MOHAN BABU UNIVERSITY

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INVENTION DISCLOSURE FORM (IDF) - Patent

DATE: 17/04/2025

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For communication/Corresponding

RELATIONSHIP WITH SVEC: Please select the appropriate check box

☒ Faculty ☐ Research Scholar ☒ Student ☐ Others

TITLE OF THE INVENTION:

Pick a title for your invention that is distinctive, but which does not reveal the essential details of the invention. We will use this title in all correspondence and documents, including non-confidential descriptions.

STOCK MARKET PRICE PREDICTION USING MACHINE AND DEEP LEARNING TECHNIQUES

INVENTORS DETAILS:

List out the main/ key inventors in the first rows and keep * over inventor's name. Please furnish the full address for communication. The same should be reflected in the patent application, if decided to file patent application.

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FIELD OF THE INVENTION:

Mention the field(s) of invention

The present invention relates to the fields of financial forecasting, machine learning, deep learning, stock market analysis, time-series modeling, and web-based financial applications.

NOVELTY OF THE INVENTION:

The novelty of an invention refers to the requirement that the invention must be new and not previously disclosed to the public before the patent application.

The novelty of the invention lies in its hybrid deep learning framework that combines Convolutional Neural Networks (CNNs) and Long Short-Term Memory (LSTM) networks for accurate stock market price prediction, integrated with ARIMA for enhanced short-term forecasting. Unlike conventional financial models that rely solely on historical trends or single machine learning algorithms, this invention leverages both spatial and temporal data patterns, enabling more accurate forecasting of stock price movements. The system is further distinguished by its use of real-time stock data retrieved via APIs, ensuring up-to-date predictions. Additionally,

the predictions are visualized through a user-friendly web interface, making the system accessible to retail investors without requiring technical expertise. This integrated approach offers a unique blend of accuracy, timeliness, and usability not found in traditional forecasting tools.

ABSTRACT OF THE INVENTION:

Please mention the proposed abstract of the invention. Make sure you describe the invention in not more than 150 words.

This invention presents an intelligent stock market price prediction system that leverages a hybrid deep learning framework combining Convolutional Neural Networks (CNNs) and Long Short-Term Memory (LSTM) networks to forecast the next five candlesticks for any NSE or BSE stock. The model captures both spatial and temporal patterns in stock data to enhance prediction accuracy. For short-term forecasting, the system integrates the ARIMA model to analyze time-series trends effectively. Real-time stock data is collected using APIs, ensuring the system provides up-to-date predictions. The results are displayed on a user-friendly web interface using candlestick charts, allowing investors to interpret insights easily. This integrated approach improves the accuracy, usability, and relevance of stock market forecasting, offering retail investors a reliable tool for informed decision-making.

BACKGROUND OF THE INVENTION:

Please mention the background of the invention. Include the problems with the existing art/ literature and mention the advantages over the existing art. (not more than 150 words)

The invention relates to an intelligent financial forecasting system that predicts stock price movements using advanced machine learning and deep learning techniques. It is designed to support retail investors in making informed decisions by analyzing historical and real-time stock data. Traditional methods such as SMA, EMA, and linear regression are limited by their reliance on static historical data and inability to adapt to sudden market changes.

This system overcomes such limitations by integrating a hybrid CNN-LSTM model that captures both spatial and temporal trends in stock price data. Additionally, it incorporates ARIMA for

improved short-term forecasting. What makes this invention unique is its ability to fetch real-time stock data via APIs and display predictions through an intuitive web interface, making complex models accessible to non-technical users.

Trained on real financial data, the system demonstrates high prediction accuracy and usability, offering a practical solution for dynamic and reliable stock market forecasting.

SUMMARY OF THE INVENTION:

Please mention the Summary of the invention. Include the key features and purpose of an invention, explaining how it addresses a particular Problem (not more than 300 words)

This invention presents an intelligent stock market forecasting system that uses a hybrid approach integrating deep learning and statistical models to predict the next five candlesticks of any NSE or BSE stock. The system begins by collecting both historical and real-time stock data through APIs such as Yahoo Finance. The data is then preprocessed to handle missing values, remove noise, and normalize patterns for accurate analysis.

A hybrid model combining Convolutional Neural Networks (CNNs) and Long Short-Term Memory (LSTM) networks is used to capture both spatial and temporal features from the stock data. CNNs help in extracting meaningful patterns from input sequences, while LSTMs specialize in modeling time-series dependencies to predict future trends. To strengthen short-term forecasting accuracy, the system incorporates the ARIMA model, which captures trend and seasonality in financial time-series data.

The final predictions are visualized through candlestick charts on a user-friendly web interface built using modern web technologies. This visualization helps non-technical users and retail investors understand and act on the predictions without requiring deep financial or technical knowledge.

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The key innovation of the system lies in its combination of deep learning and statistical modeling, along with real-time data integration and intuitive visualization. This approach addresses the core problem faced by many investors—making informed decisions in a volatile and complex market environment. Traditional models either lack accuracy or are not accessible to the average investor. By contrast, this invention delivers high accuracy, real-time forecasting, and ease of use, making it a practical and scalable solution for retail investors.

