. They are offered under GPL version 2, or a proprietary license. Support can be obtained from the official manual. Free support additionally is available in different IRC channels and forums. Oracle offers paid support via its MySQL Enterprise products. They differ in the scope of services and in price. Additionally, a number of third party organisations exist to provide support and services.

MySQL has received positive reviews, and reviewers noticed it "performs extremely well in the average case" and that the "developer interfaces are there, and the documentation (not to mention feedback in the real world via Web sites and the like) is very, very good". It has also been tested to be a "fast, stable and true multi-user, multi-threaded SQL database server".

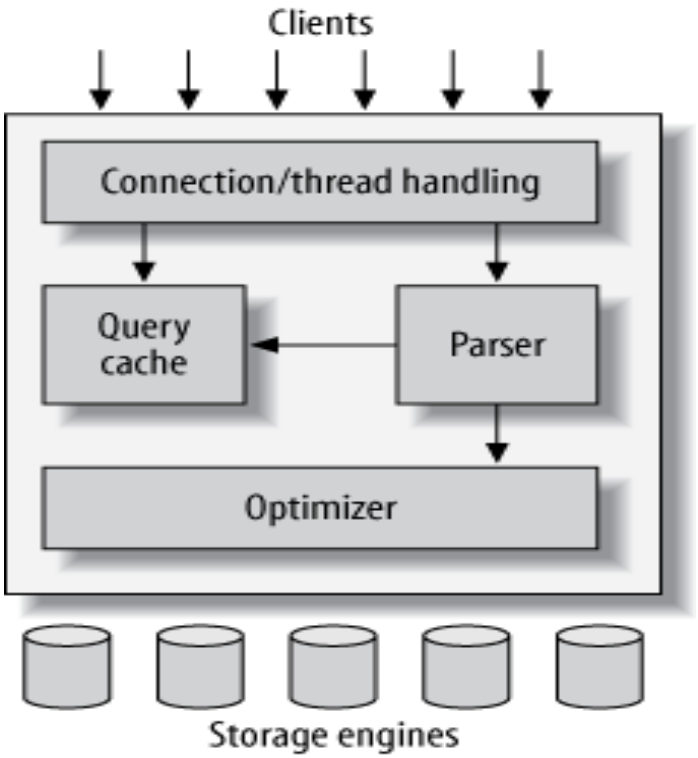


Fig 3.2: Architecture of MYSQL Server

CHAPTER 4

SYSTEM ANALYSIS

4.1 Architecture

Three-tier (layer) is a client-server architecture in which the user interface, business process (business rules) and data storage and data access are developed and maintained as independent modules or most often on separate platforms.

The Architecture of Application is based on three-tier architecture. The three logical tiers are:

- Presentation tier - HTML Forms, Images.
- Middle tier – Python classes.
- Data tier- SQL

The main reason for considering three-tier architecture for the Application is as follows:

4.1.1 Flexibility:

- Management of data is independent from the physical storage support,
- Maintenance of the business logic is easier,
- Migration to new graphical environments is faster.
- If there is a minor change in the business logic, we don't have to install the entire system in individual user's PCs.

4.1.2 Reusability:

- Reusability of business logic is greater for the presentation layer. As this component is developed and tested, we can use it in any other project and would be helpful for future use.

4.1.3 Security:

- More secured architecture since the client cannot access the database directly.

4.2 Three-Tier Architecture

A 3-tier architecture is a type of software architecture which is composed of three "tiers" or "layers" of logical computing. They are often used in applications as a specific type of client-server system. 3-tier architectures provide many benefits for production and development environments by modularizing the user interface, business logic, and data storage layers. Doing so gives greater flexibility to development teams by allowing them to update a specific part of an application independently of the other parts. This added flexibility can improve overall time-to-market and decrease development cycle times by giving development teams the ability to replace or upgrade independent tiers without affecting the other parts of the system.

For example, the user interface of a web application could be redeveloped or modernized without affecting the underlying functional business and data access logic underneath. This architectural system is often ideal for embedding and integrating 3rd party software into an existing application. This integration flexibility also makes it ideal for embedding analytics software into pre-existing applications and is often used by embedded analytics vendors for this reason. 3-tier architectures are often used in cloud or on-premises based applications as well as in software-as-a-service (SaaS) applications.

What Do the 3 Tiers Mean?

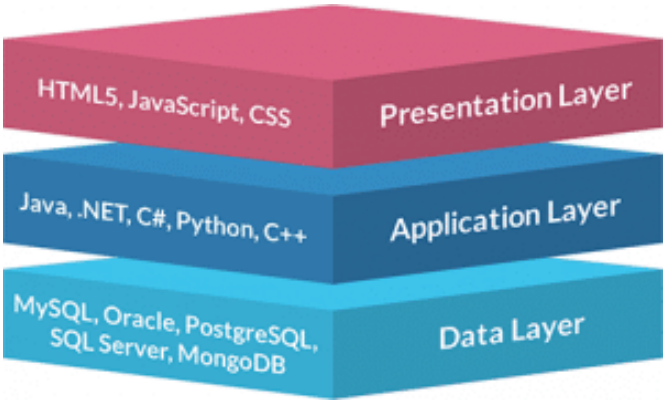


Fig 4.1: Three tier architecture

4.2.1 Presentation tier

The presentation tier is the front end layer in the 3-tier system and consists of the user interface. This user interface is often a graphical one accessible through a web browser or web-based application and which displays content and information useful to an end user. This tier is often built on web technologies such as HTML5, JavaScript, CSS, or through other popular web development frameworks, and communicates with others layers through API calls.

4.2.2 Middle tier

The Middle Tier or Business Logic layer consists of before delving further into the practical matters of application gaining a clear understanding of these concepts now will provide a sound foundation on which to build further knowledge.

4.2.3 Data tier

The Data Tier layer consists of database such as the data tier mainly concentrated on manipulating the data using a database management system. Here we implement the data tier using MYSQL. Different varieties of data base are Oracle, SQL.

4.2.4 Benefits of Using a 3-Layer Architecture

There are many benefits to using a 3-layer architecture including speed of development, scalability, performance, and availability. As mentioned, modularizing different tiers of an application gives development teams the ability to develop and enhance a product with greater speed than developing a singular code base because a specific layer can be upgraded with minimal impact on the other layers. It can also help improve development efficiency by allowing teams to focus on their core competencies. Many development teams have separate developers who specialize in front- end, server back-end, and data back-end development, by modularizing these parts of an application you no longer have to rely on full stack developers and can better utilize the specialties of each team.

Scalability is another great advantage of a 3-layer architecture. By separating out the different layers you can scale each independently depending on the need at any given time. For

example, if you are receiving many web requests but not many requests which affect your application layer, you can scale your web servers without touching your application servers. Similarly, if you are receiving many large application requests from only a handful of web users, you can scale out your application and data layers to meet those requests without touch your web servers. This allows you to load balance each layer independently, improving overall performance with minimal resources. Additionally, the independence created from modularizing the different tiers gives you many deployment options.

By having disparate layers you can also increase reliability and availability by hosting different parts of your application on different servers and utilizing cached results. With a full stack system you have to worry about a server going down and greatly affecting performance throughout your entire system, but with a 3-layer application, the increased independence created when physically separating different parts of an application minimizes performance issues when a server goes down.

4.3 System perspective

Systems management is the combination of four key elements: processes, data, tools, and organization, which are all needed to manage a system efficiently and effectively. Processes deal with how to perform the task.

4.3.1 System Definition

This section defines the working procedure of the data model of the Stock Market Analysis application.

