



# Project Report

## SkyView Capital

**Course Code:** CSN-291

**Course Title:** Object Oriented Analysis and Design

**Group 1: Team Members:**

- **Aaditya Aren:**

- Enrollment No: 22114001
- Contact No: 9897678379
- Email: [aaditya\\_a@cs.iitr.ac.in](mailto:aaditya_a@cs.iitr.ac.in)
- Contribution: Aaditya is a dedicated machine learning developer who collaborates with Kunal to ensure the project's machine learning components are robust and accurate. Additionally, Aaditya plays a key role in the front-end design, where he works on creating user-friendly interfaces for the project. He leverages his expertise to ensure that the front end is not only visually appealing but also highly functional, providing an intuitive experience for users.

- **Alind Sharma:**

- Enrollment No: 22113013
- Contact No: 7303899554
- Email: [alind\\_s@cs.iitr.ac.in](mailto:alind_s@cs.iitr.ac.in)
- Contribution: Alind specializes in front-end development. His primary focus is on creating an intuitive and visually appealing user interface for the application. Alind designs the web pages, implements responsive design, and ensures a user-friendly experience. He is responsible for creating the graphical elements, user interactions, and the overall look and feel of the project.

- **Divyansh Jain:**

- Enrollment No: 22114032

- Contact No: 9818120262
- Email: [divyansh\\_j@cs.iitr.ac.in](mailto:divyansh_j@cs.iitr.ac.in)
- Contribution: Divyansh is responsible for the back-end development. His primary role is to build and maintain the server-side infrastructure, ensuring that data is processed efficiently and securely. Divyansh handles data storage, retrieval, and processing, as well as server management. He ensures the seamless functioning of the back-end systems that support the project.
- **Kunal Bansal:**
  - Enrollment No: 22115083
  - Contact No: 8608609030
  - Email: [kunal\\_b@cs.iitr.ac.in](mailto:kunal_b@cs.iitr.ac.in)
  - Contribution: Chief Structural Designer - Frontend Team. Created the structure of the frontend application using embeddedJS. Integrated the various components of the frontend. Coordinated the progress of the project at every point. Checked for the timely submission of documents. Also contributed to the video demo.
- **Ishaan Jain:**
  - Enrollment No: 22114039
  - Contact No: 8447691065
  - Email: [ishaan\\_j@cs.iitr.ac.in](mailto:ishaan_j@cs.iitr.ac.in)
  - Contribution: Ishaan's expertise lies in front-end development. He collaborates closely with Alind to enhance the user interface of the stock price prediction project. Ishaan's responsibilities include crafting engaging and interactive web pages, optimizing user experience, and ensuring the front-end components are responsive and user centric. He focuses on the presentation layer of the application.

### **Equal Contributions:**

- Held timely meetings
- Prepared documents and assignments.
- Worked on the presentation

### **Table of Contents**

1. Abstract
2. Introduction
3. Project Overview
4. Key Principles
5. UML Diagram
6. Features Introduced
7. Applicability and Potential Users
8. Software Development Life Cycle (SDLC) Used

9.	Methodology Used
10.	Timeline
11.	Overall Requirements
12.	User Interface
13.	Deep Learning Neural Networks
14.	Technical Analysis Tools
15.	Data Collection & Preprocessing
16.	Model Training & Evaluation
17.	Challenges Faced
18.	Future Developments
19.	Conclusion
20.	References

## **1. Abstract**

The "Stock Price Prediction Using Deep Learning Neural Networks" project focuses on the development of a robust system for forecasting stock prices accurately for specific future dates. This report provides a comprehensive overview of the project's key components and achievements, aiming to predict stock prices based on historical market data and deep learning technology.

## **2. Introduction**

The financial market's ever-increasing complexity necessitates innovative approaches to predict stock prices for effective decision-making. Our project takes a forward-looking stance, leveraging deep learning neural networks to predict stock prices for future dates with a high degree of accuracy.

