

Tradexa: Your Million Dollar Shortcut

Project Synopsis

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BACHELOR OF TECHNOLOGY

BY

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ABSTRACT

The stock market is constantly in flux, and to be able to predict the prices accurately is a challenging task because of the various factors that influence the change of stock price. Time series forecasting is a notoriously complex and non-linear problem, and accurately predicting the future is a strenuous task. There have been many advancements in the field of machine learning and artificial intelligence and the employment of these new algorithms can be fortuitous. Artificial Neural Networks, Convolutional Neural Networks, and Recurrent Neural Networks are some of the architectures which have already been used in the prediction of the stock prices, but due to the problem of long term dependency and vanishing gradient problem in deep networks, the performance has not been up to the mark. A carefully developed model can effectively be utilized to predict the future price trend. Long Short Term Memory (LSTM) has overcome the problems that are faced by RNN, namely the problem of Vanishing gradients and the long term dependency. The gated structure of LSTM has improved its performance and now is widely used for problems with complex data and deep architectures. The historical data is widely used by stock market traders when deciding to purchase stocks, and displaying it in a meaningful and easier manner along with the prediction from the deep learning model is going to help the traders to better select which stocks to acquire.

Keywords: *Prediction, Deep learning, Stock market trend, LSTM*

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1 Introduction

1.1 Problem Definition

Stock market is one of the major fields that investors are dedicated to, thus stock market price trend prediction is always a hot topic for researchers from both financial and technical domains. Stock price movement is non-linear and complex. Several research works have been carried out to predict stock prices. Traditional approaches such as Linear Regression and Support Vector Regression were used but accuracy was not adequate. Financial time series prediction is known to be a notoriously difficult task due to the generally accepted, semi-strong form of market efficiency and the high level of noise. A more efficient and accurate approach was required for stock price prediction which was what Recurrent Neural Network and LSTM yields. News related to the corporate industries at one location will be an add on benefit for the clients.

1.2 Scope

This product is made for a Stock Market Trader whether he/she maybe a newbie or an amateur. The aim of this product is to make the life of a trader simpler by basically taking their inputs regarding stock and making the data available in the best format possible.

There are 3 Main tasks performed by this product-

- Stock Statistics- This feature takes input from the user i.e. Stock Name and then shows the details of that stock in various graphical and tabular formats.
- Future Stock price Prediction- This feature will predict the future price of the stock(which the user wants to know)
- Stock Recommendation- On the basis of the user profile and user needs, this feature will recommend stocks that user should buy.

These are the additional features that are beneficial:

- Validation and Verification is done of all the Data entered by the User.
- All the Live or Static Data will be stored in Database.
- The 'News' feature will show daily Updated News and this data will also be stored in the database.
- Portfolio Building Feature will help User to build a personal portfolio and manage it properly.
- Access rights restrictions for data administration will provide controlled permission granting for data handling.

1.3 Motivation

Web applications are transforming the world's activities making them more simplified, something which the internet did when it made its inception. So, obviously, one of the prime reasons why you want to develop a stock trading web app is the increasing number of global investors and traders as per the market research. As we know out of every 10 people in the world 8 of them are traders. This is a huge number and making their job simpler is a precise task as well. We have seen many people who do trading daily but suffer to get all the information as it is a very complex task to perform which includes the search for stock data, daily company news, stock statistics, stock analysis, etc which led us to think about making a web app which provides all the information a particular trader needs at just one place with customization as well. This will make all the tasks of a trader that is searching, analyzing, predicting, studying, and decision making quite easy and simple.

1.4 Literature Review

Nair et al. [1] proposed a decision tree system based on rough sets. This method combines the advantages of rough sets and decision trees, but this method is prone to overfitting when dealing with data sets with a large amount of noise, which will affect the trend of stock prediction. Nottola et al. [2] has achieved better results in the prediction of stock prices using neural networks than decision trees. Nonetheless neural networks have some caveats in the practical implementation such as the local optimal problem and vanishing gradient problem, Support Vector Machines which are based on structural risk minimization can greatly reduce the model falling into the local optimal problems of neural networks. Although Deng et al. in his paper "Application of parameter optimization stochastic forest in stock prediction" proved that after parameter optimization, the random forests have a higher accuracy than SVM.

Bowden et al. [3] proposed to use the ARIMA method to build an autoregressive model to predict stock prices. Although this method has some advantages in computational efficiency, the assumption of statistical distribution and stability of the research data limits their ability to model the nonlinear and non-stationary financial time series, and the outliers in the research data also have a great impact on the prediction results.

Tsantekidis et al. [5] proposed a stock prediction model based on convolutional neural network (CNN) and compared it with other classical models to verify the effectiveness of the convolution model in stock prediction. However, due to the timing of stock data, the convolutional neural network is not the most suitable neural network model for stock prediction.

Selvin et al. [4] proposed three stock prediction models based on CNN, recurrent neural network (RNN), and LSTM deep learning networks respectively, and compared the performance of the three models by predicting the stock prices of listed companies.

2 Software Project Management Plan

2.1 Introduction

2.1.1 Project Overview

In a modern hasty world like ours, our project plays quite an important role in the daily life of all the users who do daily trading of shares in the market. Our website will help all the expert traders as well as the new traders who have just started trading, to simplify their desirable stocks in an orderly desirable manner with all the information in just one place. Stock market is one of the major fields that investors are dedicated to, thus stock market price trend prediction is always a hot topic for researchers from both financial and technical domains. Stock price movement is non-linear and complex. Several research works have been carried out to predict stock prices. Traditional approaches such as Linear Regression and Support Vector Regression were used but accuracy was not adequate. Financial time series prediction is known to be a notoriously difficult task due to the generally accepted, semi-strong form of market efficiency and the high level of noise. A more efficient and accurate approach was required for stock price prediction which was what Recurrent Neural Network and LSTM yields. News related to the corporate industries at one location will be an add on benefit for the clients.

