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Real-Time Stock Price Prediction and Portfolio Optimization

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Abstract: The AI-Powered Stock Market Insight Application is an intelligent Android-based solution developed to help users understand stock market behavior, technical indicators, and short-term price movements more effectively. Although digital trading platforms have made stock market access easier, many retail investors still struggle to analyze live market data, interpret candlestick charts, and make informed trading decisions due to volatility, data complexity, and limited expert support. To address this issue, the proposed system combines real-time stock data processing, machine learning-based short-term prediction, interactive chart visualization, and AI-assisted guidance within a single mobile application. The application is developed using Java/XML for the frontend and Firebase Realtime Database for secure real-time synchronization and storage.

It offers features such as live stock updates, trend analysis, candlestick chart interpretation, forecasting support, and an NLP-based chatbot that answers user queries and explains trading concepts in a simple and user-friendly manner. By integrating financial analytics with mobile accessibility, the system reduces the gap between complex market data and practical user understanding. The application aims to support both beginner and intermediate investors in making smarter, data-driven, and more confident investment decisions.

Keywords- AI-Powered Stock Market Insight, Stock Market Prediction, Machine Learning, Android Application, Firebase Real-time Database, Candlestick Chart Analysis, NLP Chatbot, Real-Time Data Analytics, Financial Forecasting, Technical Indicators

I. INTRODUCTION

In recent years, the stock market has become more accessible to common people due to the rapid growth of digital trading platforms, mobile finance applications, and online investment services. With the help of smartphones and internet connectivity, users can now monitor stock prices, track market activity, and make investment decisions anytime and from anywhere. This digital transformation has increased retail participation in stock trading and encouraged more people to explore wealth creation through equity investments.[1] However, easy access to stock market platforms does not necessarily mean that users can understand or analyze the market correctly.

The stock market is highly dynamic and influenced by many factors such as company performance, economic conditions, political events, global news, investor sentiment, and demand-supply fluctuations. Because of this, stock prices change continuously, making it difficult for ordinary users to identify trends, understand technical indicators, or predict short-term price movement accurately. Many retail investors do not have enough knowledge to interpret candlestick charts, moving averages, RSI, MACD, and other market signals. [2]As a result, they often make decisions based on guesswork, emotions, incomplete information, or unreliable advice, which can lead to losses.

Most traditional stock market applications mainly provide basic services such as live price display, simple charts, watchlists, and portfolio tracking. While these features are useful, they do not offer intelligent support for deeper market understanding. Modern investors need more than raw data. They need a smart system that can process financial information, explain market patterns, provide predictive insights, and guide them in a simple and understandable way. This is where artificial intelligence and machine learning become highly valuable in financial applications.[3]

The proposed AI-Powered Stock Market Insight Application is developed as an intelligent Android-based solution to bridge the gap between complex market analytics and user-friendly mobile technology. [4] The application combines real-time stock data processing, machine learning-based short-term forecasting, interactive chart visualization, and an NLP-based chatbot within a single platform. It is designed using Java/XML for the Android frontend and Firebase Realtime Database for backend synchronization and real-time data handling. The system helps users analyse stock performance, understand candlestick chart behaviour, identify technical trends, and receive conversational guidance for trading-related queries. [5]

This application is especially useful for beginner and intermediate investors who need practical support in understanding live market conditions without relying entirely on experts. By integrating chart analytics, forecasting models, and AI-assisted explanations, the system makes stock market analysis easier, faster, and more accessible.[6] The main objective of the project is to provide an intelligent trading support platform that improves financial understanding, reduces confusion, and helps users make smarter and more confident investment decisions.

II. LITERATURE REVIEW

[1] Sharma, Y., Kumar, A., Dubey, V., and Rai, V. (2023) in their paper **"Stock Price Prediction Using LSTM"** published in the **2023 14th International Conference on Computing Communication and Networking Technologies (ICCCNT)** found that the LSTM model can predict stock prices effectively using error measures such as RMSE and MAPE, showing that deep learning is useful for capturing stock-price patterns from historical data. This paper is relevant because it supports the use of LSTM-style forecasting in stock analysis systems.