## **3. Project Overview**

The primary objective of this project is to develop a system that predicts stock prices for future dates using advanced deep learning models, rich historical datasets, and meticulous data preprocessing techniques. The application of deep learning technologies ensures that our predictions are more than just mere estimations but well-informed insights.

## **4. Key Principles**

The project's core principles are as follows:

- **Deep Learning Neural Networks**

Our project harnesses the capabilities of deep learning models to analyse historical stock data and predict future stock prices. These neural networks have proven to be instrumental in capturing intricate patterns and trends within the stock market.

- **Sentiment Analysis**

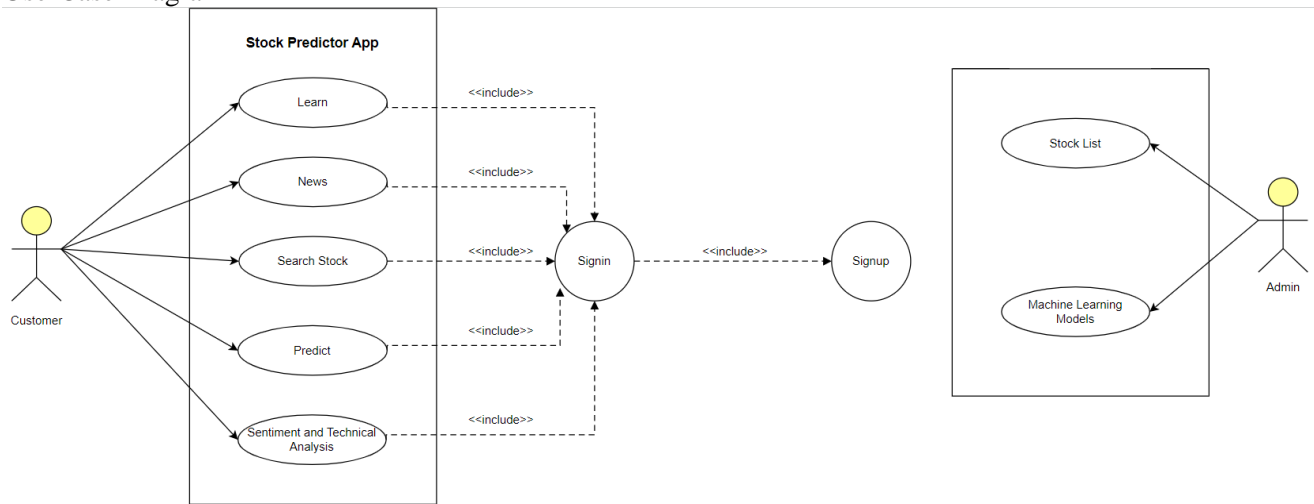
We employ sentiment analysis techniques to evaluate market sentiment by analysing news articles, social media content, and financial reports. The sentiment of traders and investors can significantly impact market movements, and our sentiment analysis tools aim to decode these sentiments.