2.1.2 Project Deliverables

The key objective of this project is a working website which helps you by solving close to all the daily problems faced by a trader or a new user new to the market. We will use various types of technologies and management skills to make this website simple but most helpful to all the stakeholders and users of the market. Like other websites our project won't have a complex user interface to navigate, we will make sure that even a Luddite person will find it quite easy and attractive to use. He/She can search for stocks, study them and also their company background. They can also study the graphical movement of the stock One of the important features of our website is that all the data is processed

and given to the user and they can study it in the simplest form which is easy to understand and predict. The list of project deliverables are:

- Software Project Management Plan (SPMP)
- Software Requirements Specification (SRS)
- UML Diagram
- RMMM Plan
- Software Design Document
- Software Testing Document
- Project closure document
- Working project

2.2 Project Organization

2.2.1 Software Process Model

Agile model is a combination of iterative and incremental process models with a focus on process adaptability and customer satisfaction by rapid delivery of working software products. Agile Methods break the product into small incremental builds. These builds are provided in iterations. Every iteration involves cross-functional teams working simultaneously on various areas like:

- Planning
- Requirements Analysis
- Design
- Coding
- Testing

REQUIREMENTS: A SRS (SOFTWARE REQUIREMENTS SPECIFICATION) document is created to gather all the requirements of a project which is to be developed. It is the initial and a very important step in this model.

DEVELOP AND DESIGN: These stages are those steps in the project model where most of the main development of the system to be created is done. These steps take more time than all the other steps in the model. Here the system is designed and developed from scratch by a team which code for weeks and weeks using the tools and technologies needed for the project.

TEST: This phase of the model is very crucial for the project to go further as at this phase a tester will test all the test cases related to the project. He/She will watch out for all the bugs in the system and report them to the team of developers and then the system will be corrected and then again tested. This cycle goes on until the tester does not find any mistakes in the system.

REVIEWS: A prototype will be send to people with and the rest of the team to take reviews from them and after knowing all their reviews and advice the system will be deployed into the market

2.2.2 Roles and Responsibilities

1. Designer: Jubin, Jash, Mitanshu
2. Developer: Jubin, Jash, Mitanshu
3. Tester: Jubin, Jash, Mitanshu

DESIGNER: A software designer is responsible for problem-solving and planning for a software solution. After the purpose and specifications of software are determined, software developers will design or employ designers to develop a plan for a solution. It includes low-level component and algorithm implementation issues as well as the architectural view. A software designer is responsible for the documentation of the plan which is usually the product of the design.

TESTER: Testers are responsible for the quality of software development and deployment. They are involved in performing automated and manual tests to ensure the software created by developers is fit for purpose. Some of the duties include analysis of software, and systems, mitigate risk and prevent software issues.

DEVELOPER: Becoming a software developer, also known as a computer programmer, you'll be playing a key role in the design, installation, testing and maintenance of software systems. The programs you create are likely to help businesses be more efficient and provide a better service. Based on your company's particular requirements, you might be responsible for writing and coding individual programs or providing an entirely new software resource.

2.2.3 Tools and Techniques

- Django
- HTML
- CSS
- Javascript
- MySQL
- Selenium
- Adobe XD
- VSCode
- PyCharm
- Chrome
- Deep Learning

2.3 Project Management Plan

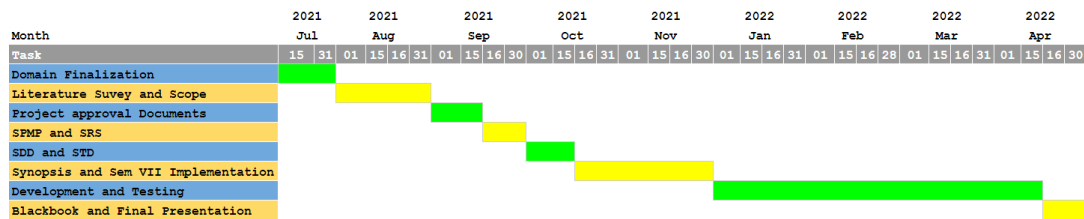
2.3.1 Tasks

- UI Design
 - Description: The initial planning for how the frontend will be laid out.
 - Resources needed: Figma, Adobe XD
 - Dependencies and constraints: Design can't be started until requirements are complete.
 - Risks and Contingencies: The client may not like the UI or the end users won't like the UI. This can be fixed by making multiple prototypes.
 - Deliverables and Milestones: On completion of this task, upon discussion with the stakeholders and getting opinions of the users, a specific UI design appropriate for the product will be analyzed and developed. Upon discussion with the team members and the designer, the UML Diagrams will be finalized and developed, which serves as the backbone of developing the product.
- Frontend Coding