[2] Khanpara, P., Kadam, R., Lavingia, K., and Patel, S. (2023) in their paper **"Stock Trend Prediction: A Comparative Study using Different Approaches"** published in the **2023 5th International Conference on Smart Systems and Inventive Technology (ICSSIT)** found that comparative modeling helps identify which prediction approach performs better for stock trend estimation, and their work highlighted the usefulness of LSTM-based methods for practical forecasting tasks. This paper is useful because your app also aims to provide short-term intelligent trend support rather than only showing raw prices.

[3] Vohra, S. and Savaridassan, P. (2023) in their paper **"Stock Price Trend Analysis and Prediction of Closing Price Using LSTM"** published in the **2023 International Conference on Computer Communication and Informatics (ICCCI)** found that LSTM can be effectively applied to analyze stock trends and estimate future closing prices with better sequence learning ability than conventional methods. This work is closely related to your project because it supports the use of mobile-friendly forecasting modules for helping users understand future movement.

[4] Jadhav, O. S., Dhokare, S. P., Mote, S., Nistane, P., and Ganjewar, P. (2024) in their paper **"Estimation of Market Price through LSTM Model"** published in a **2024 IEEE International Conference on Computing...** found that LSTM-based market-price estimation can significantly improve stock prediction methodology and assist investors in more informed decision-making. This paper supports the forecasting part of your application, especially where predictive outputs are shown in a simple user-facing way.

[5] Mozaffari, L. and Zhang, J. (2024) in their paper **"Predictive Modeling of Stock Prices Using Transformer Model"** presented at the **2024 9th International Conference on Machine Learning Technologies (ICMLT 2024)** found that the Transformer model outperformed LSTM and Prophet in their stock closing-price prediction experiments. This is important for your system because it shows that newer attention-based models can produce stronger forecasting results than older sequence models in some stock-market cases.

[6] Sikarwar, S. S., Jaswal, S., Sharma, R., Ganguli, R., and Mahawar, M. (2024) in their paper **"Stock Price Prediction Using Transformers"** presented at the **2024 4th International Conference on Advancement in Electronics & Communication Engineering (AECE)** found that Transformer-based modeling can capture long-term dependencies and complex financial patterns effectively, making it suitable for real-time stock prediction tasks. This paper is highly relevant because your app can benefit from advanced trend-detection logic beyond basic chart reading.

[7] Ho, R. and Hung, K. (2024) in their paper **"CEEMD-based Multivariate Financial Time Series Forecasting using a Temporal Fusion Transformer"** published in the **2024 IEEE 14th Symposium on Computer Applications and Industrial Electronics (ISCAIE 2024)** found that combining CEEMD decomposition with a Temporal Fusion Transformer improves multivariate financial forecasting and can provide better insights into time-series behavior. This is valuable for your project because stock data is multivariate by nature, involving open, close, high, low, volume, and indicator-based features.

[8] Alam, K. and Ahmed, T. (2024) in their paper **"Enhancing Stock Market Prediction: A Robust LSTM-DNN Model Analysis on 26 Real-Life Datasets"** published in **IEEE Access** found that a hybrid LSTM-DNN architecture produced strong performance across a large number of real-world datasets, showing that hybrid deep-learning models can improve robustness and generalization in stock prediction. This is directly useful for your application because it supports combining multiple AI layers for better reliability.

[9] Chen, Q. and Kawashima, H. (2024) in their paper **"Stock Price Prediction Using LLM-Based Sentiment Analysis"** presented at the **2024 IEEE International Conference on Big Data (BigData 2024)** found that large language model based sentiment extraction from financial news can improve stock prediction by adding textual market context beyond numerical price history alone. This paper is highly important for your project because your proposed system includes an NLP-based chatbot and AI guidance, making sentiment-aware analysis a strong extension for smarter stock insights.