- **Technical Analysis**

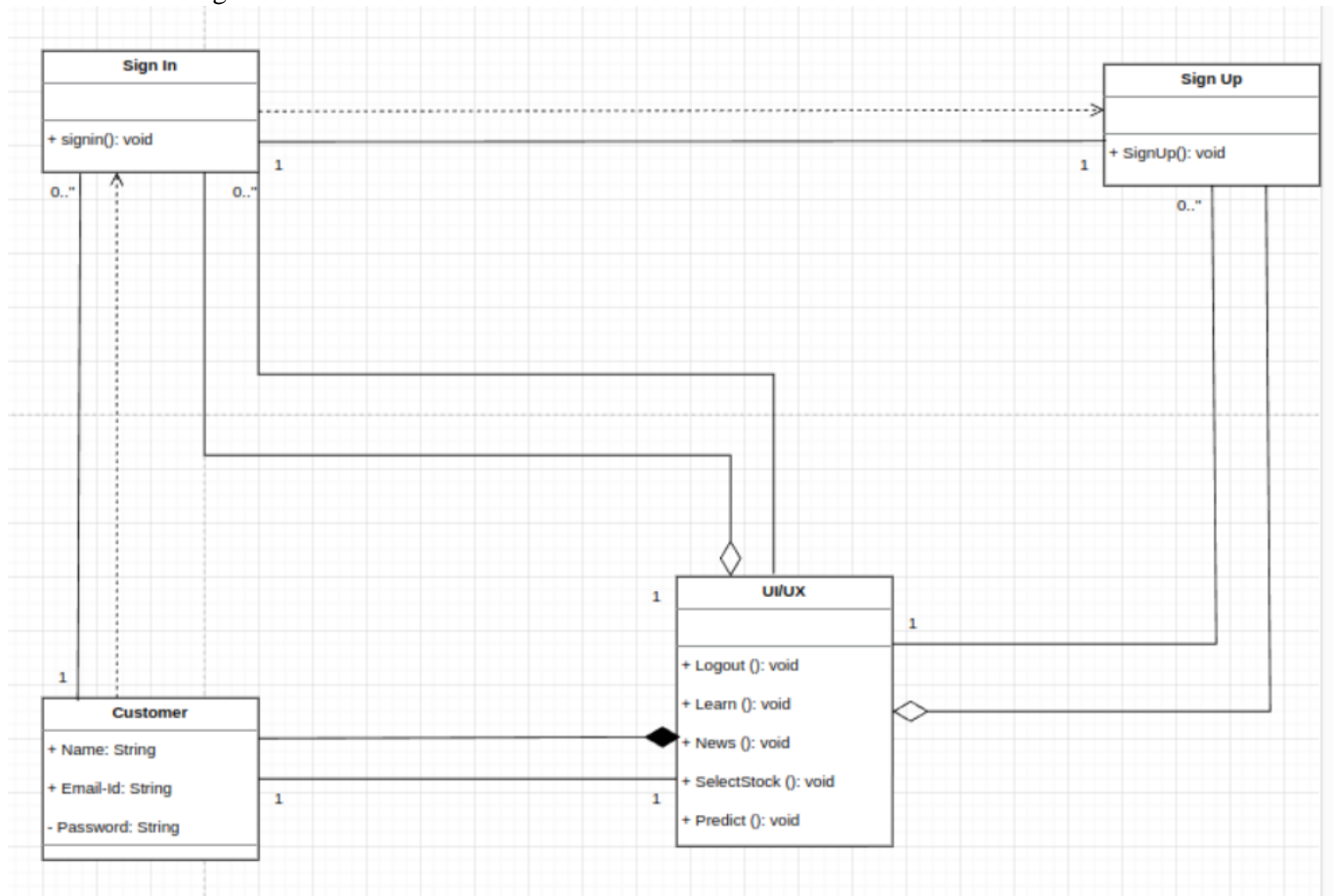
We provide a suite of technical analysis tools to help traders identify trends, support and resistance levels, and other critical indicators. The art of technical analysis has been refined over decades, and our project brings these proven tools to traders' fingertips.

