

Regression Based Intelligent Mechanism For Prediction Of Stock Values In Real-Time Invision

Ajay Yadav¹, Vijay Karnatak^{2*}, Dattatray Raghunath Kale³, Manvi Chopra⁴

¹University Institute of Computing Department, Chandigarh University Gharuan Mohali Punjab, India.

^{2*}Department of Computer Science & Engineering, Uttaranchal University, Dehradun, India

³Department of Computer Science & Engineering, MIT School of Computing, MIT Art, Design and Technology University, Pune, Maharashtra, India.

⁴Assistant Professor, SOEC, Dev Bhoomi Uttarakhand University, Dehradun, India.

Email: ¹ajaydaas200@gmail.com, ²vijay.karnatak92@gmail.com, ³kaledatta156@gmail.com, ⁴chopramanvi4@gmail.com

ABSTRACT

A company's stock price, which might increase in tandem with the price of a single share, is the most useful indicator of its success. Businesses therefore try to persuade their clients to purchase their stocks by advertising them to them. Clients or stockholding firms find it challenging to predict the future value of a single stock due to price volatility. As a result, stock market forecasting has become the most popular topic in the corporate sector. As a result, it is crucial to solve this problem for the benefit of buyers and investors because they frequently experience investment losses, which can be resolved by a variety of machine learning algorithms. One of the best machine learning statistical methods for predictive analysis, linear regression, and Python are being used to create a stock price prediction website to address this issue. The prediction is based on past data. Finding a way to employ linear regression models to get more accurate values is the main objective. The dataset that will be used to train the linear regression models can be altered to obtain more accurate results. To forecast stock market analysis, this research aims to show that linear regression is the most suitable and efficient technique.

Keyword: Machine Learning, Linear Regression, Python, Django framework, Yahoo Finance.

I. Introduction

Investors can purchase or sell stocks on the stock market, which is a regulated marketplace, either publicly or privately. The stock market is a well-liked investment choice for investors since companies frequently use it to generate money for business expansion. Many investors use forecasts based on historical market trends to help them make well-informed investment decisions. Given how dynamic the stock market is and how much it has evolved in recent years, it is essential to predict its future value or price. A supervised machine learning approach and a mathematical technique called linear regression are commonly used in predictive analysis. The continuous/real values of mathematical variables are often consistent with the linear regression model, which produces linear correlations between independent and dependent variables. After initial training using the training data set, the algorithm generates predictions based on the instructions supplied. HTML and CSS are the additional front-end tools and technologies utilized in the provided website. Because it includes all machine learning methods and algorithms, the scikit-learn library is used. The Django framework, which is part of the Python programming language, is utilized at the backend to access web services and resources. The Yahoo Finance website is used and connected to an API in order to retrieve the data for the website, which must

be accurate and dependable. Our service allows users to anticipate the stocks of every company listed on Yahoo Finance.

II. Literature Review

The following are literature collected from the distinct articles utilized for the linear regression algorithm as an ML technique for stock price prediction:

A multiple linear regression model for stock price prediction based on historical price data and financial variables is presented in this review paper by Shruti Shukla and Bhavya Shah. In this study [2], Nusrat Rouf, Saurabh Singh, and others examined machine learning techniques for linear regression, which is used to predict stock prices. To increase the prediction models' accuracy, the authors emphasized the significance of feature selection and data pre-processing. In this study [3], Vaishnavi Gururaj and Shriya V. R. evaluated the effectiveness of support vector machines and linear regression models for predicting stock prices using technical indicators and historical price data. In this review [4], Nils Karlsson examined how well artificial neural network and multiple linear regression models performed in predicting stock prices using historical price data and financial factors. The artificial neural network model performed better than the linear regression model, according to the authors' findings.

In this study [5], Payal Soni, Yogya Tewari, and Deepa Krishnan examined the most recent machine learning methods for predicting stock prices, such as linear regression. The authors stressed how crucial it is to include outside variables in the prediction models, such as macroeconomic data and news mood. According to the [6] article, the best machine learning technique for predictive analysis of statistical data is linear regression. The linear regression model is ideal for stock price prediction, according to the authors' findings. This review by Daniel Kastberg [7], the effectiveness of random forest and linear regression models for predicting stock prices using technical indicators and historical price data was examined. The random forest regression model fared better than the linear regression model, according to the authors' findings. The performance of several machine learning methods, such as linear regression, for stock price prediction based on historical price data and financial indicators, random forest regression model, and LSTM was compared in this article by distinct researchers' [8] multivariate regression and logistic regression were reported in this paper. Indu Kumar, Chetna Utreja, and others' study article from 2018: This study [9] evaluated the efficacy of several machine learning methods, such as support vector machines and forestry. Using a graphical depiction, this website can forecast the stock price for the following day as well as the next 360 days. It has been challenging for researchers to predict how the stock market will behave, but machine learning has made it feasible to predict stock values with accuracy.

III. Methodology

Stock prices are forecasted in the project using the linear regression algorithm in machine learning, and data is implemented using Python tools and libraries such as Numpy and Scikit-learn. The labelled data (supervised learning) in a linear regression is used to determine the best fit line or line of minimum reluctance by generating the link between independent and dependent variables using basic mathematical formulae. Graph or curve analysis can be used to compute stock predictions using this line. Linear regression is a fundamental statistical and machine learning technique used to model the relationship between a dependent variable and one or more independent variables. The implementation of linear regression follows a systematic process involving several key steps. The first step is problem definition and data collection, where the goal is to identify the dependent (target) variable and the independent (predictor) variables, and then gather relevant and high-quality data. Once the data is collected, the second step involves data preprocessing, which includes handling missing values, encoding categorical variables if any, normalizing or standardizing data, and ensuring data is clean and ready for modeling. The third step is data visualization and EDA, where relationships between variables are explored using scatter plots, correlation matrices, and summary statistics to understand trends and potential outliers. Next, splitting the dataset into training and testing sets is essential to evaluate the model's performance on unseen data.