- Description: The initial planning for how the frontend will be laid out.
- Resources needed: Django, HTML, CSS, Bootstrap.
- Dependencies and constraints: We depend on other groups in the project to provide us with objects we need.
- Risk: The code will not be scalable to allow for new features and accounts with ease.
- Contingency: The only real contingency for this is to inform the client of the functionality available and to decide whether there is time enough to alter the code so that it is scalable with a fair amount of ease.
- Deliverables and Milestones: This task will be completed with the backend as both are going to be changing everytime. Most of the data shown on the website will be retrieved from the server, so this is an important task which needs to be completed.
- Backend Coding
 - Description: Implement the server-side business logic.
 - Resources needed: Django, Python, Deep Learning.
 - Dependencies and constraints: We depend on the stability of the hardware and software involved in the development of the project.
 - Risk: The code will not be scalable to allow for new features and accounts with ease.
 - Contingency: The only real contingency for this is to inform the client of the functionality available and to decide whether there is time enough to alter the code so that it is scalable with a fair amount of ease.
 - Deliverables and Milestones: The completion of this task and frontend coding will be done together. The backend needs to send all the important stock related information and the predictions from the deep learning model along with the latest news related to the stock market. The completion of this task is going to be crucial and once completed the project will then go into testing part.
- Testing
 - Description: Once the design and final software is developed, the application goes for testing. Testing is based on different criteria related to efficiency,bugs,performance,response time, correct functionality etc.
 - Resources needed: In this the resources needed, is the tablet(Device) or laptop or a desktop on which the software will run.
 - Dependencies and constraints: In these, each module needs to be checked whether the order is placed correctly. As well as there is no problem encountered during updating the list of stocks (with their up-to-date details) and no difficulty is faced by the users.
 - Risks and Contingencies: Risk here is if the modules aren't combined in a proper manner that will result in different output and the customer will not be able to use the product.And also if the software is not compatible with different hardware.
 - Deliverables and Milestones: Final product after this task is released to a Stock Market Agency/Firm so they can have an overview about what the software will look like and test the software if their requirements are fulfilled.
- Documentation
 - Description: The software is documented timely by updating the code according to the changes taking place in the user end environment or technology. This phase may face challenges from hidden bugs and real-world unidentified problems.The Software is maintained timely by updating the code according to the changes taking place in user end environment or technology.This phase may face challenges from hidden bugs and real-world unidentified problems.

- Resources needed: Word Processor 3.1.6.4, overleaf
- Dependencies and constraints: Meetings with the stakeholders and users so as to determine the finality of the product software. Customer review is needed to complete this phase.
- Risks and Contingencies: Risks would be failure to get clarity on the challenges from hidden bugs and real-world unidentified problems and discrepancies along with miscommunication between the users and the developers.
- Deliverables and Milestones: Deployed software, documentation, and Customer’s review act as a deliverable here. Updated Software and bug fixes and their documentation may be expected as deliverable as well.

2.3.2 Timetable



3 Software Requirements Specification

3.1 Introduction

3.1.1 Project Overview

In a modern hasty world like ours, our project plays quite an important role in the daily life of all the users who do daily trading of shares in the market. Our website will help all the expert traders as well as the new traders who have just started trading, to simplify their desirable stocks in an orderly desirable manner with all the information in just one place. Stock market is one of the major fields that investors are dedicated to, thus stock market price trend prediction is always a hot topic for researchers from both financial and technical domains. Stock price movement is non-linear and complex. Several research works have been carried out to predict stock prices. Traditional approaches such as Linear Regression and Support Vector Regression were used but accuracy was not adequate. Financial time series prediction is known to be a notoriously difficult task due to the generally accepted, semi-strong form of market efficiency and the high level of noise. A more efficient and accurate approach was required for stock price prediction which was what Recurrent Neural Network and LSTM yields. News related to the corporate industries at one location will be an add on benefit for the clients.

3.2 Specific Requirements

3.2.1 External Interface Requirements

- User Interface: The UI should be easy to manipulate without additional training. The user should be able to interact with the system in any of the languages available in the language menu. The pages should use a ZUI graphical environment, should be built with a good sense of color and contrast, and should be printable, using keys. All pages of the system should be accessible from any page through the use of a navigator.
- Hardware Interfaces: The web app will work on the supported OS on any smart device. Following are minimum requirements of hardware required:
 - RAM: 1GB

- Screen pixel density: 350dpi
- Connectivity: Wi-Fi connectivity or mobile data network.
- Fast internet access is preferred.
- Software Interfaces
 - The project requires a database system to store the details of a customer and to manage the Stock details as well.
 - As it is a web based application a minimal Browser is good for Usage of this application.
 - Browser - We have chosen Chrome Browser for its best support and user friendliness.
 - Database - To save the records of user progress, we have chosen MySQL.
- Communication Protocols
 - Hyper-Text Transfer Protocol (HTTP),
 - Hypertext Transfer Protocol Secure (HTTPS),
 - Simple Mail Transfer Protocol (SMTP),
 - Transmission Control Protocol (TCP)

3.2.2 Software Product Features

- New User Registration
- Login/Signup
- My Account
- Daily Stock Updates
- Stock Prediction

3.2.3 Software System Attributes

- Reliability
 - The web-app is reliable as long as there is a stable internet connection available.
 - This is required because all the data that the user generates will be stored in a remote database and many functions of the web app will be on the server side.
 - Internet connection will be required for the login process to take place.
- Availability
 - The software will be available at all times except during software updates.
 - The user will be notified if any updates or patches are required and the web app will not be accessible during this time.
- Security
 - All of the data generated by the user will be encrypted and stored on a secure database.
 - Login activity will be monitored and stored in logs.
- Maintainability
 - The app will be getting constant updates based on the feedback given by users.