## 5. UML Diagram

Use-Case Diagram

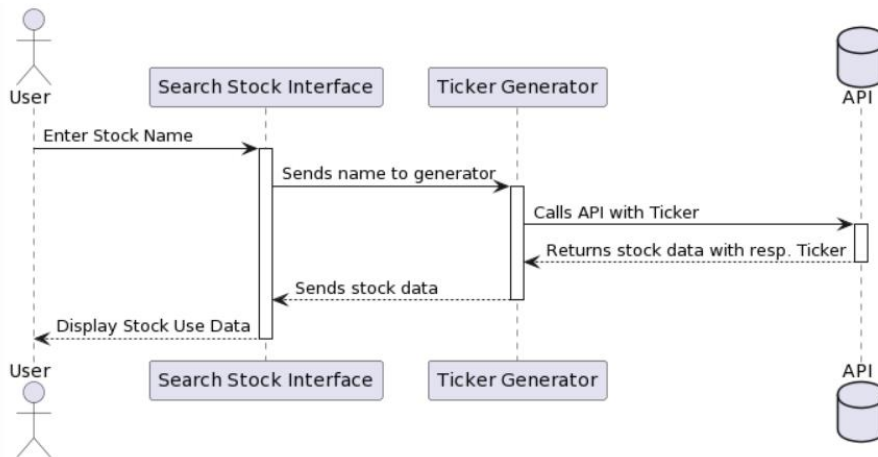


Class Diagram

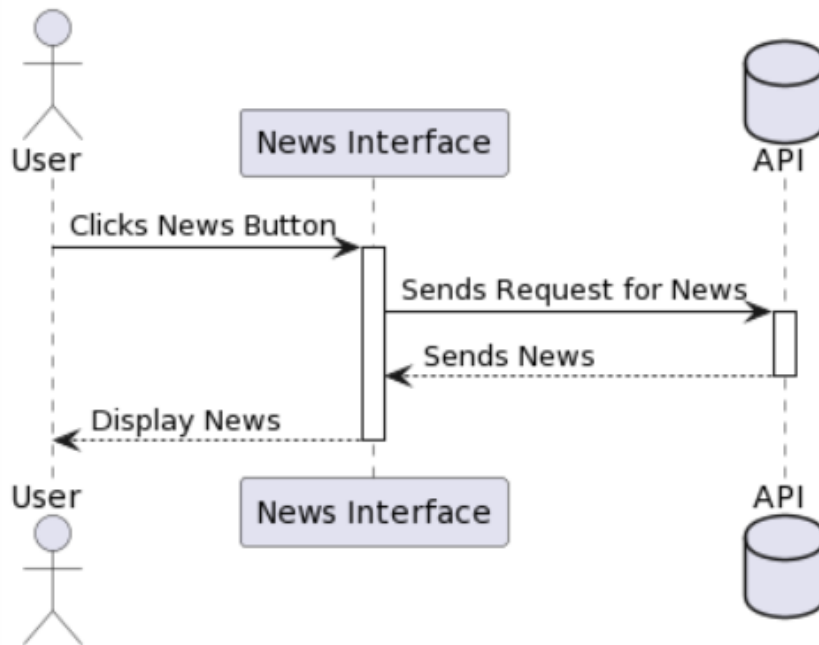


Sequence Diagrams

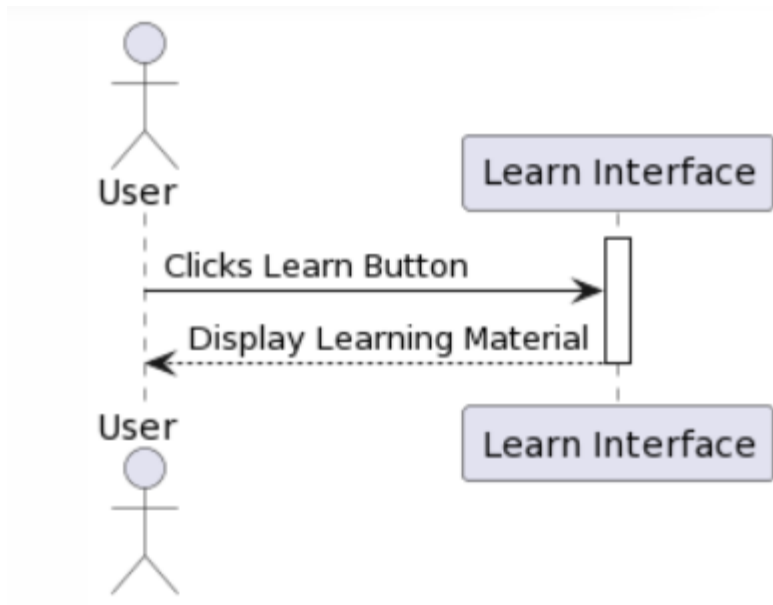
### 1. Search Stock



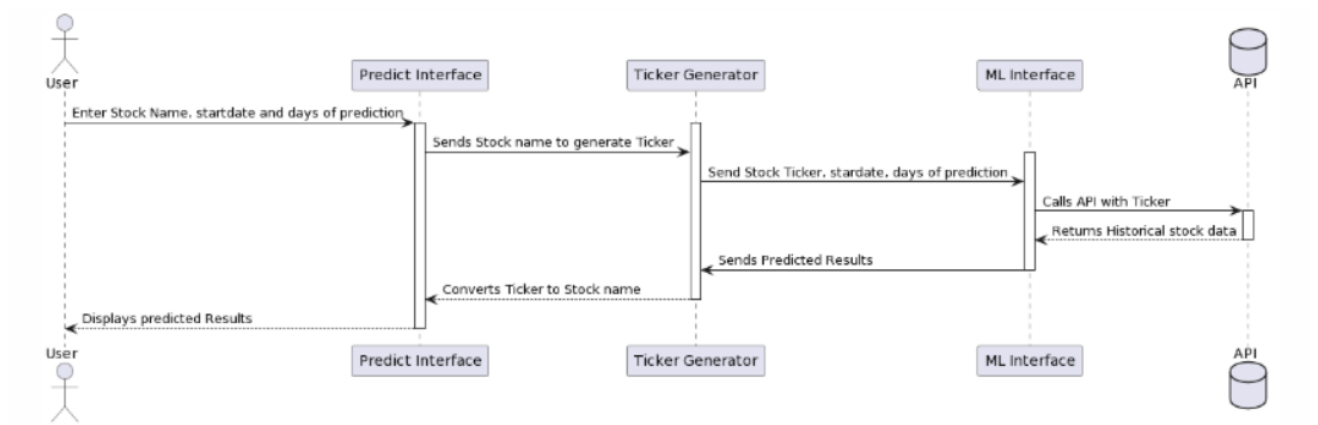
### 2. News



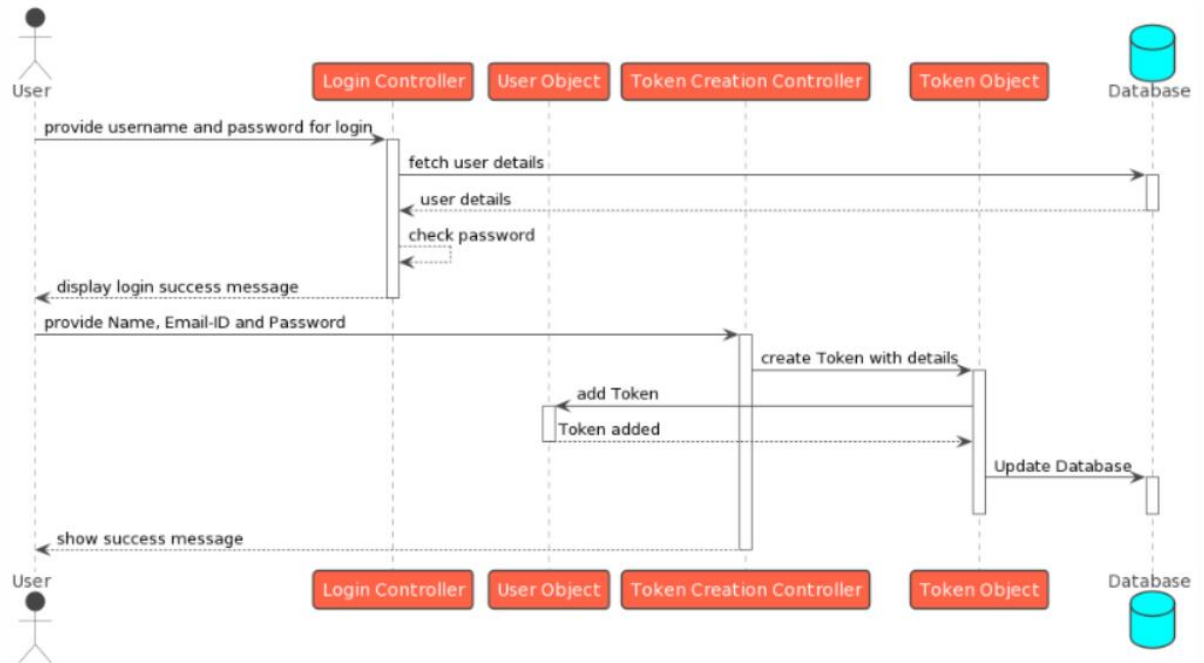
### 3. Learn



#### 4. Predict



#### 5. Signin and Singup



## 6. Features Introduced

Our project introduces the following features

### 6.1. Stock Price Prediction

Our deep learning models use historical stock data, including price, volume, and other market indicators, to predict future stock prices with accuracy. This feature is the heartbeat of our project, offering traders a glimpse into the future of stock prices.

### 6.2. Sentiment Analysis

We perform sentiment analysis by scraping news articles, tweets, and financial reports, providing insight into market sentiment and its potential impact on stock prices. Understanding market sentiment is a cornerstone of successful trading.

### 6.3. Technical Analysis Tools

Our project offers a diverse set of technical analysis tools, including trend analysis, moving averages, and relative strength indicators, helping traders make well-informed decisions. These tools cater to the analytical needs of traders, offering valuable insights into stock movements.

