International Journal of Combined Research & Development (IJCRD)
eISSN:2321-225X; pISSN:2321-2241 Volume: 14; Issue: 8; August- 2025

STOCK MARKET PREDICTION

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ABSTRACT

In this research paper represent a inclusive study on Stock Market Prediction is an artificial intelligence-based system created to make the stock market forecasting process easier and more efficient with the help of a convenient, user-friendly web interface. This application is designed using Python and Streamlit which combines past stock prices, technical analysis tools and predictive models including Linear Regression, Random Forest, and LSTM in order to guide the investors to make informed decisions based on data. By using the real-time and historical values of such resources as Yahoo Finance or Alpha Vantage the users can easily create trends, get the moving averages and make further calculations about the changes in future prices. It also has secured user authentication, personal dashboards and session management to provide user experience. Aimed both at the technical and at the non-technical users, this application fills in the gap between complicated financial analytics and user-friendly investment tools.

KEYWORDS: *Artificial Intelligence, Machine Learning, Data Visualization, Streamlit, FinTech, Python, Time Series Forecasting, Linear Regression, LSTM (Long Short-Term Memory)*

INTRODUCTION

Stock Request is an important part of the world frugality because it determines the investment strategies, the base of fiscal opinions, and profitable policy. The number of investors trading equities is in the millions, which makes it necessary to dissect stock price trends duly to reduce pitfalls and increase returns. nonetheless, the unpredictable nature of the fiscal request and the huge volume of real- time data involved in prognosticating the movements within the stock make this process relatively grueling .

This report offers the Stock Prediction and Analysis App that has been erected with Python and Streamlit. The program is erected on machine literacy algorithms, the operation of real- time data source reclamation of stock information and interactive visualizations used to help the stoner prognosticate movement of stock prices and make informed choices. By filling the gap between the complicated models of vaticination and easy to use interfaces, the system offers a way of availability to dealers both new and expert.

LITERATURE SURVEY

There are a lot of the stock market analysis systems developed, and some of them are quite simple, known as data portal and others are rather complex institutional tools. Media websites like Yahoo Finance and Google Finance give access to the past data, current stock price and stock news and are relatively easy to be used by an average user, albeit not providing predictive analytics. TradingView has high visualization levels with interactive charts and a means of customizing and incorporating a range of technical indicators, including RSI.

MACD, and Bollinger Bands, however, its technicality can be intimidating to the novice trader, and it is not capable of having built-into it AI forecasting as yet. Unfortunately the institutional solutions like Bloomberg Terminal which offer excellent analytics and professional content, are also prohibitively expensive and would be unavailable to any retail investor. The classical methods of analysis whose methods include the fundamental and technical analysis are useful in determining the information relevant but they can be time-consuming and this factor makes them irrelevant in covering such mass and fast-moving data in the financial market.

To overcome these challenges, various methods have been given to researchers such as Linear Regression, Random Forest, and Long Short-Term Memory (LSTM) models, which can identify latent patterns and time dynamics in the valuation of stocks. Though these strategies have been mentioned that can be applied to increase the accuracy of the forecasts, they all inculcate technical know how and computer applications and softwares and prior processing of data and are therefore not feasible to common investors.

EXISTING WORK

The provision of the systems supplements the stock market prediction and analysis over the years. Web sites such as Yahoo Finance and Google Finance serve to provide reasonably the latest information such as moves over

time, and news but are not predictive. Secondly, TradingView is also competing successfully with sophisticated charting functionality as well as the ability to access the advanced technical indicators like RSI, MACD, Bollinger Bands, which are in high demand but only the professionals can access since it cannot adopt machine learning technology due to the technical indicators required to give predictions. On the institutional level all this may be present at a very high level through Bloomberg Terminal but the expense factor is too high to reach the retail player.

Linear regression, Random Forests and LSTM networks are the mechanisms used several years ago by researchers and even those, who test in practice to get more reliable predictions. On an institutional level, Bloomberg Terminal might provide all of this at a very high level but the cost factor is very high and inaccessible to the retail player.

Linear regression, Random Forest, and LSTM networks are the tools employed a few years ago by scholars and even those, who check in practice in order to make more accurate predictions. Although the technologies have recorded good performances, majority of the applications have significant request of high level of technical implementation, multi-complicated computations and programming skills, which has disadvantaged the need of easy to use systems.

PROPOSED SYSTEM

The proposed system is an application of Stock Market Prediction and Analysis based on machine learning algorithm and dynamic visualization modules which will be used to make easy accurate prediction and instill confidence in the values of those predictions to the user. Compared to classic systems, proposing to show historical data or graphs at best, it is attempted to project the future development of the stocks prices given the analysis of an enormously great amount of past information about the market and the employment of the modern ML tools, such as the Linear Regression, Random Forest, and LSTM models. The user interface is designed in Python as well as Streamhas the form of a front-end framework that makes it easy to transform complex material into the user front end much easier to understand and visualizes findings of the predictions without prior knowledge of coding.

It employs APIs like yFinance which brings real time data and cleans it by discarding noise and outliers thus coming up with processed data which in-turn can be used to form

predictions by point machine learning models. Besides the forecasts, it includes technical indicators such as the moving averages,RSI, and the MACD to provide even more informative data regarding the market trend. The report was delivered in graphical results, interactive graphs and dashboards where the user can compare output across models and track displayed performance trend.