- The data generated by the users will be stored securely and proper database maintenance measures will be taken. The data will constantly get updated as the app gets updated to fit the feedback given by the users.
- Portability
 - The web app will be run on any browser interface which is available on any device.
 - Proper accessibility and responsiveness features will be built into the app to make sure it runs properly on every device.
- Performance
 - The app will be built such that multiple instances of it can be run on a browser without having much impact on device hardware.
 - The database will be able to handle all the requests and will be able to respond in milliseconds to those requests.
 - The performance will also be dependent on the device on which the web app is opened.

3.2.4 Database Requirements

Mysql Database

MySQL, the most popular Open Source SQL database management system, is developed, distributed, and supported by Oracle Corporation. The MySQL website (<http://www.mysql.com/>) provides the latest information about MySQL software. MySQL is a database management system. A database is a structured collection of data.

4 Software Design Description

4.1 Introduction

4.1.1 Design Overview

In a modern hasty world like ours, our project plays quite an important role in the daily life of all the users who do daily trading of shares in the market. Our website will help all the expert traders as well as the new traders who have just started trading, to simplify their desirable stocks in an orderly desirable manner with all the information in just one place. Stock market is one of the major fields that investors are dedicated to, thus stock market price trend prediction is always a hot topic for researchers from both financial and technical domains. Stock price movement is non-linear and complex. Several research works have been carried out to predict stock prices. Traditional approaches such as Linear Regression and Support Vector Regression were used but accuracy was not adequate. Financial time series prediction is known to be a notoriously difficult task due to the generally accepted, semi-strong form of market efficiency and the high level of noise. A more efficient and accurate approach was required for stock price prediction which was what Recurrent Neural Network and LSTM yields. News related to the corporate industries at one location will be an add on benefit for the clients.

4.1.2 Requirement Traceability Matrix

	User	Prediction Module	News retrieval Module	Stocks Data Module	Server
New User Registration	X				X
Login and Logout	X				X
Stock Prediction	X	X		X	X
Stock recommendation	X			X	X
Reliability		X	X	X	X
Usability	X		X		X
Security	X	X	X	X	X

4.2 System Architecture Design

4.2.1 Chosen Architecture

MVC Architecture

The proposed architecture for our Project is MVC i.e. Model View Controller architecture. The Model-View-Controller (MVC) is an architectural pattern that separates an application into three main logical components: the model, the view, and the controller. Each of these components are built to handle specific development aspects of an application. MVC is one of the most frequently used industry-standard web development frameworks to create scalable and extensible projects. In our Project we plan to have the three components as below:

Model:

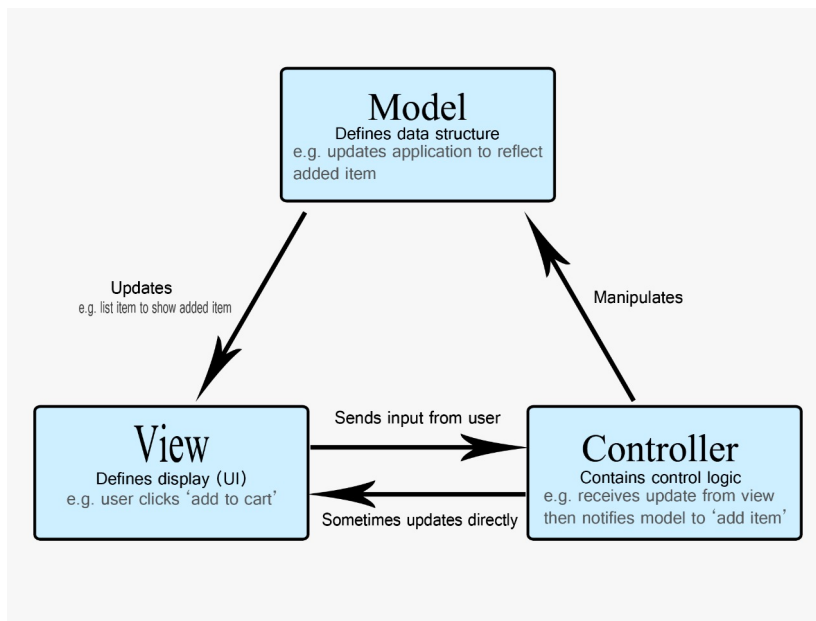
The Model component corresponds to all the data-related logic that the user works with. This can represent either the data that is being transferred between the View and Controller components or any other business logic-related data. For example the model component would be dealing with all the user data that would be stored in the databases and every other data that would be transferred between the View and Controller components.

View:

The View component is used for all the UI logic of the application. For example, the Customer view will include all the UI components such as text boxes, pages, chatbot UI, sections etc. that the final user interacts with.

Controller :

Controllers act as an interface between Model and View components to process all the business logic and incoming requests, manipulate data using the Model component and interact with the Views to render the final output. The reason behind choosing the MVC architecture for our project is, One that underlying technology stack we plan on using is Django which itself is built on the MVC architecture and two that MVC architecture has widely taken over in the Industry and enables one to make a scalable application with appropriate distinction between the various components.



4.2.2 Discussion of Alternative Designs

Data Centric Architecture

Data Centered Architecture is a layered process which provides architectural guidelines in data center development. Data Centered Architecture is also known as Database Centric Architecture. This architecture is the physical and logical layout of the resources and equipment within a data center facility. The data centric approach is used for users to access data as it acts as a repository, but in this particular web application we want users to store the data, be able to access the data, as well as make changes to the data stored. Hence data centric approach was not selected.

