

REAL-TIME STOCK MARKET PRICE PREDICTION USING MACHINE LEARNING

Ishrath Nousheen , Y. Roshini , J. Srinija , P. Sruthi

1 Associate Professor, Department of Information Technology, Bhoj Reddy Engineering College for Women

2,3,4 B,tech students, Department of *Information Technology*, *Bhoj Reddy Engineering College for Women*

ABSTRACT

Stock market prediction plays a vital role in financial decision-making. Due to the highly volatile and nonlinear behavior of stock prices, traditional prediction models often fail to provide accurate results in real-time environments. This paper presents a real-time stock market prediction system using Long Short-Term Memory (LSTM), a deep learning technique capable of capturing temporal dependencies in sequential data. The proposed system integrates historical and live stock data using financial APIs, processes the data, and generates short-term price predictions. A user-friendly dashboard is developed to visualize actual and predicted trends dynamically. The system aims to assist traders and analysts by providing accurate, real-time insights for better decision-making.

KEYWORDS

Stock Market Prediction, LSTM, Deep Learning, Time Series Analysis, Real-Time Data, Machine Learning, Financial Analytics, Streamlit Dashboard.

OBJECTIVE

The main objective of this project is to develop a real-time stock price prediction system using LSTM that can analyze both historical and live data to provide accurate short-term forecasts. The system also aims to offer a user-friendly interface for better visualization and decision-making.

EXISTING SYSTEM

Existing stock prediction systems mainly rely on traditional machine learning models trained on historical data. Techniques such as **ARIMA, SVM, and CEEMDAN** are commonly used. However, these systems have several limitations:

- Lack of real-time data integration
- Inability to capture long-term dependencies
- Static predictions without updates
- Limited visualization and user interaction
- Designed mainly for research rather than practical usage

PROPOSEDSYSTEM

. The proposed system overcomes the limitations of existing methods by integrating real-time data processing with deep learning. Historical and live stock data are collected using APIs such as Yahoo Finance and Alpha Vantage. The data is preprocessed and converted into a time-series format.

An LSTM model is used to learn patterns and predict future stock prices. The system continuously updates predictions using real-time inputs. A Streamlit-based dashboard is developed to display interactive graphs and trends, making the system user-friendly and practical.

NEED TO STUDEY .

Stock markets are highly dynamic and influenced by multiple factors, making prediction a challenging task. Traditional models fail to adapt to real-time changes, leading to inaccurate predictions. There is a need for intelligent systems that can process live data and identify complex patterns. This study focuses on using deep learning techniques to improve prediction accuracy and provide real-time insights.

Functional Requirements

User Authentication – Provides secure login access to authorized users

Real-time Data Fetching – Collects live stock data using APIs

Data Preprocessing – Cleans and prepares data for model training

Feature Engineering – Extracts important features for better prediction

Price Prediction – Uses LSTM model for forecasting stock prices

Visualization – Displays predictions through charts and graphs

Alert System – Sends notifications for important price changes

SYSTEM REQUIREMENTS

1. Hardware Requirements

- **Processor:** Minimum Intel i5 or equivalent (Recommended: Intel i7 / AMD Ryzen 7 for faster model training)
- **RAM:** Minimum 8 GB (Recommended: 16 GB or higher for handling large datasets)
- **Storage:** At least 256 GB SSD (Recommended: 512 GB or higher for faster data access)
- **GPU (Optional):** NVIDIA GPU (for deep learning models and faster computation)

Hardware Requirements

- **Processor:** Intel i5 or higher
- **RAM:** Minimum 16 GB
- **Storage:** Minimum 1 TB Hard Disk

Non-Functional Requirements

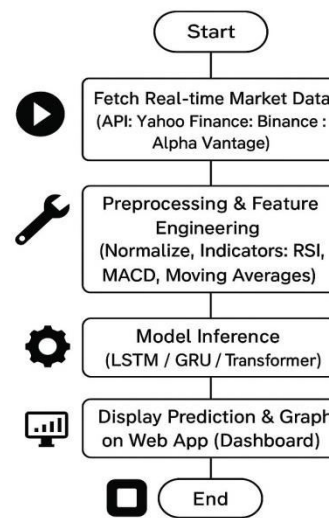
The proposed stock market prediction system must satisfy several non-functional requirements to ensure its effectiveness, reliability, and user satisfaction. **Performance** is a critical aspect, as the system should be capable of processing large volumes of historical and real-time stock data with minimal latency, ensuring quick predictions and smooth dashboard updates. **Accuracy** is equally important, where the LSTM model should consistently provide precise and reliable forecasts by minimizing prediction errors and adapting to changing market conditions.