[10] Rodrigues, G. N., Mir, M. N. H., Bhuiyan, M. S. M., Al Rafi, M., Fuad, K. M. N. R., and Islam, M. S. (2024) in their paper **"MiniBert24: A Lightweight Transformer-Based Model for Stock Market Movement Prediction"** presented at the **2024 IEEE 3rd International Conference on Robotics, Automation, Artificial-Intelligence and Internet-of-Things (RAAICON)** found that a lightweight transformer architecture using financial news and past stock prices can improve movement prediction while staying computationally efficient. This paper is especially relevant for mobile and app-based systems because lightweight models are more practical for fast and scalable intelligent finance applications.

III. METHODOLOGY

The AI-Powered Stock Market Insight Application is developed using a step-by-step approach to provide real-time stock analysis, prediction, chart visualization, and AI-based guidance. The system is built using Java/XML for Android development and Firebase Realtime Database for real-time data storage and synchronization. First, system requirements are identified based on the problems faced by retail investors in understanding market trends and technical indicators. Then, the application structure is designed with modules such as live stock data, prediction engine, chart analysis, and chatbot support.

Stock data is collected and processed for analysis, after which real-time updates are integrated into the app. Machine learning techniques are used to predict short-term stock trends, while candlestick charts help users understand market movements visually. An NLP-based chatbot is also included to answer user queries and explain stock-related concepts in simple language. Finally, the complete application is tested to ensure proper performance, accuracy, and user-friendly operation.

1. Requirement Analysis
In this step, the main problems faced by users are identified, such as difficulty in understanding stock trends, charts, and technical indicators. Based on this, the system requirements are defined.

2. System Design
The overall structure of the application is planned by dividing it into modules like live stock data, prediction, chart visualization, chatbot, and Firebase backend.

3. Stock Data Collection and Processing
Stock-related data such as price, volume, and trend information is collected and arranged in a proper format so it can be used for analysis and prediction.

4. Real-Time Data Integration
Live stock market data is connected to the application so that users can view updated stock information instantly. This makes the app useful for current market analysis.

5. Machine Learning-Based Prediction
In this step, machine learning is used to study past stock behavior and predict short-term market trends. This gives users intelligent forecasting support.

6. Chart Visualization
Candlestick charts and other visual tools are used to display stock movements clearly. This helps users understand trends and market patterns more easily.

7. NLP Chatbot Integration
An AI chatbot is added to answer user questions related to stocks, indicators, and trading concepts in simple language. This improves user understanding and support.

8. Android App Development
The full application is developed using Java/XML, with proper screens and features for stock viewing, prediction, charts, and chatbot interaction.

9. Firebase Backend Implementation
Firebase Realtime Database is used to store and sync stock-related data, ensuring that the app works smoothly with real-time updates.

10. Testing and Evaluation
Finally, the application is tested to check whether all features work correctly, the predictions are meaningful, and the app is easy for users to use.