System Goals

- Load data
- Manage users
- Manage data
- Invest amount/or budget estimation
- Prediction based on distribution /or prediction based on estimation

CHAPTER 5

SYSTEM DESIGN

Detailed design starts after the system design phase is completed and the system design has been certified through the review. The goal of this phase is to develop the internal logic of each of the modules identified during system design.

In the system design, the focus is on identifying the modules, whereas during detailed design the focus is on designing the logic for the modules. In other words in system design attention is on what components are needed, while in detailed design how the components can be implemented in the software is the issue.

The design activity is often divided into two separate phase system design and detailed design. System design is also called top-level design. At the first level focus is on deciding which modules are needed for the system, the specifications of these modules and how the modules should be interconnected. This is called system design or top level design. In the second level the internal design of the modules or how the specifications of the module can be satisfied is decided. This design level is often called detailed design or logic design.

5.1 Data flow diagram

DFD graphically representing the functions, or processes, which capture, manipulate, store, and distribute data between a system and its environment and between components of a system. The visual representation makes it a good communication tool between User and System designer. Structure of DFD allows starting from a broad overview and expand it to a hierarchy of detailed diagrams. DFD has often been used due to the following reasons:

- Logical information flow of the system
- Determination of physical system construction requirements
- Simplicity of notation
- Establishment of manual and automated systems requirements

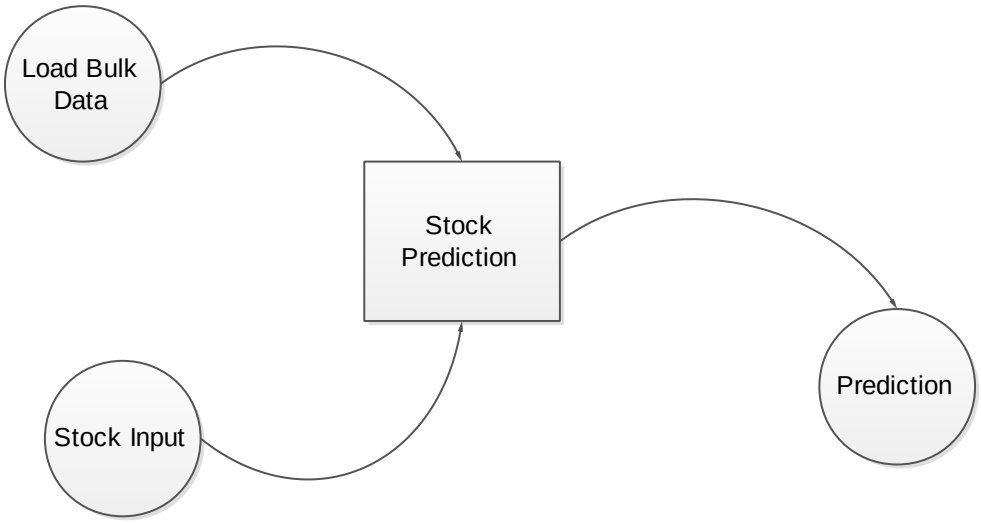


Fig 5.1: Level 0 Data Flow Diagram

Description: Above diagram represents the Level 0 DFD diagram of the Stock Price Prediction. This diagram indicates the process of program. Processes are represented in the form circle that are performed in the system bulk data and input values will be given as input to the system and the output will be the prediction of stock price.

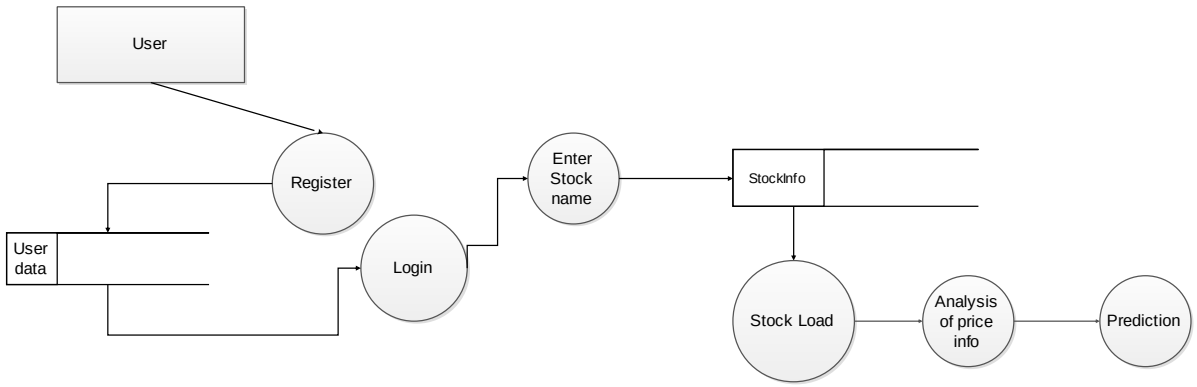


Fig 5.2: Level 1 Data Flow Diagram – User

Description: Above diagram represents the Level 1 DFD diagram of the Stock Price Prediction. This diagram indicates the process of program. Processes are represented in the form circle that are performed by the user, like registering and logging to the application. After login loading the

data required for the prediction after loading he can view the pre-processed data, data analysis, and get the prediction from the system he can view the output in the visualizer.

5.2 Use Case Diagrams

Use case diagram is a graph of actors, a hard and fast of use instances enclosed by means of a device boundary, conversation associations among the actor and the use case. The use case diagram describes how a gadget interacts with out of doors actors; each use case represents a bit of functionality that a machine provides to its users. A use case is called an ellipse containing the call of the use case and an actor is shown as a stick figure with the call of the actor beneath the parent.

The use instances are used at some point of the evaluation phase of a task to pick out and partition system capability. They separate the device into actors and use case. Actors represent roles which might be played by using person of the system. Those users may be people, different computer systems, portions of hardware, or maybe other software structures.

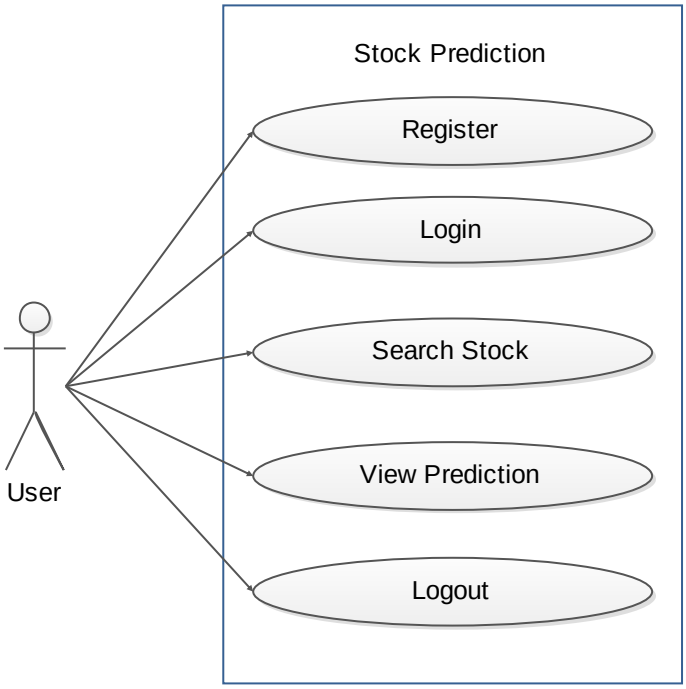


Fig 5.3: Use case diagram for User

Above diagram represents the user use case diagram of the Stock Price Prediction. This diagram indicates the use cases or functionalities of program. Those activities are register, login, search stock and data analysis, view prediction in the visualization form.