The system must also ensure strong **security** by implementing proper authentication and authorization mechanisms to protect user data and prevent unauthorized access. In addition, **scalability** is required so that the system can handle increasing numbers of users, large datasets, and multiple stock predictions without performance degradation. **Usability** plays a vital role in making the system accessible to both technical and non-technical users, with a simple, intuitive, and interactive interface.

Furthermore, the system should maintain high **reliability**, ensuring continuous operation with minimal downtime, even when handling real-time data streams. Proper error handling

and backup mechanisms should be implemented to avoid data loss or system failure. Overall, these non-functional requirements ensure that the system is efficient, secure, user-friendly, and capable of supporting real-world financial applications.

Workflow



MODULE DESCRIPTION

User Authentication Module

The proposed system is organized into several key modules to ensure smooth functionality and better user interaction. The first module is the **User Authentication Module**, which provides secure access to the system. This module allows users to register and log in using their credentials, ensuring that only authorized users can access stock predictions and data. It also helps in maintaining user privacy and protecting sensitive information

through proper validation and security mechanisms.

Stock Selection Module

The second module is the **Stock Selection Module**, which enables users to choose the specific stock they want to analyze. Users can search for stocks based on company names or stock symbols, making the system flexible and user-friendly. This module acts as a bridge between the user and the data, ensuring that the selected stock information is accurately fetched from the database or APIs for further processing.

Stock Data Visualization Module

The **Stock Data Visualization Module** plays an important role in presenting the stock information in an understandable format. It displays historical and real-time stock data using interactive graphs and charts. This helps users easily analyze trends, patterns, and price movements over time. The visualization improves decision-making by providing a clear and graphical representation of complex data.

Price Prediction Module

Price Prediction Module is the core component of the system, where the LSTM model is used to predict future stock prices. This module processes the selected stock data, applies the trained model, and generates accurate short-term predictions. The predicted values are then displayed alongside actual data to help users compare

and understand market trends. Together, these modules ensure that the system is secure, interactive, and capable of delivering real-time stock market insights effectively.

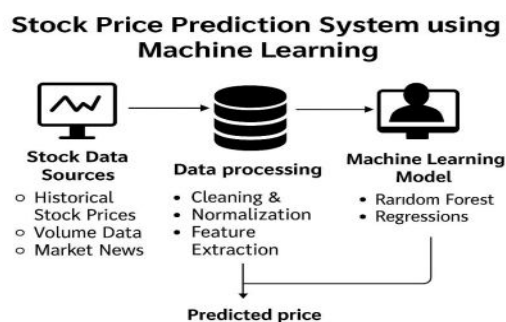
CHALLENGES&RISKS

Despite the advantages of the proposed system, several challenges and risks must be considered. One of the primary challenges is the **high volatility of the stock market**, which makes accurate prediction difficult, as prices are influenced by unpredictable factors such as global events, economic changes, and investor sentiment. Another major challenge is the **dependency on real-time APIs**, where any delay, failure, or inaccuracy in data fetching can directly impact the prediction results.

The system also faces **model-related risks**, such as overfitting and underfitting. Overfitting occurs when the model performs well on training data but fails to generalize to new data, while underfitting results in poor learning of patterns. Additionally, **data quality issues**, including missing values, noise, or incorrect data, can affect the overall performance of the model.

From a technical perspective, **computational complexity** is another concern, as deep learning models like LSTM require significant processing power and memory. Furthermore, there are **security risks** associated with handling financial data and user information, which require proper authentication and data protection mechanisms. Addressing these challenges is essential to ensure the reliability and effectiveness of the system.

SYSTEM ARCHITECTURE



FUTURE ENHANCEMENT

The proposed system can be further enhanced in several ways to improve its performance and usability. One important enhancement is the integration of **news sentiment analysis**, where real-time news and social media data can be analyzed to understand market sentiment and improve prediction accuracy. Additionally, advanced deep learning models such as **Transformer-based architectures** or hybrid models combining LSTM with other techniques can be implemented to achieve better results.

The system can also be expanded to support **multi-stock prediction**, allowing users to analyze and predict multiple stocks simultaneously. Developing a **mobile application** for the system would improve accessibility and enable users to monitor stock predictions on the go. Another enhancement is the implementation of an **intelligent alert system** that provides personalized notifications and AI-based recommendations to users based on market trends.

Further improvements can include integration with **live trading platforms**, enabling automated or semi-automated trading decisions. Enhancing the user interface with more advanced visualizations and analytics tools can also improve user experience. These future enhancements will make the system more robust, intelligent, and practical for real-world financial applications.

Conclusion

This paper presents a real-time stock market prediction system using LSTM, which effectively captures time-based dependencies in stock data. By integrating live data and interactive visualization, the system provides accurate and timely predictions. The proposed solution improves upon traditional methods and offers practical benefits for traders, analysts, and researchers. Future improvements can further enhance the system's performance and usability..

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