Client Server Model

The system architecture of Client-Server architecture is the most suited for our software because our project is a Web application where the Users/Clients are the service requesters and the Server is the Service Provider. Apart from its simple architecture, the Client-Server model also provides many other benefits like 24x7 availability, reliability and security. Client Server is thus used to handle the large amount of data that our project collects and stores about the users so that there are easy backups and high security.

Event Driven Architecture

An event-driven architecture (EDA) is a framework that orchestrates behavior around the production, detection and consumption of events as well as the responses they evoke. An event is any identifiable occurrence that has significance for system hardware or software. An event-driven architecture consists of event creators and event consumers. EDA includes security risks and increased complexity. Because EDA systems are often extremely loosely coupled and highly distributed: we don't always know exactly what components are part of the system and the dependencies between them. Hence we did not select this.

4.2.3 System Interface Description

1. For WEB Application:

- Django Framework:

Django follows a MVC (Model-View-Controller) architecture which is similar to the architecture which we'll be using for our system software. Hence, Django Framework suits the best for our software. Version: Django 3.2.7, Purpose: The Django admin would be

used as the admin side, where trusted admins or owners can view and edit the database using the model-centric architecture and user-friendly interface.

- **Windows Operating System:**
The Web Application requires Windows Operating System for the smooth running of the Application. Windows Operating System is required to access the browser and run the Web Application smoothly, along with its various functionalities.
- **Vs Code:**
The ML algorithms and exploratory data analysis performed on the dataset requires Vs Code to easily program and run the algorithms. Version: Python 3.3, Purpose: Jupyter Notebook is an IDE, required to implement and test the machine learning models.

4.3 Detailed Description of Components

4.3.1 Component 1- User

The User component involves the Login, Sign Up and eventually the modules associated with the chatbot. This component interacts with the server in terms of submitting the required details and storing them into the database tables. It also encompasses the security and usability component. The constraints include a proper internet connection, a Web Browser to access the application. For the Login functionality, the additional constraint is that the user must be registered. As a part of the User module, the application displays the profile information of the user and allows them to edit their profile. This feature involves basic CRUD operations on the database.

4.3.2 Component 2- Stock Statistics

The Stock Statistics subsection includes a search stock subsection where the user can search for any stock they want. As they click on search, all the details regarding the stock like it's per share value, increase and decrease percentage, all time highs and lows, today's highs and lows and many other ratios and graphs etc. There is also information about the company that holds that stock. In turn, this component provides all the information that a user needs to know or to study a stock.

4.3.3 Component 3- Stock Future Prediction

The Stock Future Prediction component is a great feature for both, one who knows a lot about a stock and one who is just got in to share market recently. This components shows the future statistics and graphs of any company's stock. It is gold for a person who knows how to study a graph of a stock and also a person who trusts the system and takes risks on that basis.

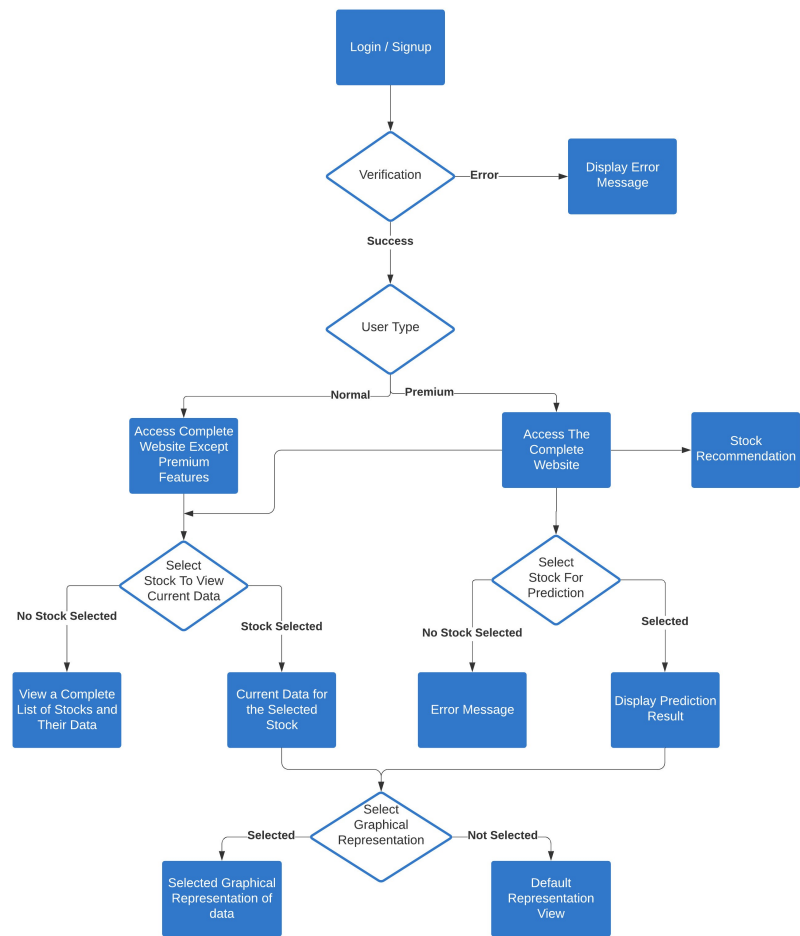
4.3.4 Component 4- Stock Recommendation

The Stock Recommendation component gives us a result(list of stocks) which we should buy on the basis of our portfolio and our choice. It basically analysis your portfolio, then takes some inputs from you and then presents you with a list of stocks that you should buy. There is always a risk factor but if a person wants to start somewhere then this might be the best place to do from.