IV. BLOCK DIAGRAM

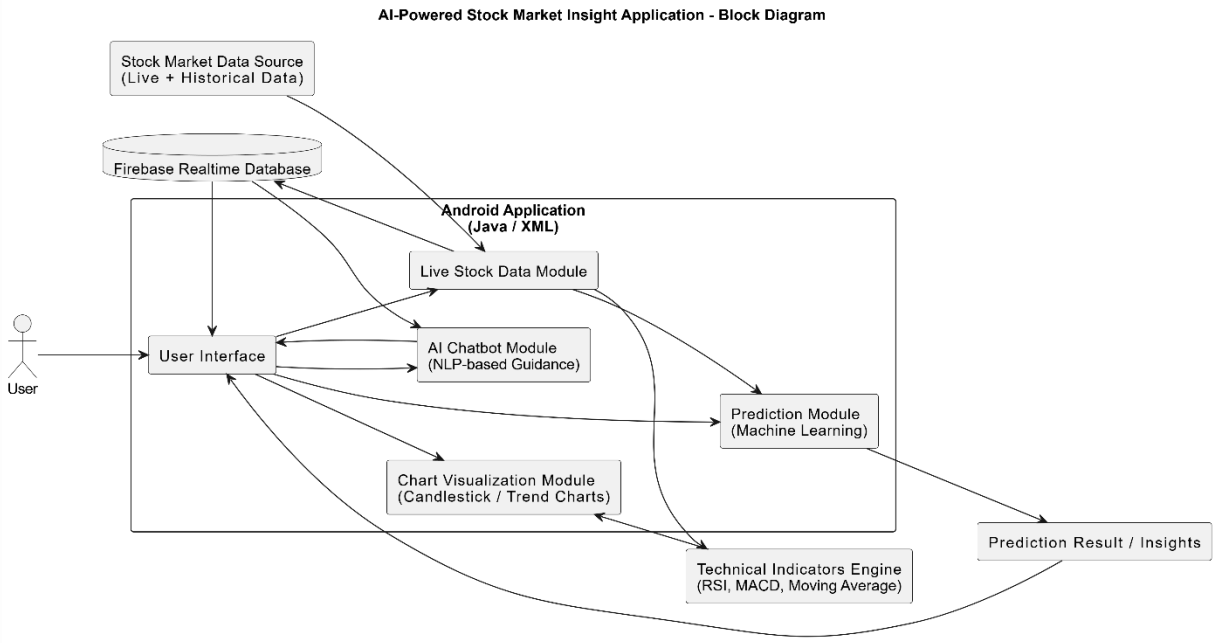

Fig 1 – Block Diagram

IV. RESULTS AND DISCUSSION

The AI-Powered Stock Market Insight Application was successfully developed and tested as an intelligent mobile platform for stock market analysis and guidance. The system was able to provide live stock-related updates, display chart-based market trends, generate short-term prediction support, and answer user queries through an NLP-based chatbot. The application showed that combining real-time data, machine learning logic, visual chart analysis, and conversational AI in a single Android app can make stock market understanding easier and more accessible for users, especially beginners and intermediate investors.

During testing, the live stock data module worked effectively by showing updated stock values and trend movements in the application. The chart visualization module helped users understand candlestick patterns and trend direction in a more practical way compared to only reading raw numerical values. The prediction module provided useful short-term forecasting support by analyzing past stock behavior and identifying possible market movement patterns. In addition, the AI chatbot improved the user experience by explaining stock-related concepts and answering queries in simple language.

The overall results indicate that the proposed system is not just a stock display application, but a decision-support platform that improves user understanding of market behavior. It reduces dependency on guesswork and allows users to make more informed decisions by combining prediction, visualization, and guidance features. The system also demonstrates that mobile-based financial applications can become more intelligent and user-friendly when supported by AI and real-time backend integration.

Descriptive Table: Performance and Outcome Summary

Module / Feature	Result / Outcome	Benefit to User
Live Stock Data Module	Real-time stock values and market movement displayed successfully	Users get updated information for current market analysis
Chart Visualization	Candlestick and trend charts were shown clearly	Helps users understand stock patterns visually
Prediction Module	Short-term stock trend forecasting was generated	Supports smarter and data-driven investment decisions
Technical Indicator Support	Market behavior was interpreted through trend-related analysis	Makes technical concepts easier to understand
NLP Chatbot	User queries were answered in simple language	Improves learning and reduces confusion
Firebase Realtime Database	Data synchronization worked properly in real time	Ensures smooth and updated app performance

Android User Interface	Application screens were responsive and easy to use	Provides better usability and user experience

The above table shows the main modules of the application along with their outcomes and benefits. It explains how each feature contributes to the overall performance of the system. The live stock data and Firebase modules ensure real-time operation, while the chart visualization and prediction modules improve stock analysis. The NLP chatbot adds an educational and support layer, making the application more user-friendly. Overall, the table shows that each module plays an important role in improving market understanding and decision-making.

Discussion

The discussion of the results shows that the application successfully addresses the core problems faced by retail investors, such as difficulty in understanding market fluctuations, interpreting charts, and making decisions based on technical indicators. Traditional applications mainly display stock prices and basic graphs, but this proposed system goes one step further by offering prediction and AI-based interaction. This makes the application more practical for real-world use.