5.3 Sequence diagrams:

A sequence diagram shows object interactions arranged in time sequence. It depicts the objects and classes involved in the scenario and the sequence of messages exchanged between the objects needed to carry out the functionality of the scenario. Sequence diagrams are sometimes called event diagrams, event scenarios**.**

UML sequence diagrams are used to represent or model the flow of messages, events and actions between the objects or components of a system. Time is represented in the vertical direction showing the sequence of interactions of the header elements, which are displayed horizontally at the top of the diagram Sequence Diagrams are used primarily to design, document and validate the architecture, interfaces and logic of the system by describing the sequence of actions that need to be performed to complete a task or scenario. UML sequence diagrams are useful design tools because they provide a dynamic view of the system behavior.

5.3.1 Purpose

The sequence diagram is used primarily to show the interactions between objects in the sequential order that those interactions occur. One of the primary uses of sequence diagrams is in the transition from requirements expressed as use cases to the next and more formal level of refinement.

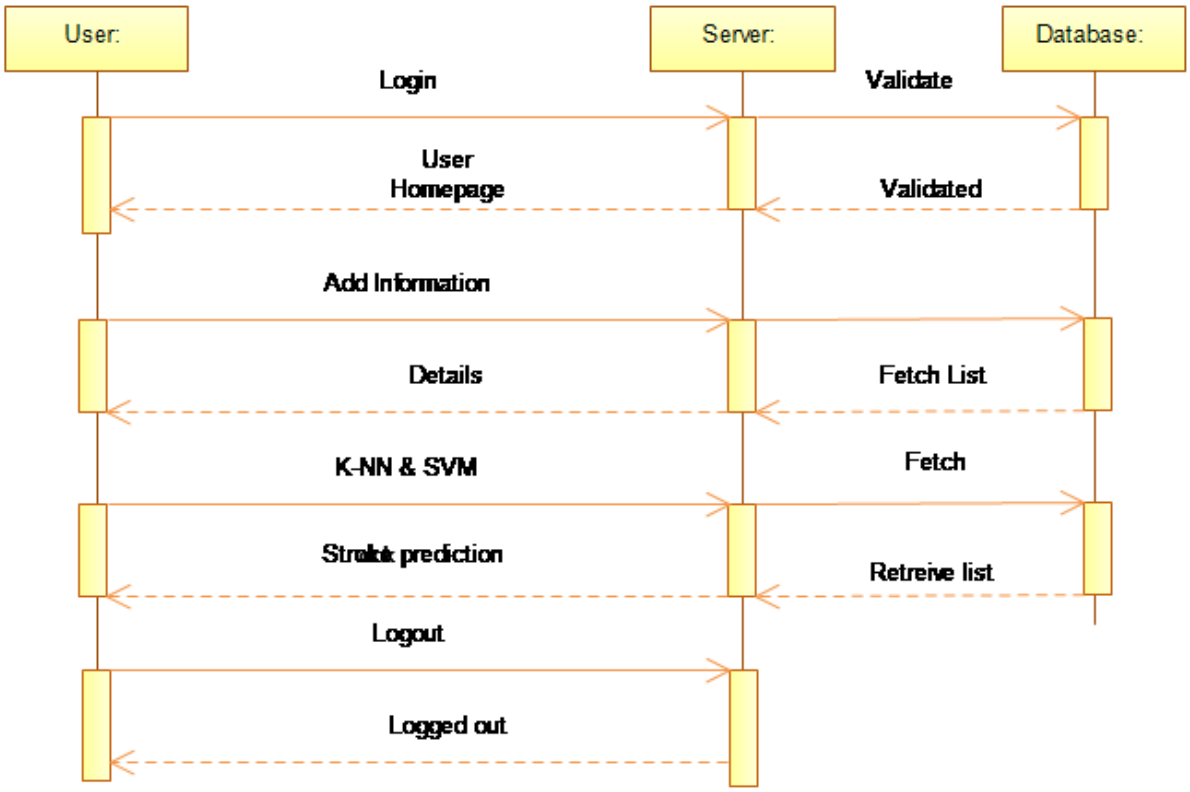


Fig 5.4: Sequence diagram for User

Above diagram represents the user sequence diagram of the Stock Price Prediction. This diagram indicates the flow of program. Initially user will register and login to the application by entering his credentials after this, load the data into the system after loading the data to the system after that data analysis will be done based on this the prediction will be given to the user, user can view the output in the visualization.

5.4 Activity diagram

In this developed project the Activity diagrams illustrate the overall flow of control. This diagram symbolizes the goings-on taking place in the project. There are different accomplishments for member.

Basic Notations

Initial Activity

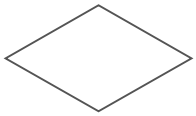
This shows the starting point or first activity of the flow. It is denoted by a solid circle.

Final Activity

The end of the Activity diagram is shown by a bull's eye symbol, also called as a final activity.

Activity

Represented by a rectangle with rounded (almost oval) edges



Decisions

A logic where a decision is to be made is depicted by a diamond.

Workflow

Workflow is depicted with an arrow. It shows the direction of the workflow in the activity diagram.

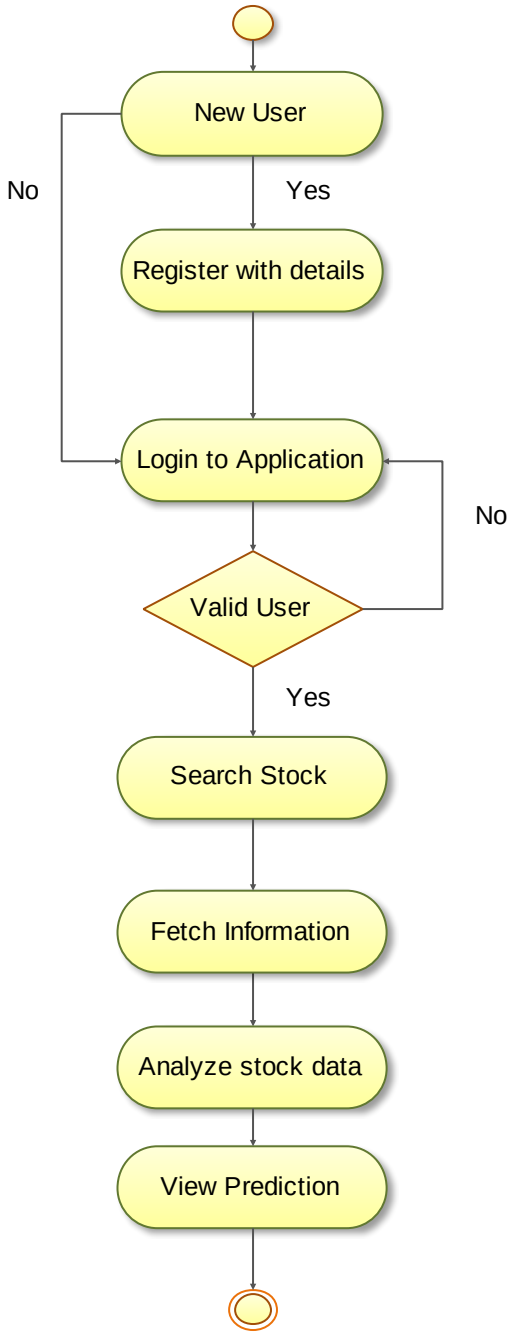


Fig 5.5: Activity diagram for User

Description: Above diagram represents the user activity diagram of the Stock Price Prediction. This diagram indicates the flow of program. Initially user will register and login by making use of his credentials. After login loading the data required for the prediction after loading he can view the pre-processed data, data analysis, and get the prediction from the system he can view the output in the visualizer.