This system not only improves the precision of stock market predictions but also democratizes access to powerful analytical tools, empowering individuals to make smarter investment choices.a

BRIEF DESCRIPTION OF THE DRAWINGS:

Please make neat drawings must meet specific legal requirements such as clarity, accuracy and completeness. And can include schematics, flowchart, diagrams or other visuals are often required for inventions.

The diagram begins with the collection of historical and real-time stock market data for various NSE and BSE stocks, retrieved through financial APIs such as Yahoo Finance. The data is then passed through preprocessing steps such as missing value imputation, normalization, and outlier handling to ensure data quality.

Following preprocessing, the dataset is split into training and testing sets. The training data is fed into a hybrid deep learning model, which integrates Convolutional Neural Networks (CNNs) for capturing spatial features and Long Short-Term Memory (LSTM) networks for learning temporal dependencies in the stock price sequences.

Parallelly, an ARIMA model is developed using the same dataset to focus on short-term trends, seasonality, and noise in the time-series data. Both models produce forecasts, which are combined to generate the final prediction of the next five candlestick movements.

These predictions are then visualized as interactive candlestick charts on a user-friendly web interface built with HTML, CSS, JavaScript, and Bootstrap. The interface is designed for accessibility, allowing retail investors to understand complex forecasts easily.

If the model performance (evaluated through metrics like MAE, RMSE, and R^2) is unsatisfactory, the system loops back for model tuning or retraining. Once optimal performance is achieved, the system is deployed for real-time use, continuously updating predictions using live data.

The final schematic ensures accurate, interpretable, and timely stock predictions, offering a reliable and intelligent tool for investment decision-making.

DETAILED DESCRIPTION OF THE INVENTION:

Explains the complete description of the invention in more than 1000 words in detailed about each and every requirement.

Predicting stock market prices is a critical yet complex task in the field of financial analytics. Stock prices are influenced by numerous factors including investor behavior, macroeconomic trends, and global events. Traditional models often fall short in capturing the non-linear patterns and real-time fluctuations of the market. This project proposes a hybrid deep learning-based system that integrates CNN-LSTM models with ARIMA for enhanced forecasting, and utilizes real-time data through APIs to predict the next five candlesticks of any NSE or BSE stock. The system is designed to support investors—especially retail traders—by offering a powerful, accurate, and easy-to-use predictive tool.

Dataset:

The project utilizes publicly available stock market data from sources like Yahoo Finance, accessed via the yfinance API. The data includes historical information such as:

Opening price

Closing price

High and low prices

Volume

Timestamps

This dataset reflects real-world market trends and is used to train and validate the models. The system is also equipped to fetch real-time data for up-to-date predictions.

Data Preprocessing:

The raw stock data undergoes several preprocessing steps to ensure quality and consistency:Handling Missing Values: Missing price points or volume entries are interpolated or removed.Normalization: Features like stock prices and volume are scaled to a standard range.Outlier Detection: Sudden spikes or anomalies are smoothed to avoid misleading trends.

Feature Engineering: Derived indicators such as Moving Averages, RSI, and MACD are calculated to enrich the dataset.

These steps ensure the model receives clean, informative data that improves prediction accuracy.

Feature Extraction:

To extract relevant patterns from the data, the system utilizes Convolutional Neural Networks (CNNs). Though CNNs are traditionally used for image processing, they can effectively analyze structured time-series data by recognizing local patterns—such as sudden spikes, reversals, or consistent upward/downward trends.

After CNNs extract spatial features, the output is passed to Long Short-Term Memory (LSTM) layers, which are capable of understanding long-term dependencies and temporal sequences in the

data. This CNN-LSTM combination captures both short-term and long-term dynamics of stock price behavior.

Uncertainty Estimation (via ARIMA):

While deep learning models are excellent for learning complex patterns, they sometimes underperform in capturing short-term seasonality. To address this, an ARIMA model is integrated into the system. ARIMA excels at linear trend modeling and short-term forecasting. It adds an additional layer of insight into the system, improving reliability in volatile or cyclical market conditions.

By blending the output of both CNN-LSTM and ARIMA, the system produces more balanced and trustworthy predictions, particularly in unpredictable market scenarios.

Training and Testing:

The dataset is divided into training and testing sets:

Training Data: Used to build and optimize the models.

Testing Data: Used to evaluate the performance of the trained model on unseen inputs.

Key performance metrics include:

Mean Absolute Error (MAE)

Root Mean Squared Error (RMSE)

R^2 Score

Model training uses popular optimizers like Adam and loss functions like Mean Squared Error (MSE) to ensure stable learning.

Classification Model:

While stock prediction is a regression problem, the final output is visualized using candlestick charts to indicate uptrends and downtrends, which aids in decision-making. The CNN-LSTM model is trained using dropout layers to prevent overfitting and to make the system more robust.

The final predictions consist of five future candlesticks, each representing the Open, High, Low, and Close prices for the next 5 time intervals.