## 7. Applicability and Potential Users

Our project caters to a wide audience, including:

- **Individual traders looking for accurate stock predictions:** For those who rely on data-driven strategies to navigate the stock market.
- **Financial analysts seeking market sentiment insights:** Professionals who understand the importance of market sentiment in stock trading and investment decisions.
- **Institutional investors requiring technical analysis tools for portfolio management:** Organizations that need sophisticated tools to manage large portfolios.

This section clarifies the project's potential user base and its broad applicability in the world of finance and stock trading.

## 8. Software Development Life Cycle (SDLC) Used

The iterative development process was chosen to ensure product quality. It allowed for continuous refinement

and feature updates. This selection of SDLC methodology underlines the importance of flexibility and adaptation in the project development cycle.

## **9. Methodology Used**

The development process followed a sequential approach:

### **9.1. Research and Planning**

In this phase, we finalized project features and conducted extensive research on deep learning models, sentiment analysis tools, and technical analysis techniques. This research phase is the foundation of the entire project, ensuring that our methods are built on a solid understanding of the technologies and concepts involved.

### **9.2. Design and UI**

The user interface was designed to be user-friendly, with a focus on providing a seamless user experience. This design phase acknowledges the role of user experience in the adoption and success of the platform.

### **9.3. Development**

The development phase involved implementing the designed features and integrating the backend with the frontend. This implementation phase is where the project starts to take shape, turning ideas into a functional system.

### **9.4. Testing and Quality Assurance**

Extensive testing was conducted to identify and rectify bugs, glitches, and design flaws. The testing and quality assurance phase is where the project is fine-tuned, ensuring that it meets the highest standards of quality and reliability.

This methodology provides a structured approach to project development, reflecting the importance of each phase in achieving the final product's success.

## **10. Timeline**

### **Phase 1: Conceptualization**

- Define project goals and requirements.
- Analyse the competitive landscape.

### **Phase 2: Research and Planning**

- Finalize primary features.
- Conduct in-depth research on deep learning models and sentiment analysis techniques.

### **Phase 3: Design and UI**

- Design the user interface for maximum usability.
- Finalize the project's overall look and feel.