4.3.5 Component 5- Server

This component handles the databases which store the information about the User entity and the Machine Learning models that will process the User inputs. It also ensures security, reliability and usability of the application. This particular component interacts with every other component of the application.

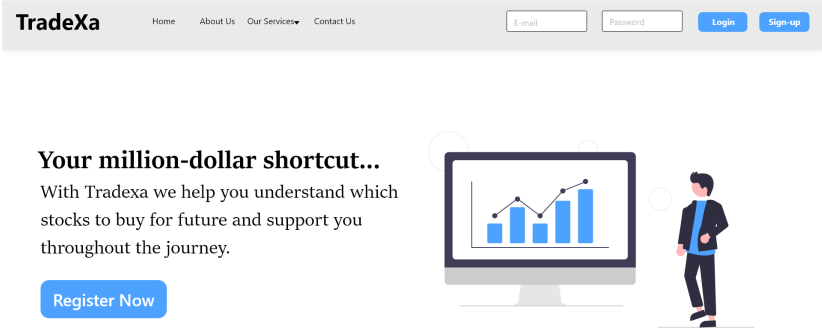
4.4 ER Diagram



4.5 User Interface Design

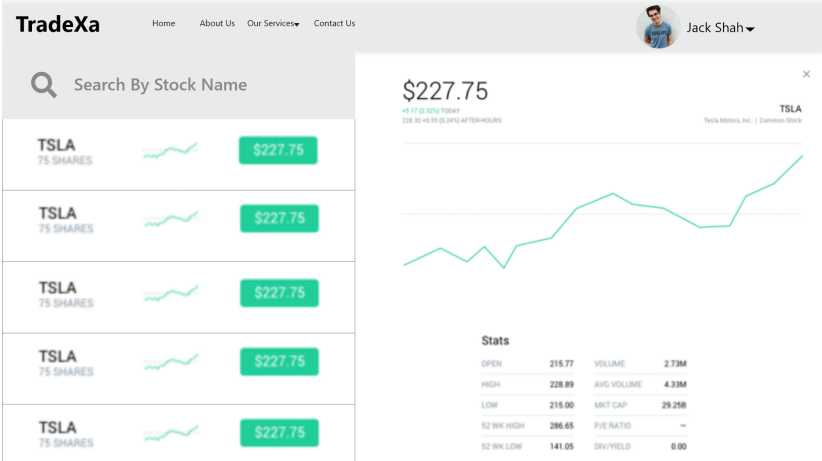
4.5.1 Description of the User Interface

- Home Screen



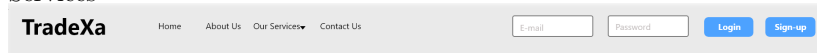
This will be the Home Page of Tradexa which will provide a brief overview of the purpose of the application and the various services that it provides to its users.

- Stock Statistics



This is the Stock Statistics Section which will provide all the information about the stock in all formats.

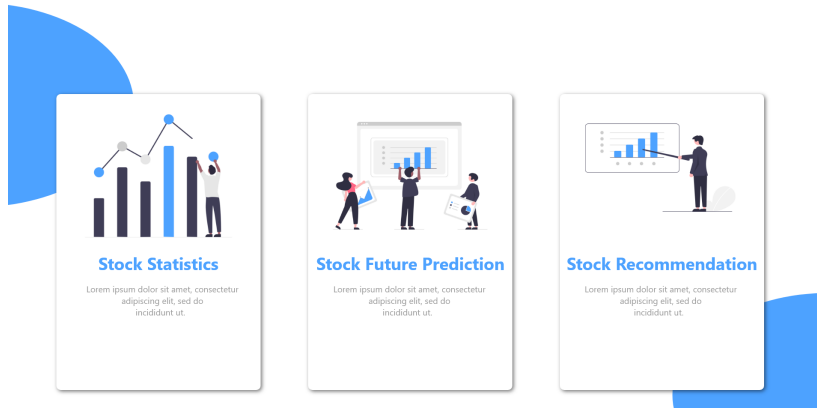
- Services



Your million-dollar shortcut...

With Tradexa we help you understand which stocks to buy for future and support you throughout the journey.

[Register Now](#)



This subsection will highlight the main functionalities offered by the application and provide a way for users to navigate through them in a convenient manner.

4.6 Objects and Actions

- Home Page:

The homepage consists of a navigation bar which has the following objects and associated actions:

1. On clicking the Home link, the user is redirected to the Home Page of the Web Application.
2. On clicking the About Us link, the user is redirected to the About Us page where information about the purpose, motivation and features of the application can be found.
3. On Clicking the Login link, the user is redirected to the Login page where the user can login by entering the credentials.
4. On clicking on the Our Services Dropdown, it will lead to a page showing all the different types of services our website provides
5. On Clicking the Register Now button, it will lead you to a sign-up page where you can start the process of becoming a member.