5.5 Flowchart

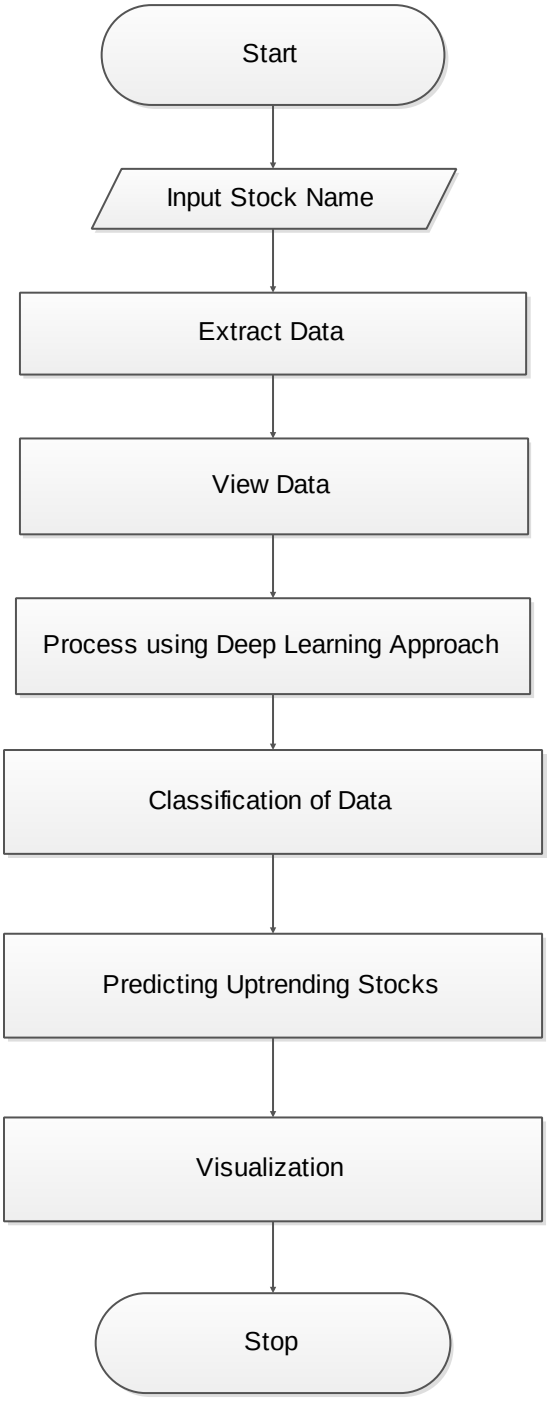


Fig 5.6: Flowchart

5.6 Code Snippets

LINEAR REGRESSION

```
def linear_regression(dates, prices, test_date, df):
    lin_reg = LinearRegression()
    trainX, trainY, testX, testY = create_preprocessed_Dataset(df)
    # trainX = [item for sublist in trainX for item in sublist]
    # testX = [item for sublist in testX for item in sublist]
    X_train, X_test, y_train, y_test = train_test_split(trainX, trainY, test_size=0.33,
random_state=42)
    lin_reg.fit(trainX, trainY)
    decision_boundary = lin_reg.predict(trainX)
    y_pred = lin_reg.predict(X_test)
    test_score = mean_squared_error(y_test, y_pred)
    prediction = lin_reg.predict(testX)[0]
    return (decision_boundary, prediction, test_score)
```

#RANDOM FOREST

```
def random_forests(dates, prices, test_date, df):
    rand_forst = RandomForestRegressor(n_estimators=10, random_state=0)
    trainX, trainY, testX, testY = create_preprocessed_Dataset(df)
    # trainX = [item for sublist in trainX for item in sublist]
    # testX = [item for sublist in testX for item in sublist]
    X_train, X_test, y_train, y_test = train_test_split(trainX, trainY, test_size=0.33,
random_state=42)
    rand_forst.fit(trainX, trainY)
    decision_boundary = rand_forst.predict(trainX)
    y_pred = rand_forst.predict(X_test)
    test_score = mean_squared_error(y_test, y_pred)
    prediction = rand_forst.predict(testX)[0]

    return (decision_boundary, prediction, test_score)
```

```
#LSTM
def LSTM_model(dates, prices, test_date, df):
    df.drop(df.columns.difference(['date', 'open']), 1, inplace=True)
    df = df['open']
    dataset = df.values
    dataset = dataset.reshape(-1, 1)
    dataset = dataset.astype('float32')

# split into train and test sets
    train_size = len(dataset) - 2
    train, test = dataset[0:train_size, :], dataset[train_size:len(dataset), :]

# create and fit the LSTM network
    model = Sequential()
    model.add(LSTM(4, input_shape=(1, look_back)))
    model.add(Dense(1))
    model.compile(loss='mean_squared_error', optimizer='adam')
    model.fit(X_train, y_train, epochs=100, batch_size=1, verbose=2)

    # make predictions
    trainPredict = model.predict(X_train)
    mainTestPredict = model.predict(X_test)
    testPredict = model.predict(testX)
```

CHAPTER 6

SYSTEM IMPLEMENTATION

6.1 Introduction

Implementation is the process of converting a new or a revised system design into an operational one. The objective is to put the new or revised system that has been tested into operation while holding costs, risks, and personal irritation to the minimum. A critical aspect of the implementation process is to ensure that there will be no disrupting the functioning of the organization. The best method for gaining control while implanting any new system would be to use well planned test for testing all new programs. Before production files are used to test live data, text files must be created on the old system, copied over to the new system, and used for the initial test of each program.

Another factor to be considered in the implementation phase is the acquisition of the hardware and software. Once the software is developed for the system and testing is carried out, it is then the process of making the newly designed system fully operational and consistent in performance.

Implementation is the most crucial stage in achieving a successful system and giving the user's confidence that the new system is workable and effective. This type of conversation is relatively easy to handle, provide there are no major changes in the system.

6.2 Parallel conversion type of implementation

In this type of implementation both the current system and the proposed system run in parallel. This happens till the user gets the complete confidence on the proposed system and hence cuts of the current system.

6.2.1 Phase - in method of implementation

In this type of implementation the proposed system is introduced phase-by-phase. This reduces the risk of uncertainty of proposed system.

Each program is tested individually at the time of development using the data and has verified that this program linked together in the way specified in the programs specification, the computer system and its environment is tested to the satisfaction of the user. The system that has been developed is accepted and proved to be satisfactory for the user. And so the system is going to be implemented very soon. A simple operating procedure is included so that the user can understand the different functions clearly and quickly.

Initially as a first step the executable form of the application is to be created and loaded in the common server machine which is accessible to the entire user and the server is to be connected to a network. The final stage is to document the entire system which provides components and the operating procedures of the system.

Implementation is the stage of the project when the theoretical design is turned out into a working system. Thus it can be considered to be the most critical stage in achieving a successful new system and in giving the user, confidence that the new system will work and be effective.

The implementation stage involves careful planning, investigation of the existing system and it's constraints on implementation, designing of methods to achieve changeover and evaluation of changeover methods.

Implementation is the process of converting a new system design into operation. It is the phase that focuses on user training, site preparation and file conversion for installing a candidate system. The important factor that should be considered here is that the conversion should not disrupt the functioning of the organization.

6.3 Algorithms used in the system

6.3.1 Linear Regression

Linear Regression is a machine learning algorithm based on supervised learning. It performs a regression task. Regression models a target prediction value based on independent variables. It is mostly used for finding out the relationship between variables and forecasting. Different regression models differ based on – the kind of relationship between dependent and

independent variables, they are considering and the number of independent variables being used.

Linear regression algorithm shows a linear relationship between a dependent (y) and one or more independent (y) variables, hence called as linear regression. Since linear regression shows the linear relationship, which means it finds how the value of the dependent variable is changing according to the value of the independent variable.