One of the major strengths of the system is the integration of multiple intelligent features into a single Android platform. The prediction module adds analytical value, the chart visualization improves clarity, and the chatbot provides easy explanations. Together, these modules create a more complete stock market support system. However, the quality of prediction depends on the correctness of stock data and the model used for forecasting. Similarly, chatbot performance depends on the quality of its training and response design.

V. CONCLUSION

The AI-Powered Stock Market Insight Application was developed to simplify stock market analysis for beginner and intermediate investors by combining real-time stock updates, chart visualization, short-term prediction, and AI-based guidance into a single Android platform. The system successfully addresses the common problems faced by retail investors, such as difficulty in understanding candlestick charts, technical indicators, and live market behavior.

By using Java/XML for the frontend and Firebase Realtime Database for real-time synchronization, the application provides a smooth, responsive, and user-friendly experience. The inclusion of machine learning-based forecasting and an NLP chatbot further improves the usefulness of the system by offering predictive insights and simple explanations of stock-related concepts. Overall, the project demonstrates that integrating mobile technology with AI can make financial analytics more accessible, practical, and supportive for better investment decision-making...

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References

[1] C. Y. Lin and J. A. L. Marques, "Stock market prediction using artificial intelligence: A systematic review of systematic reviews," *Smart Systems and Applications,* vol. 22, 2024, Art. no. 100864, doi: 10.1016/j.ssaho.2024.100864.

[2] M. Saberironaghi, J. Ren, and A. Saberironaghi, "Stock Market Prediction Using Machine Learning and Deep Learning Techniques: A Review," *AppliedMath,* vol. 5, no. 3, 2025, Art. no. 76.

[3] D. M. Q. Nelson, A. C. M. Pereira, and R. A. de Oliveira, "Stock market's price movement prediction with LSTM neural networks," in *Proc. Int. Joint Conf. Neural Netw. (IJCNN)*, Anchorage, AK, USA, 2017, pp. 1419–1426, doi: 10.1109/IJCNN.2017.7966019.

[4] M. R. Vargas, B. S. de Lima, and A. G. Evsukoff, "Deep learning for stock market prediction from financial news articles," in *Proc. IEEE Int. Conf. Computational Intelligence and Virtual Environments for Measurement Systems and Applications (CIVEMSA),* 2017, pp. 60–65, doi: 10.1109/CIVEMSA.2017.7995302.

[5] S. Selvin, R. Vinayakumar, E. A. Gopalakrishnan, V. K. Menon, and K. P. Soman, "Stock price prediction using LSTM, RNN and CNN-sliding window model," in *Proc. Int. Conf. Advances in Computing, Communications and Informatics (ICACCI),* 2017, doi: 10.1109/ICACCI.2017.8126078.

[6] M. Wen, P. Li, L. Zhang, and Y. Chen, "Stock Market Trend Prediction Using High-Order Information of Time Series," *IEEE Access,* vol. 7, pp. 28299–28308, 2019, doi: 10.1109/ACCESS.2019.2901842.

[7] J. Lee, R. Kim, Y. Koh, and J. Kang, "Global Stock Market Prediction Based on Stock Chart Images Using Deep Q-Network," *IEEE Access,* vol. 7, pp. 167260–167277, 2019, doi: 10.1109/ACCESS.2019.2953542.

[8] A. Fazeli and S. Houghten, "Deep learning for the prediction of stock market trends," in *Proc. IEEE Int. Conf. Big Data (Big Data),* 2019, pp. 5513–5521, doi: 10.1109/BigData47090.2019.9005523.

[9] G. Li, "Application of Deep Learning in Stock Market Valuation and Prediction," in *Proc. IEEE Int. Conf. on Systems, Man, and Cybernetics / ICSESS-related proceedings metadata available,* 2019, doi: 10.1109/ICSESS47205.2019.9040833.

[10] S. Siami-Namini, N. Tavakoli, and A. S. Namin, "A Comparison of ARIMA and LSTM in Forecasting Time Series," in *Proc. 17th IEEE Int. Conf. Machine Learning and Applications (ICMLA),* 2018, pp. 1394–1401, doi: 10.1109/ICMLA.2018.00227.