### **Phase 4: Development**

- Implement the design and frontend development.
- Integrate backend and frontend components.

### **Phase 5: Testing and Quality Assurance**

- Conduct extensive testing.
- Identify and address bugs and design flaws.

This timeline provides insight into the project's development journey, emphasizing the structured approach adopted throughout the process.

## **11. Overall Requirements**

The project required the utilization of the following technologies, programming languages, and tools:

- **Python:** The primary programming language for data analysis, deep learning, and system integration.
- **Deep Learning Frameworks (TensorFlow, PyTorch, Keras):** These frameworks are instrumental in building and training deep learning models.
- **Sentiment Analysis Tools (BERT):** Natural Language Processing tools that are critical in evaluating sentiment in textual data.
- **Data Processing Libraries (NumPy, Pandas):** A library of for crunching and manipulating data in



easy and time efficient way.

- **Data Scraping and API Integration (yfinance):** The ability to collect data from various sources and integrate it into the platform.
- **Plotting Tools (Canvas):** Tools for creating graphs rendered on the website

These requirements underscore the technological stack utilized to bring this project to life.

## 12. User Interface

Our user interface components include:

- **Dashboard: A user-friendly dashboard for easy navigation.**
- **Stock Price Prediction: A prediction tool that provides insights into future stock prices.**
- **Sentiment Analysis: A sentiment analysis dashboard displaying market emotions.**

These user interface components are designed with the user's experience in mind, ensuring that traders can access the platform's key features effortlessly.

### Website/Application Overview:

The website/application offers a range of features and resources related to finance, stocks, and machine learning. It aims to provide users with tools and information to make informed decisions in the financial market.

#### User Authentication:

1. **Sign In and Sign Up:** Upon visiting the site, users are presented with options to either sign in or sign up. They can create an account or log in to access the platform's services.

#### Main Page:

After authentication, users are directed to the main page, which serves as the central hub for accessing various features.

#### Main Buttons:

1. **Learn:** When users click the "Learn" button, they are redirected to a dedicated page where they can access educational resources related to stocks and finance. This section provides articles, videos, and other materials to help users gain knowledge and make informed decisions.
2. **News:** Clicking the "News" button redirects users to a page that offers the latest news and updates from the finance industry, as well as information related to machine learning in finance.
3. **Search Stock:** The "Search Stock" button allows users to search for specific stocks and companies. Users can access detailed information about various stocks, including historical data, performance, and other relevant metrics.
4. **Predict:** By clicking the "Predict" button, users can access stock prediction tools. They can select a particular stock and set a period to receive predictions or forecasts about its future performance.
5. **Sentimental and Technical Analysis:** This button leads users to a section where they can perform sentiment analysis and technical analysis on stocks. They can use various indicators and tools to evaluate stock trends and make data-driven decisions.

#### Use Cases:

1. **Learn (Educational Resources):**
  - Access to educational content for stock market and finance-related topics.
  - Resources may include articles, videos, tutorials, and guides.
2. **News (Finance Industry Updates):**
  - Access to the latest news and updates from the finance industry.
  - Provides insights into market trends, financial news, and developments.
3. **Search Stock (Stock Information):**
  - Search for specific stocks and companies.
  - Access detailed stock information, historical data, and performance metrics.
4. **Predict (Stock Prediction):**
  - Receive stock predictions based on user-selected stocks and periods.
  - Helps users make informed investment decisions.
5. **Sentimental and Technical Analysis:**
  - Tools for sentiment analysis and technical analysis of stocks.

- Allows users to analyse trends and indicators to make informed trading decisions.

#### **User Data Handling:**

The system stores user data, including authentication details, preferences, and interaction history to provide personalized experiences and recommendations.

#### **Additional Features:**

The website/application may also offer additional features, such as user profiles, notifications, and customizable settings to enhance the user experience.

This report outlines the key features and use cases of the website/application, highlighting its role in providing financial and stock-related resources and tools to users.