Linear Regression Analysis consists of more than just fitting a linear line through a cloud of data points. It consists of 3 stages –

(1) Analyzing the correlation and directionality of the data

(2) Estimating the model, i.e., fitting the line, and

(3) Evaluating the validity and usefulness of the model.

6.3.2 Random Forest

Random Forest is a popular machine learning algorithm that belongs to the supervised learning technique. It can be used for both Classification and Regression problems in ML. It is based on the concept of ensemble learning, which is a process of combining multiple classifiers to solve a complex problem and to improve the performance of the model.

As the name suggests, "Random Forest is a classifier that contains a number of decision trees on various subsets of the given dataset and takes the average to improve the predictive accuracy of that dataset." Instead of relying on one decision tree, the random forest takes the prediction from each tree and based on the majority votes of predictions, and it predicts the final output.

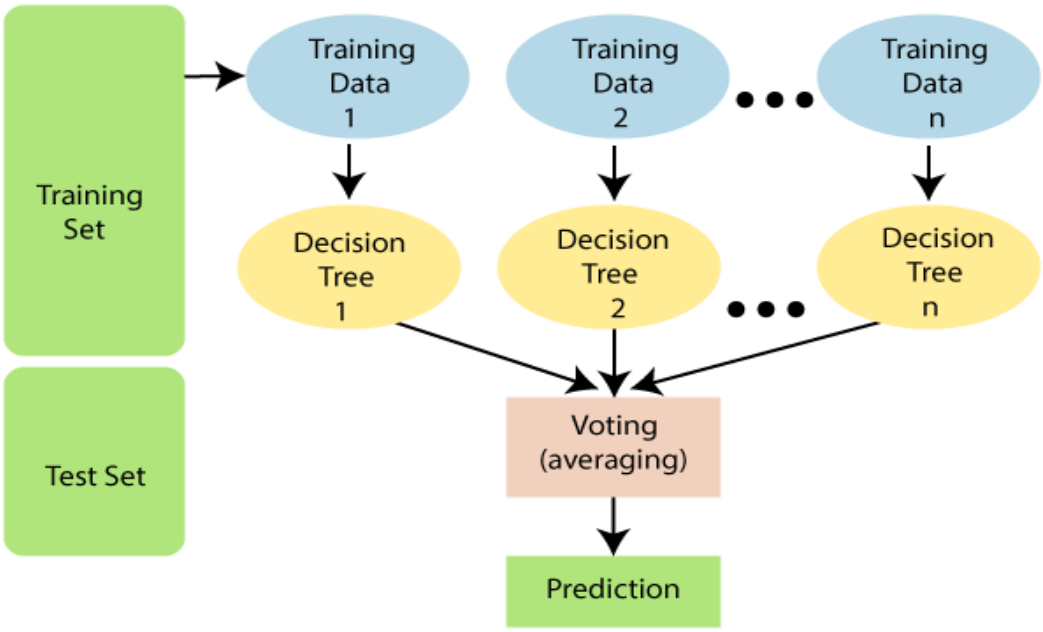


Fig 6.1: Working of Random Forest

The Working process can be explained in the below steps:

Step-1: Select random K data points from the training set.

Step-2: Build the decision trees associated with the selected data points (Subsets).

Step-3: Choose the number N for decision trees that you want to build.

Step-4: Repeat Step 1 & 2.

Step-5: For new data points, find the predictions of each decision tree, and assign the new data points to the category that wins the majority votes.

6.3.3 LSTM

Long short-term memory (LSTM) is an artificial recurrent neural network (RNN) architecture used in the field of deep learning. Unlike standard feedforward neural networks, LSTM has feedback connections. It can not only process single data points (such as images), but also entire sequences of data (such as speech or video). For example, LSTM is applicable to tasks such as unsegmented, connected handwriting recognition, speech recognition and anomaly detection in network traffic or IDSs (intrusion detection systems).

A common LSTM unit is composed of a cell, an input gate, an output gate and a forget gate. The cell remembers values over arbitrary time intervals and the three *gates* regulate the flow of information into and out of the cell.

6.3.4 RNN

A recurrent neural network (RNN) is a class of artificial neural networks where connections between nodes form a directed graph along a temporal sequence. This allows it to exhibit temporal dynamic behavior. Derived from feedforward neural networks, RNNs can use their internal state (memory) to process variable length sequences of inputs. This makes them applicable to tasks such as unsegmented, connected handwriting recognition or speech recognition.

The term "recurrent neural network" is used indiscriminately to refer to two broad classes of networks with a similar general structure, where one is finite impulse and the other is infinite impulse. Both classes of networks exhibit temporal dynamic behavior. A finite impulse recurrent network is a directed acyclic graph that can be unrolled and replaced with a strictly feedforward neural network, while an infinite impulse recurrent network is a directed cyclic graph that cannot be unrolled.

6.4 Implementation methodology

The project is implemented in modular approach. Each module is coded as per the requirements and tested and this process is iterated till the all the modules have been thoroughly implemented.

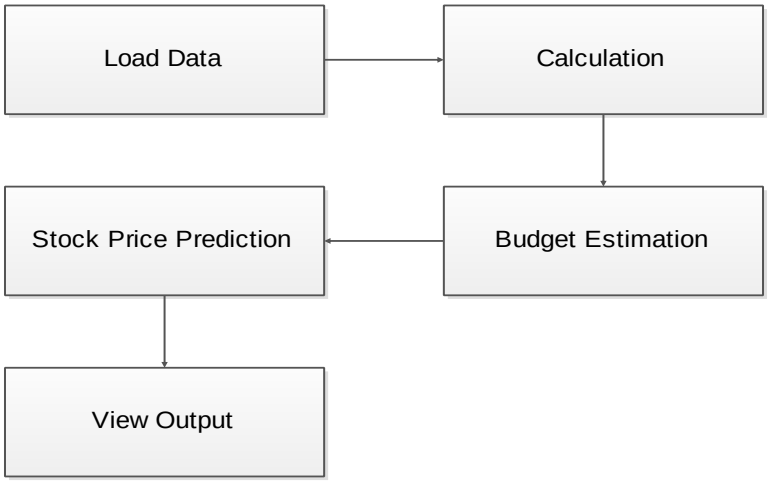


Fig 6.2: Block Diagram of Proposed System

Bulk data will be given as input to the system using the given data the system will calculate and budget the estimation and based on that estimation the system will predict if the stock price will go in profit or in loss and the user can view this as output, the system will greatly help the user while buying or selling stocks.

CHAPTER 7

SNAPSHOTS

Fig 7.1: Homepage

The above figure indicates the home page/landing page where user can opt between Register page or Login page.