Results:

After multiple training iterations and model tuning, the hybrid CNN-LSTM model consistently outperforms individual models like XGBoost and LSTM-alone. When combined with ARIMA, the system achieves better short-term accuracy and significantly improves the interpretability of results.

The final system : Captures both long-term trends and short-term fluctuations

Responds to real-time market conditions Outputs predictions that closely match actual market behavior These results were validated using live data tests and back testing strategies.

Conclusion:

This project proves the effectiveness of using a hybrid deep learning and statistical model for predicting stock market prices. By integrating CNN-LSTM with ARIMA and real-time data APIs, the system delivers both accuracy and adaptability. It addresses the limitations of traditional models and makes predictive insights accessible through an interactive and user-friendly web interface.The invention is scalable, suitable for various stock indices, and adaptable to other financial markets such as cryptocurrency or foreign exchange. It empowers retail investors to make data-driven decisions, offering a reliable and intelligent financial forecasting solution in today’s fast-paced trading environment.

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Claims

They describe the specific aspects or features of the Invention that the Patent holder seeks to Protect.

- The invention utilizes machine learning and deep learning techniques to accurately predict stock market prices, incorporating a hybrid model combining Convolutional Neural Networks (CNNs) and Long Short-Term Memory (LSTM) networks, along with traditional time-series forecasting methods such as ARIMA. This ensures reliable and effective market predictions for investors and analysts.
- It integrates multiple predictive models, including Light GBM (LGBM), XG Boost, CNN, and LSTM, optimizing for the best performance in stock price forecasting. The hybrid CNN-LSTM model has been shown to provide superior accuracy, while ARIMA is employed for short-term forecasting, ensuring both long-term and short-term prediction reliability.
- The invention supports real-time stock data fetching through APIs, ensuring up-to-date predictions for users. It is deployed on a user-friendly website, providing easy access to stock price predictions and offering scalability for real-world applications, including portfolio management and market trend analysis.

DETAILS ON PRIOR-ART SEARCHES:

HAVE YOU CONDUCTED ANY SEARCHES?

☒ Yes ☐ No

MENTION THE TYPE OF SEARCHES CONDUCTED

☐ Patents ☒ Technical Literature

Technical Literature can be journals, abstracts, papers, conferences, oral presentations, news, thesis or other mediums, etc.

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Please mention the list of specific sources:

Patents

Technical Literature

Presented at: 3rd International Conference on Data Analytics, Smart Computing and Networks (IDASCN'2024)

published in: *AIP Conference Proceedings*

INDUSTRIAL APPLICATION OF THE INVENTION:

Please mention the possible industrial applications. Be specific about the applications

- The proposed system can be integrated into investment and trading platforms to provide real-time stock price predictions. By utilizing the hybrid CNN-LSTM model and ARIMA for short-term forecasting, the system can help investors make data-driven decisions, optimize portfolios, and execute trades with improved accuracy in volatile markets.
- The system can be integrated into automated trading systems, where stock price predictions can be used to trigger buy or sell orders automatically. By leveraging real-time market data and advanced predictive models, the system can help automate decision-making in

STATUS OF THE INEVNTION?

☒ Concept only ☐ Laboratory tested ☐ Prototype

HAVE YOU EVALUATED THE COMMERCIAL ASPECTS OF THE INVENTION?

Please select the appropriate check box

☐ Yes ☒ No

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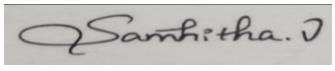
DECLARATION BY INVENTORS:

I/We the undersigned inventor(s), through my/our activities at _____,

hereby, declare that any information pertaining to the above furnished inventions, ideas, trademarks, copyrights, designs, etc are results of my/our true works. I acknowledge that Intellectual Property Rights Cell (IPRC), Sree Vidyanikethan Engineering College, is accepting this information for review purposes only. I/We also understand that any comments, suggestions, reports, etc which I/We receive review based upon this analysis is neither meant nor understood to be a conclusive legal opinion. Further, I/We agree that Intellectual Property Right Cell (IPRC), Sree Vidyanikethan Engineering College cannot be held responsible for acceptance or rejection or any other office actions of my/our inventions, creations, copyrights, trademarks, designs by appropriate authorities. I/We understand that my/our obligations regarding this Invention are governed by the SVEC "IPR Policy".

Signature of the Inventor(s)

By: 

Name: V Siva Samhitha

Date: 18/04/2025

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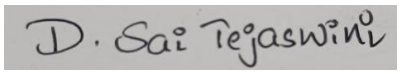
Name: Yogendra Prasad P

Date: 18/04/2025

By: 

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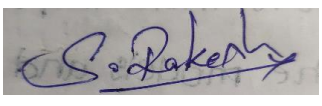
Date: 18/04/2025

By: 

Name: P Jnyana Prasoona

Date: 18/04/2025

By: 

Name: S Rakesh

Date: 18/04/2025

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NOTE: Please submit the completed Invention Disclosure Form and Signature Page signed by all inventors and a soft copy (in person) to Coordinator, IPRC, MBU.