### **13. Deep Learning Neural Networks**

The deep learning models used in the project include:

- **LSTM Networks: Long Short-Term Memory networks for sequence prediction.**
- **BERT: Natural Language Processing model for evaluating sentiment of news.**

These models are the heart of our stock price prediction system. LSTM networks are particularly suited for sequential data analysis, which makes them ideal for stock price prediction. CNN models are used for pattern recognition and are valuable in identifying trends and subtle cues in market data. Autoencoders aid in feature extraction, reducing data dimensionality and focusing on essential information for prediction.

### **14. Technical Analysis Tools**

Our technical analysis tools comprise:

- **Volume: Analysing strength of stock movement and trends.**
  - **MACD Line and Signal Line: Analysing when trend is in full motion and optimal entry and exit points.**
- Each of these tools plays a specific role in helping traders make informed decisions. Moving averages smooth out price data, making it easier to identify trends. The RSI helps in assessing the momentum of a stock's price, and support and resistance analysis is crucial for understanding potential price reversal points.

### **15. Data Collection & Preprocessing**

Data for our project is sourced from:

- **Financial News Websites: For news articles and reports.**
- **Stock Market APIs: For real-time and historical stock data.**

The success of our project relies heavily on the quality and depth of the datasets used. These datasets include historical stock prices, trading volumes, and relevant market indicators. Our data sources encompass well-recognized financial platforms, APIs, and public financial reports, ensuring a wealth of accurate and up-to-date information.

-**Data Preprocessing:** Data is cleaned and converted to appropriate dimensions to be feed into data.

### **16. Model Training & Evaluation**

Model training includes:

- **Data Splitting: Separating data into training, validation, and test sets.**
- **Hyperparameter Tuning: Optimizing model parameters for accuracy.**
- **Mean Squared Error (MSE): Measuring prediction accuracy.**
- **Accuracy Metrics: Assessing sentiment analysis performance.**

### **17. Challenges Faced**

Challenges encountered during the project:

- **Data Availability: Obtaining reliable data sources.**

- **Model Complexity: Balancing model complexity for accurate predictions.**
- **Overfitting: Addressing overfitting issues during training.**

Addressing data availability issues and maintaining a balance between model complexity and simplicity were ongoing challenges. Additionally, overfitting, a common concern in machine learning, required attention to ensure models could make accurate predictions on unseen data.

## 18. Future Developments

- **Real-time Data: Incorporating real-time data for up-to-the-minute predictions.**

Real-time data integration is essential to keep traders and investors informed of the latest market movements. By incorporating real-time data, users will have access to the most current information for more accurate predictions.

- **User Customization: Allowing users to customize sentiment and technical analysis parameters.**

Empowering users to customize the sentiment and technical analysis parameters will enhance their ability to tailor the system to their specific needs. It will make the platform more versatile and adaptable to individual trading strategies.

- **Mobile Application: Developing a mobile app for on-the-go trading and analysis.**

In today's fast-paced financial markets, traders often need access to their tools and predictions while on the move. The development of a mobile application will provide users with the flexibility to trade and analyse stocks from their smartphones, making it more convenient and accessible.

## 19. Conclusion

"Skyview Capital" is not just a project; it is a powerful solution for traders and investors. By incorporating deep learning models, sentiment analysis, and technical analysis tools, we have created a robust platform that empowers users to make data-driven decisions. The accuracy of our stock predictions and the insights gained from sentiment analysis and technical analysis make this a significant change in the world of stock trading.

## 20. References

We acknowledge the contributions and resources of various institutions, platforms, and libraries that have been instrumental in the success of our project. Here is a list of references:

1. Yahoo Finance: <https://finance.yahoo.com>
2. TensorFlow: <https://www.tensorflow.org>
3. PyTorch: <https://pytorch.org>

This comprehensive list represents the extensive resources and tools we utilized to develop our stock prediction platform.