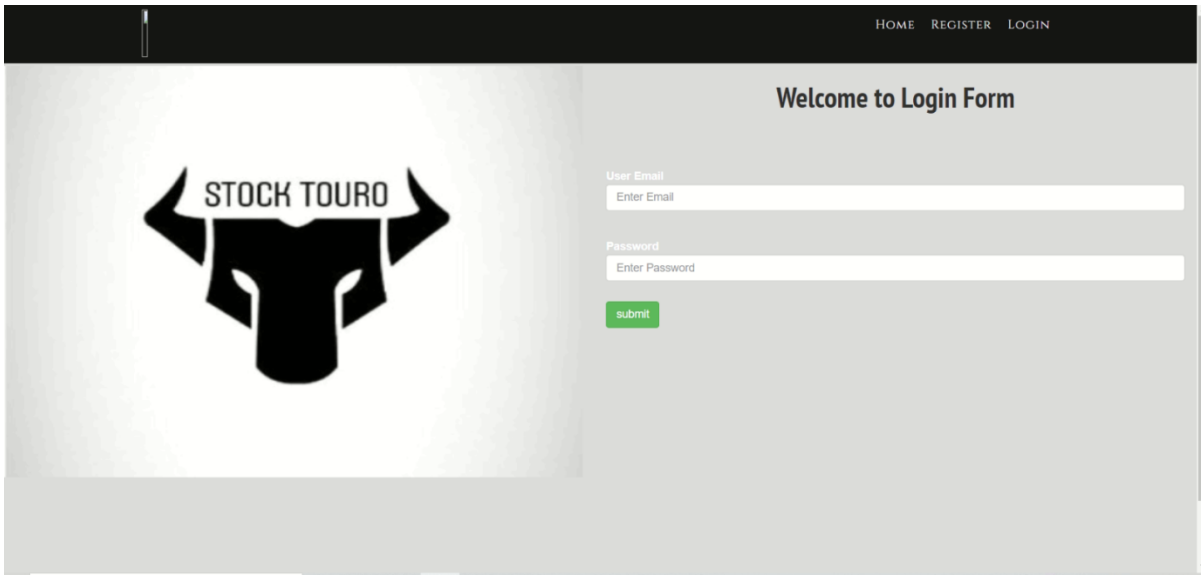


Fig 7.2: Login Page

The above figure shows the login page where user can enter his login credentials and login.

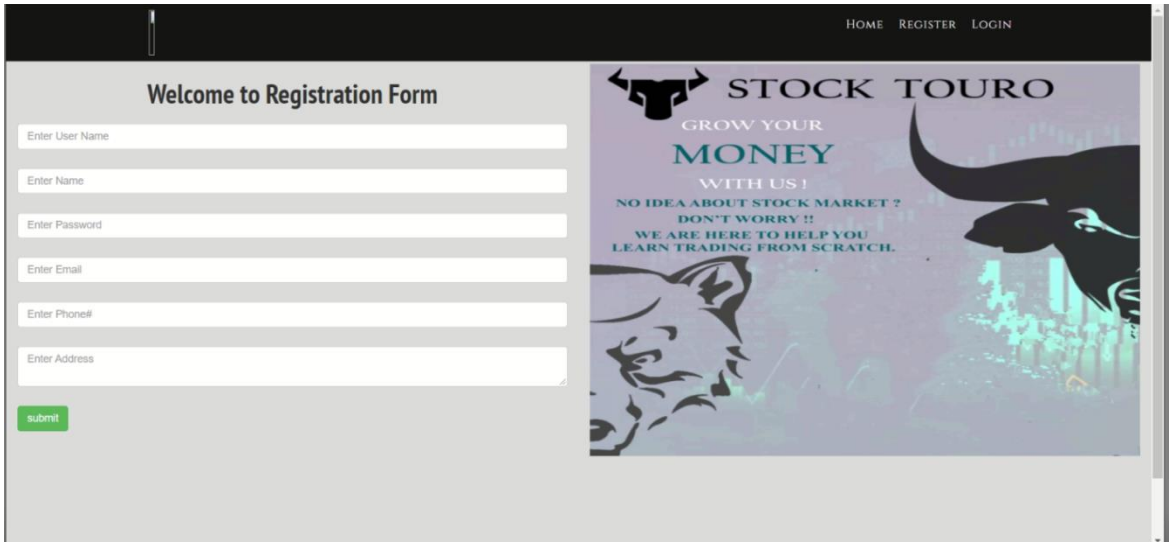


Fig 7.3: Registration page

The above figure shows the registration page where user can enter his details for the purpose of logging in.

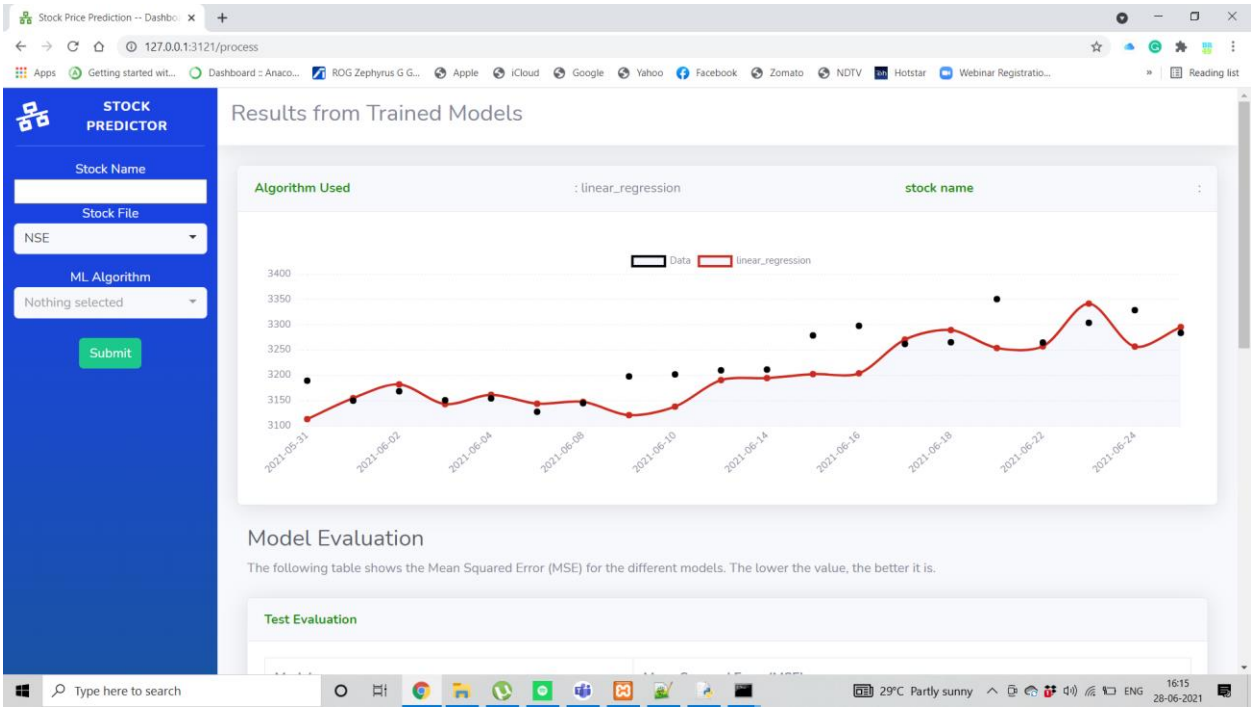


Fig 7.4: Linear Regression Analysis Graph of TCS share

The above figure shows the graphical representation of TCS (Tata Consultancy Services) stock based on linear regression and considering the historical data of the TCS share collected from NSE (National Stock Exchange).