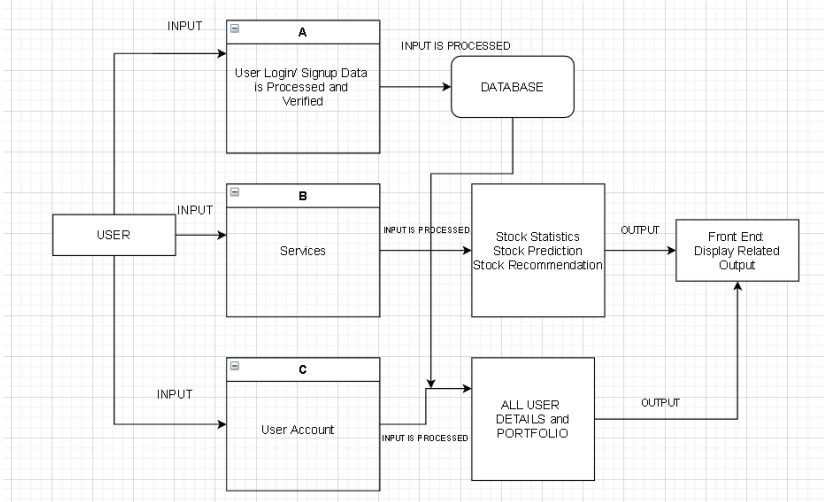
- Functionalities Sections:

The functionalities subsection consists of the following objects and associated actions:

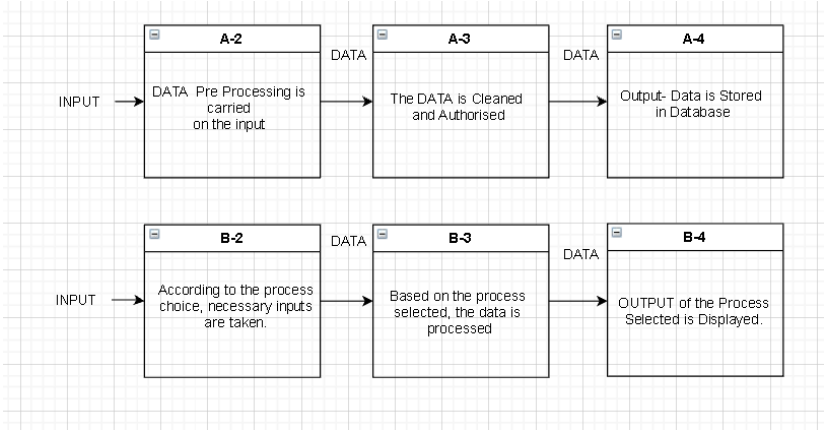
1. Sign up or Login card, using which the user is redirected to the Sign-Up page for registration or login using existing credentials.
2. Stock Prediction subsection, using which user can find all the statistical data about the stock they want to know.
3. Our Services subsection, shows all the services we provide to the user and also how they can get to us using Contact Us subsection.

4.7 Data Flow Specifications

4.7.1 Level 0 DFD with Description



4.7.2 Level 1 DFD with Description



4.8 System Architecture

4.8.1 Use Case 1

Admin Part:

Use Case ID:	1		
Use Case Name:	Login		
Created By:	Jash Mehta	Last Updated By:	-
Date Created:	-	Date Last Updated:	-

Primary Actors:	Admin
Secondary Actors:	-
Description:	This use case describes how a user can log into the system. The actors using this login page is admin.
Trigger:	This is the root/opening page of the website.
Preconditions:	The admin's credentials needed to be saved in the system beforehand.
Normal Flow:	<ol style="list-style-type: none">1. When the Admin start the application the login page appears2. Admin needs to provide valid credentials3. Click on the login button.4. Taken to the admin homepage.
Exceptions:	<ol style="list-style-type: none">1. Server Down2. Database Connectivity Issues
Priority:	High
Frequency of Use:	High
Business Rules:	-
Special Requirements:	Valid Credential for Authorized login.

Stock Statistics:

Use Case ID:	2		
Use Case Name:	Stock Statistics		
Created By:	Jubin Kamdar	Last Updated By:	Jash Mehta
Date Created:	-	Date Last Updated:	-

Primary Actors:	User, ML Model
Secondary Actors:	-
Description:	After Signup, the user can use our services in which one of them is Stock Statistics, in which all the data about all the stocks is available and can be displayed on search.
Trigger:	Our Services ---Stock Statistics
Preconditions:	User must be logged in and have good internet.
Normal Flow:	<ol style="list-style-type: none">1. Login/Signup2. Our Services3. Stock Statistics4. Search for Stocks
Exceptions:	<ol style="list-style-type: none">1. Server Down2. Database Connectivity Issues
Priority:	High
Frequency of Use:	High

Stock Future Prediction:

Use Case ID:	3		
Use Case Name:	Stock Prediction		
Created By:	Mitanshu Gada	Last Updated By:	Jubin Kamdar
Date Created:	-	Date Last Updated:	-

Primary Actors:	User, ML Module, Admin
Secondary Actors:	-
Description:	After Signup, User can opt for any of our services. Stock Future Prediction module gives us future stats of a stock in form of detailed data.
Trigger:	Our Services— Stock Future Prediction
Preconditions:	User should have logged in and have good internet.
Normal Flow:	<ol style="list-style-type: none"> 1. Login/Signup 2. Our Services 3. Click on Stock Future Prediction 4. Search for stock and have the output.
Exceptions:	<ol style="list-style-type: none"> 1. Server Down 2. Database Connectivity Issues
Priority:	High
Frequency of Use:	High