METHODOLOGY

The algorithms of machine learning would follow preprocessing and be applied to the data set to find the model. The models of Linear Regression used to provide easy time-series forecasting, Random forest that is used to retain models of nonlinear dependency between variables and Long Short-term Memory (LSTM) that is used to model sequence dependence basing on time-sequent data are as presented below. Training on the models then follows and testing and prediction where the percentage accuracy of the models on forecasting future movement of stocks is examined. The accuracy and reliability of predictions is estimated based on such indicators as Mean Square Error (MSE), Root Mean Square Error (RMSE), R 2 Score.

The last phase is the visualization and deployment where results will be posted on a Streamlit based web application. Users have access to dashboards reflecting their forecasts, past trends, model comparison and insight charts that are dynamically built. The machine learning and interactivity that the system entails can help fill the gap between the complexity of the predictive modeling and practical decision-making between investors. The same methodology may actually make the system more than accurate, it would also make it more accessible even to amateur traders.

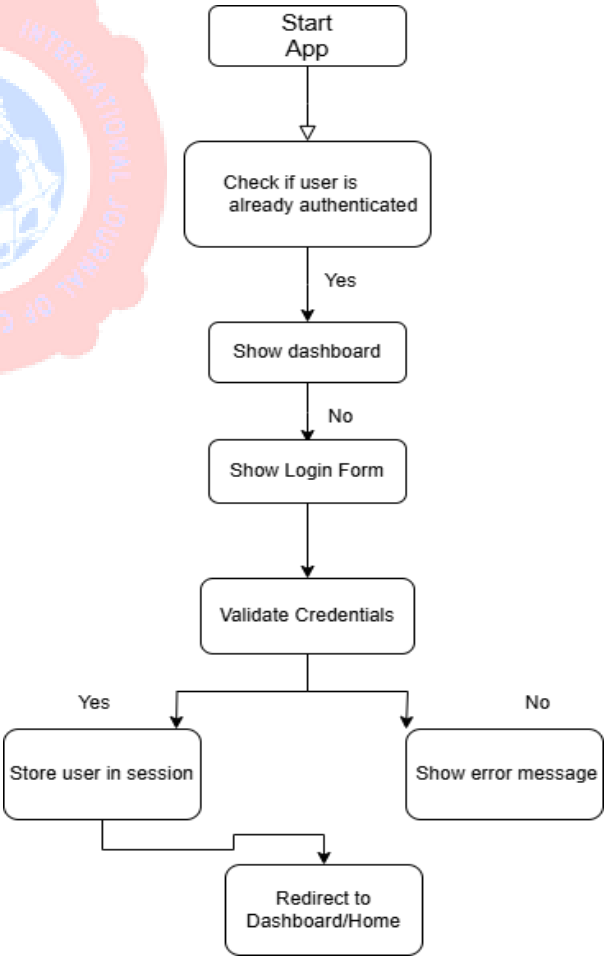

Fig.1. Flow Chart

EXPERIMENTAL RESULTS

The system was tested on historical data scraped by the yFinance API of such companies as Tesla and Apple. These data were split into the training (80 percent) and testing (20 percent) sets and three models were employed, such as Linear Regression, Random Forest and LSTM. The measurement criteria was by use of the values MSE, RMSE and R 2 Score. The findings revealed that linear Regression was an appropriate baseline which was easily detected but the Random Forest correctly detected more instances as compared to those that it failed to detect since it modeled the non-linearity. LSTM worked the best due to their capability to model time-sequences in the information. The findings showed the error value and the highest R 2 score of the LSTM method was lowest, making it effective in stock prediction. The outcomes of the predictions were displayed with dashboards on Streamlit, which also allows a user to compare the historical and forecasted values dynamically by manipulating the date and demonstrated that the proposed system could be an effective and intuitive tool to help an investor to work on the problem of making forecasts. In summary, the experiments suggest the more advanced deep learning model like LSTM cell is more appropriate to predict financial time-series, and it is valuable that they can be integrated into a user-friendly app and fine-tune decision-making.

Fig. 2. Raw Data Preview

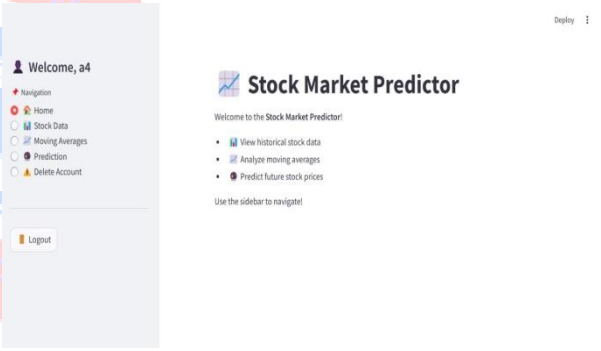

Fig. 3. Stock Market Predictor

Fig. 4. Machine Learning Prediction Trend Graph

CONCLUSION

The proposed stock market prediction system has managed to integrate the machine learning algorithms along with interactive user interface albeit an easy to understand interface. Conducting such analysis as Linear Regression, Random Forest, and LSTM on the historical stock data, one will observe that the most recent and up-to-date deep learning algorithms like LSTM are capable of providing more accurate results since they also account temporal patterns. The results confirm that machine learning can increase the accuracy of stock prices forecasting considerably as compared to the traditional method.

Through its Streamlit-powered dashboard the predictions are not only accurate, but they can also be interpreted easily making them valid to the novice or experienced investors. The project will make it one step closer to reducing the gap between complex models and decision-making since real-time data uploading, preprocessing, training the model, and visualizing it are accessible in one place. In conclusion, in cooperation with investment, the AI-based tools can be deployed as risk-hedging tools and sources of data-driven financial decisions. Additional enhancements could leverage sentiment analysis, add supplementary financial metrics to scalp the system and offer insight into real-time trading to help deliver more comprehensive market intelligence.

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