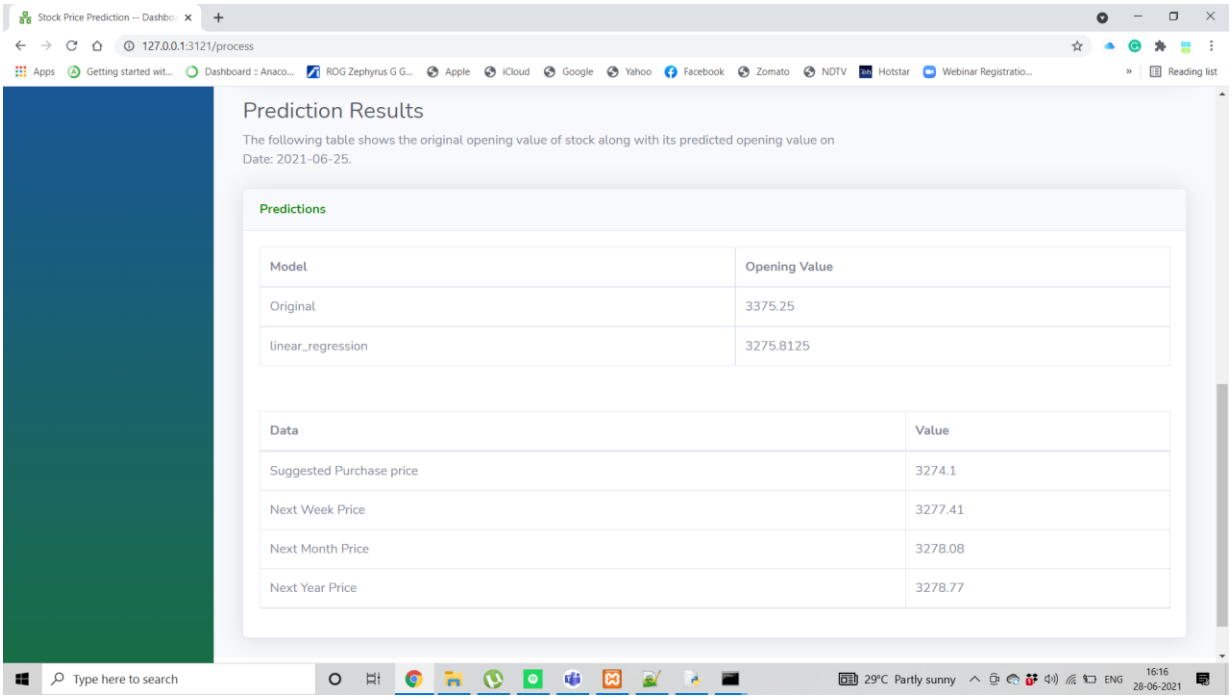


Fig 7.5: Linear Regression Prediction Result of TCS Share

The above figure shows the weekly, monthly and yearly prediction result by using Linear Regression algorithm. From the above graph, considering the predicted result, the user/trader can enter a trade in live market at suggested price in order to minimize losses

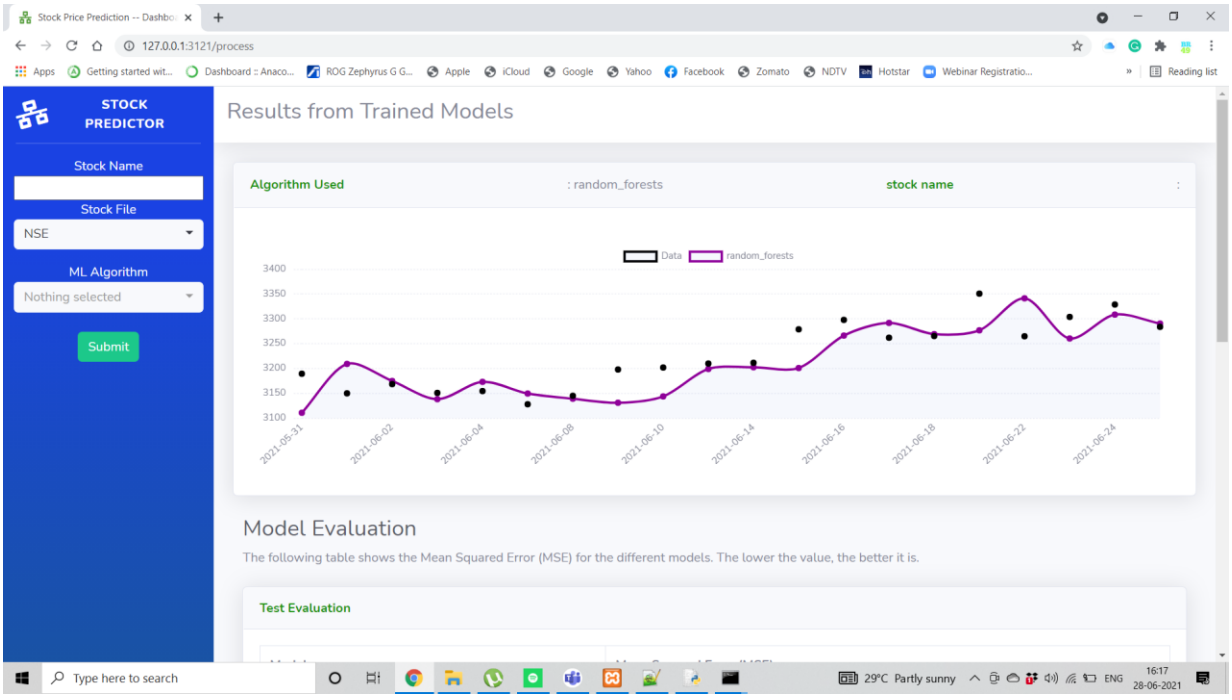


Fig 7.6: Random forest Analysis Graph of TCS share

The above figure shows the graphical representation of TCS (Tata Consultancy Services) stock based on random forest algorithm and considering the historical data of the TCS share collected from NSE (National Stock Exchange).

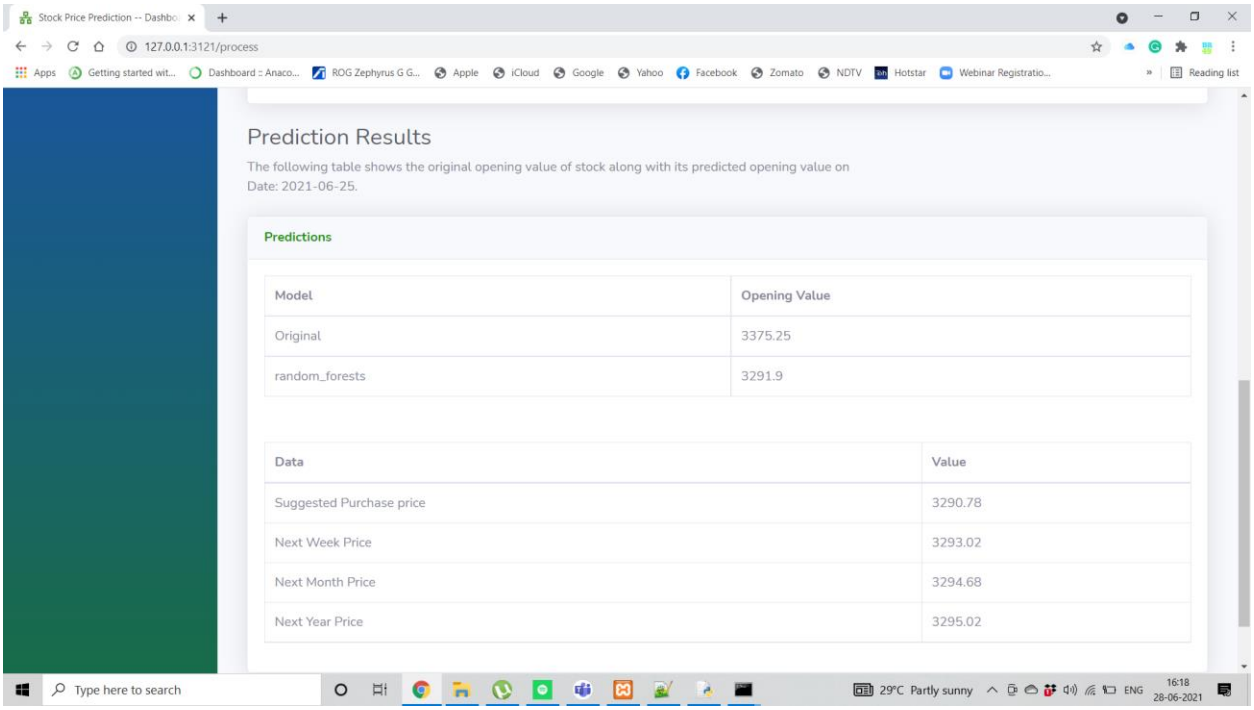


Fig 7.7: Random forest Prediction Result of TCS Share

The above figure shows the weekly, monthly and yearly prediction result by using Random forest algorithm. From the above graph, considering the predicted result, the user/trader can enter a trade in live market at suggested price in order to minimize losses.