[11] X. Pang, Y. Zhou, P. Wang, W. Lin, and V. Chang, "An Innovative Neural Network Approach for Stock Market Prediction," *Journal of Supercomputing,* vol. 76, 2020, pp. 2098–2118.

[12] S. Zhou and C. Chen, "Stock prediction based on genetic algorithm feature selection and long short-term memory neural network," *IEEE Access,* vol. 9, pp. 9066–9072, 2021, doi: 10.1109/ACCESS.2020.3047109.

[13] I. R. Parray, S. S. Khurana, M. Kumar, and A. A. Altalbe, "Time series data analysis of stock price movement using machine learning techniques," *Soft Computing,* vol. 24, 2020, pp. 16509–16517, doi: 10.1007/s00500-020-04957-x.

[14] J. Tian, L. Feng, L. Yang, and Y. Guo, "Stock price prediction based on LSTM and LightGBM hybrid model," *The Journal of Supercomputing,* vol. 78, no. 9, pp. 11768–11793, 2022, doi: 10.1007/s11227-022-04326-5.

[15] S. R. Polamuri, "Multi-Model Generative Adversarial Network Hybrid Prediction Model for Stock Market," *Journal of King Saud University – Computer and Information Sciences*, vol. 34, no. 10, 2022, doi: 10.1016/j.jksuci.2021.07.001.

[16] K. M. Mamidala, R. C. Veena, and P. I. C. Kumari, "Stock Price Prediction using LSTM and TLBO," in *Proc. 2023 IEEE Int. Conf. Integrated Circuits and Communication Systems (ICICACS)*, 2023, doi: 10.1109/ICICACS57338.2023.10100074.

[17] P. Khanpara, R. Kadam, K. Lavingia, and S. Patel, "Stock Trend Prediction: A Comparative Study using Different Approaches," in *Proc. 2023 5th Int. Conf. Smart Systems and Inventive Technology (ICSSIT)*, 2023.

[18] S. Vohra and P. Savaridassan, "Stock Price Trend Analysis and Prediction of Closing Price Using LSTM," in *Proc. 2023 Int. Conf. Computer Communication and Informatics (ICCCI)*, 2023.

[19] Q. Chen and H. Kawashima, "Stock Price Prediction Using LLM-Based Sentiment Analysis," in *Proc. 2024 IEEE Int. Conf. Big Data (BigData)*, Washington, DC, USA, 2024, pp. 4846–4853, doi: 10.1109/BigData62323.2024.10825946.

[20] L. Mozaffari and J. Zhang, "Predictive Modeling of Stock Prices Using Transformer Model," in *Proc. 2024 9th Int. Conf. Machine Learning Technologies (ICMLT)*, 2024, doi: 10.1145/3674029.3674037.

[21] S. S. Sikarwar, S. Jaswal, R. Sharma, R. Ganguli, and M. Mahawar, "Stock Price Prediction Using Transformers," in *Proc. 2024 4th Int. Conf. Advancement in Electronics and Communication Engineering (AECE)*, 2024.

[22] R. Ho and K. Hung, "CEEMD-based Multivariate Financial Time Series Forecasting using a Temporal Fusion Transformer," in *Proc. 2024 IEEE 14th Symp. Computer Applications and Industrial Electronics (ISCAIE)*, 2024.

[23] K. Alam and T. Ahmed, "Enhancing Stock Market Prediction: A Robust LSTM-DNN Model Analysis on 26 Real-Life Datasets," *IEEE Access*, 2024.

[24] G. N. Rodrigues, M. N. H. Mir, M. S. M. Bhuiyan, M. Al Rafi, K. M. N. R. Fuad, and M. S. Islam, "MiniBert24: A Lightweight Transformer-Based Model for Stock Market Movement Prediction," in *Proc. 2024 IEEE 3rd Int. Conf. Robotics, Automation, Artificial-Intelligence and Internet-of-Things (RAAICON)*, 2024.

[25] T. Li, "Market-Guided Stock Transformer for Stock Price Forecasting," in *Proc. AAAI Conf. Artificial Intelligence*, vol. 38, no. 1, 2024, pp. 151–159.