5 Software Testing Document

5.1 Introduction

5.1.1 System Overview

In a modern hasty world like ours, our project plays quite an important role in the daily life of all the users who do daily trading of shares in the market. Our website will help all the expert traders as well as the new traders who have just started trading, to simplify their desirable stocks in an orderly desirable manner with all the information in just one place. Stock market is one of the major fields that investors are dedicated to, thus stock market price trend prediction is always a hot topic for researchers from both financial and technical domains. Stock price movement is non-linear and complex. Several research works have been carried out to predict stock prices. Traditional approaches such as Linear Regression and Support Vector Regression were used but accuracy was not adequate. Financial time series prediction is known to be a notoriously difficult task due to the generally accepted, semi-strong form of market efficiency and the high level of noise. A more efficient and accurate approach was required for stock price prediction which was what Recurrent Neural Network and LSTM yields. News related to the corporate industries at one location will be an add on benefit for the clients. The clients can purchase the premium membership to access the future predictions of our model. They will be able to view the news related to stocks and will also be able to view comprehensive statistical data of the stocks that they have selected and would be able to get the gist of the opens and closes of the stock in the previous days/week/months.

5.1.2 Testing Approach

A test approach is the test strategy of the implementation of the project, it defines how testing should be carried out. There are two techniques of testing:

- Proactive Testing - An approach in which the test design process is began as early as possible in order to find and fix the errors/bugs before a new build is created.

- Reactive Testing - An approach in which the testing is started after the Coding process is over.
- System Testing: System Testing (ST) is a black box testing technique performed to evaluate the complete system's compliance against specified requirements. From an end-to-end perspective, the functionalities of the system are tested. The design and behavior of the system and also the expectations of the end user are tested.

Types:

- Performance Testing: test the speed, scalability, stability and reliability of the software product or application.
- Load Testing: behavior of a system or software product under extreme load.
- Stress Testing: robustness of the system under the varying loads.
- Scalability Testing: performance of a software application or system in terms of its capability to scale up or scale down the number of user request load.
- Performance Testing: Performance Testing is a testing process used for testing the speed, stability, response time, scalability, reliability and resource usage under particular workload. The main purpose is to identify and eliminate the performance bottlenecks in the application. It is a subset of performance engineering and also known as "Perf Testing".
 - Load testing - to understand the behaviour of the system under a specific load. measuring important business critical transactions and load on the database, application server, etc.
 - Stress testing - It is performed to find the maximum capacity of the system and also to determine how the system performs if the current load goes well above the expected maximum.
 - Endurance testing - to determine the system parameters under continuous expected load. During these tests the parameters such as memory utilization is monitored to detect memory leaks or other performance issues. The main aim is to discover the system's performance under sustained use.
 - Spike testing - performed by increasing the number of users suddenly by a very large amount and measuring the performance of the system. The main aim is to determine whether the system will be able to perform as it did earlier with the increased workload.
- Black Box Testing: Black Box Testing is a software testing method in which the functionalities of software applications are tested without having knowledge of internal code structure, implementation details and internal paths. Black Box Testing mainly focuses on input and output of software applications and it is entirely based on software requirements and specifications. It is also known as Behavioral Testing. Black box testing involves testing from an external or end-user type perspective. The "black box" in Black Box Testing symbolizes not being able to see the inner workings of the software so that only the end-user experience can be tested.
- White Box Testing: White Box Testing is software testing technique in which internal structure, design and coding of software are tested to verify flow of input-output and to improve design, usability and security. In white box testing, code is visible to testers so it is also called Clear box testing, Open box testing, Transparent box testing, Code-based testing and Glass box testing. White box testing in software engineering is based on the inner workings of an application and revolves around internal testing. The term "White Box" was used because of the see-through box concept. The clear box or White Box name symbolizes the ability to see through the software's outer shell (or "box") into its inner workings.
- Unit Testing: Individual units or components of a software are tested in Unit testing. The purpose is to validate that each unit of the code performs as expected. It is done during the development phase i.e. Coding phase of an application by the developers. With these tests we can isolate a section of code and verify its correctness.

- Integration Testing: Integration Testing is a level of software testing where individual units are combined and tested as a group. The purpose of this level of testing is to expose faults in the interaction between integrated units.

5.2 Test Plan

5.2.1 Features to be Tested

- User Interface
- Login and Sign-up Form Validation
- Successful user registration and login
- View different stocks and news on the homepage
- view different stock suggestions
- premium users can view the future predictions of each stock
- view the complete history of the stock in graph

5.2.2 Features not to be Tested

- Internet Connectivity
- Android Device Compatibility
- Desktop Compatibility

5.2.3 Testing Tools and Environment

A mobile phone with the following specifications:

- An active internet connection.
- Chrome or Firefox web browser
- Sufficient RAM to run chrome or any other browser

A workstation with the following specifications:

- Windows 8.1 or higher.
- RAM capacity of 3 GB or higher.
- Intel i3 or higher variant processor.
- An active internet connection.

Software Configurations:

- A browser supporting HTML, CSS and js.
- server on which the django backend will be running

5.3 Test Cases

Test Case ID	Purpose	Input	Expected Output	Actual Output	Result
1.1	Check whether pages are loading properly on browser	User opens the application on his browser	Pages open properly and display all content	All pages open proper properly and in required time	Pass
1.2	Check for user login and registration	user loads the login or registration page	Form loads correctly and user can enter data	Form loaded correctly and details can be entered	Pass
1.3	check user authentication	User fills invalid details and submits the form	message received invalid username or password	message received invalid username or password	Pass
1.4	check user authentication	User fills valid details and submits the form	user is sent to the home page	user is sent to the home page	Pass
1.5	check if user can access premium services	user log-in to the account and has purchased the premium services	user can access the premium services	user can access the premium services	Pass

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