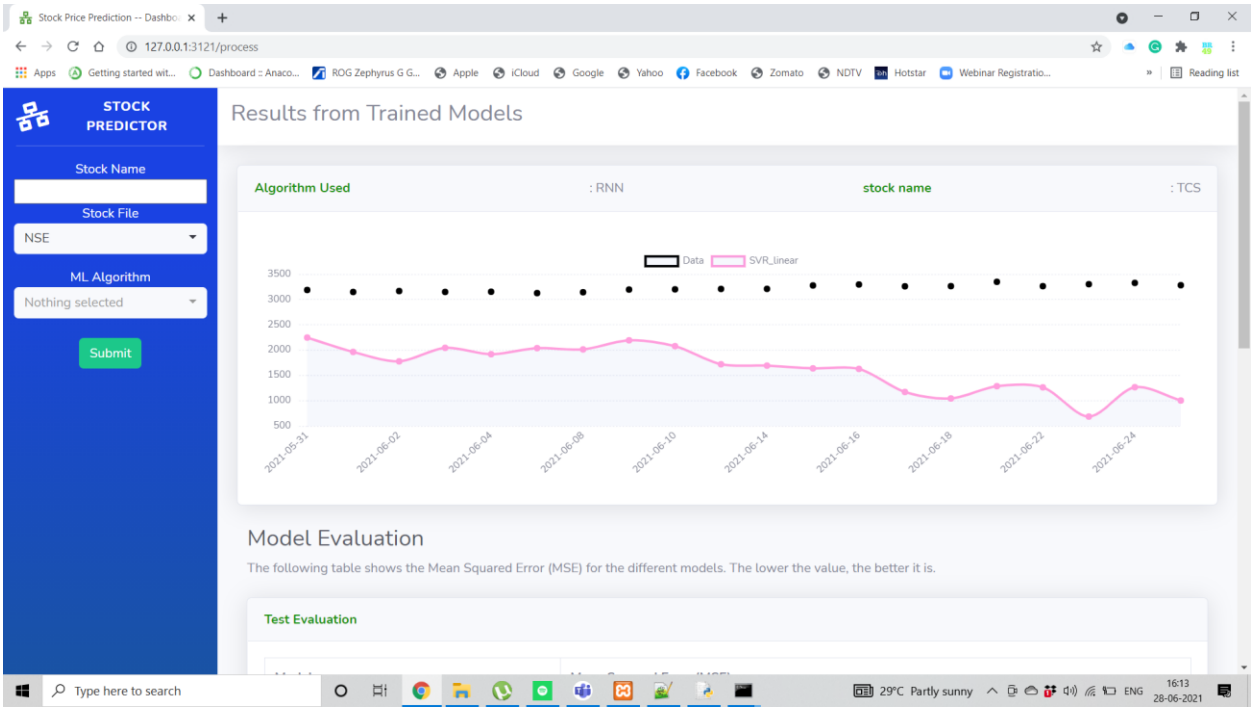


Fig 7.8: RNN Analysis Graph of TCS share

The above figure shows the graphical representation of TCS (Tata Consultancy Services) stock based on RNN algorithm and considering the historical data of the TCS share collected from NSE (National Stock Exchange).

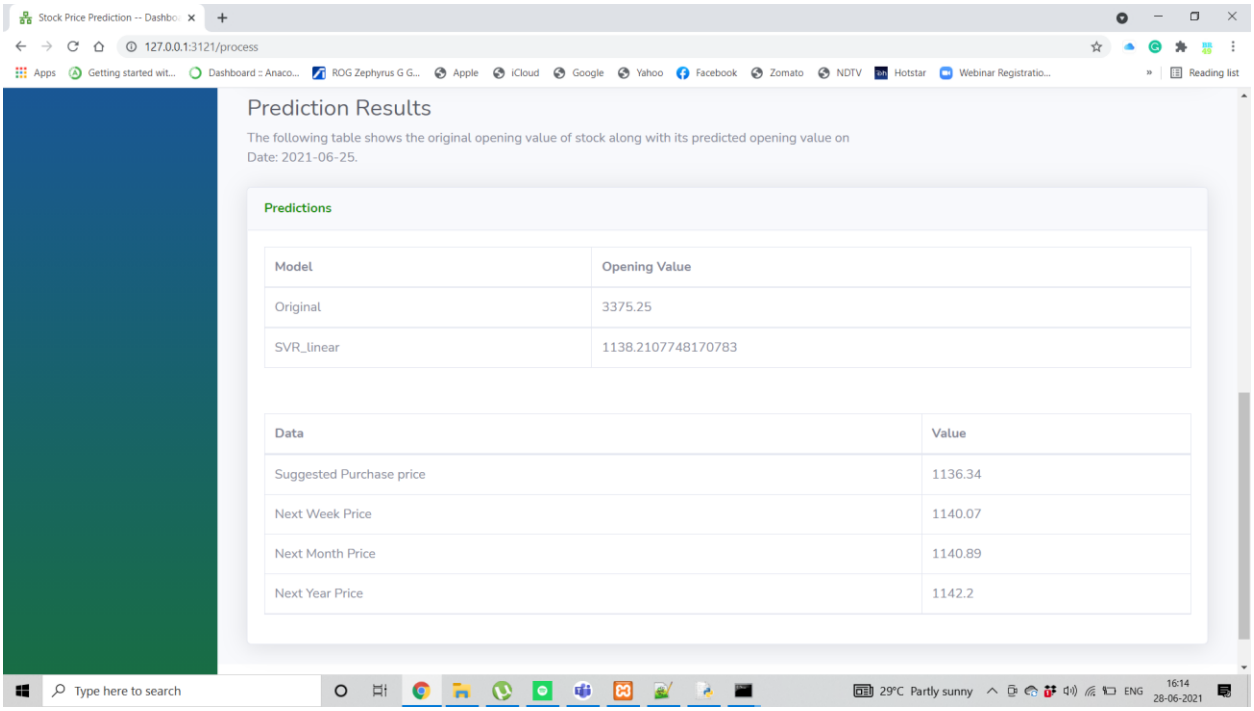


Fig 7.9: RNN Prediction Result of TCS Share

The above figure shows the weekly, monthly and yearly prediction result by using RNN algorithm. From the above graph, considering the predicted result, the user/trader can enter a trade in live market at suggested price in order to minimize losses.

CHAPTER 8

CONCLUSION AND FUTURE ENHANCEMENT

Conclusion

The main objective of our dissertation is to develop a more adaptive and effective stock prediction system by applying machine learning techniques. The survey papers prove the successfully of our proposed approach. A systematic prediction tool is developed could be used to assist invested make more accurate decision in their stock market investment. Our prediction system integrates the stock movement forecasting and stock price forecasting.

In addition, numbers of visualization are provided to enhance our system. The models using the features from these external sources along with the traditional stock market data improve the performance for the stock market prediction.

Future enhancement

In the future, more studies on the use of different algorithms in RSs can be done to observe the implications of their use, performance, and utility. Moreover, RS development lacks studies analyzing early stages, such as requirements and design, and late stages, such as maintenance. Open questions in these stages must be investigated to improve the knowledge about the field.

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