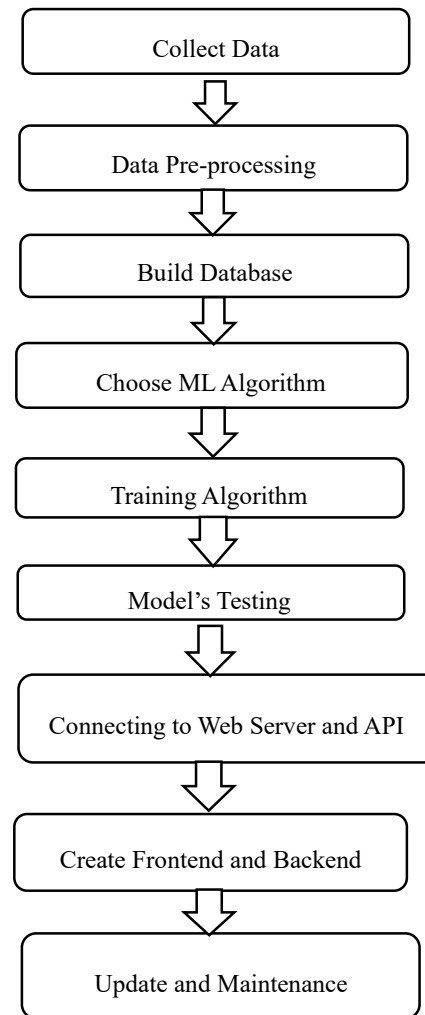


Fig.1. Flow Methodology

After this, the model is trained using the training data by finding the best-fit line, usually by minimizing the cost function, often the MSE, using methods like the Ordinary Least Squares (OLS) technique or gradient descent. If the model does not perform satisfactorily, model tuning or feature engineering is done to improve performance, possibly by removing irrelevant variables, transforming features, or using polynomial terms. Once satisfied, the model is deployed for making predictions on new data. Additionally, model interpretation is crucial—understanding the coefficients helps interpret the influence of each predictor on the target variable. Lastly, monitoring and updating the model over time is necessary as new data becomes available or underlying data patterns change. Overall, linear regression is valued for its simplicity, interpretability, and effectiveness, especially in scenarios where relationships between variables are approximately linear. The structured implementation of linear regression ensures robust results, making it a popular tool for forecasting, trend analysis, and quantitative modeling in fields such as economics, business, healthcare, and engineering. Because it is simpler to implement and incorporates fundamental mathematical and computational theory, linear regression is thought to be superior to the majority of other approaches. It entails fitting a straight line with a slope of (m) and an error of (e) to the provided data points of the independent variable (x) and dependent variable (y) . The sum of squared discrepancies between the actual values understood in the equations and diagrams above is reduced to implement this line:

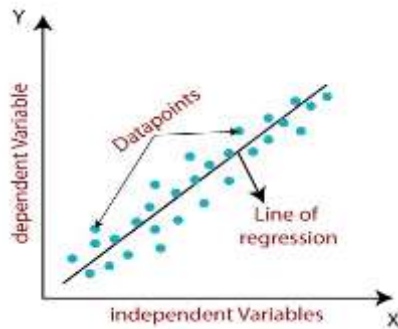


Fig. 2. Representation of best fit line of regression [16]

Plotting the data sets using matplotlib and plotly tools through normalized data and generate the graph as shown below:-

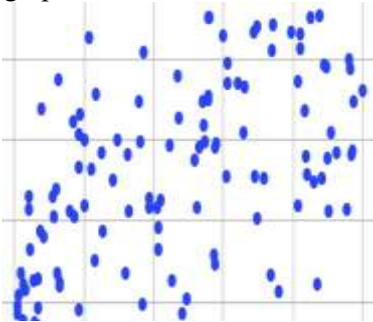


Fig. 3. Normalized stock market data

The predictor is transformed into a website that displays real-time stock market predictions in order to provide a graphical user interface (GUI) that will enable consumers to access this tool. The initial stage in this process is to gather and retrieve the data from Yahoo Finance, a trustworthy source website, and use SQLite to create a database management system (DBMS). Another crucial stage is data preprocessing, which involves removing any errors or inconsistencies from the data and utilizing the Python pandas package to convert it into a format that is easy for users to understand. Plotly, matplotlib, and numPy are utilized in the backend portion to execute various operations. Machine learning's linear regression technique is used to carry out the prediction portion. The Django framework and the scikit-learn package are used, respectively, to access the website's machine learning tools and resources. Versions of HTML5 and CSS3 are utilized for the UI/UX portion. The website is updated often and always retrieves the most recent data status.

IV. Results and Discussions

Predicting stock market prices with greater accuracy rates was the main goal of this study, and it was accomplished with an accuracy of between 75% to 85%. From one day to 365 days (one year), the stock market prediction website "J3 predictor" may forecast stock values. Yahoo Finance's API path connects the data server to the website, which contains stock data for several equities. All of the stocks' ticker information is provided on the website under the third tab. By entering the ticker value into the second tab's predictor page, the results are displayed as follows.

Information		Show More
Symbol	ADANIGREEN.NS	
Name	AdaniWilmar	
Last Sale	408.3	
Net Change	1.2	
Percent Change	102320.83	
Market Capital	India	
Country	1750568	
IPO Year	ConsumerFood	
Volume	nan	
Sector	nan	
Industry	nan	

Fig. 4. Display of stock information on result page



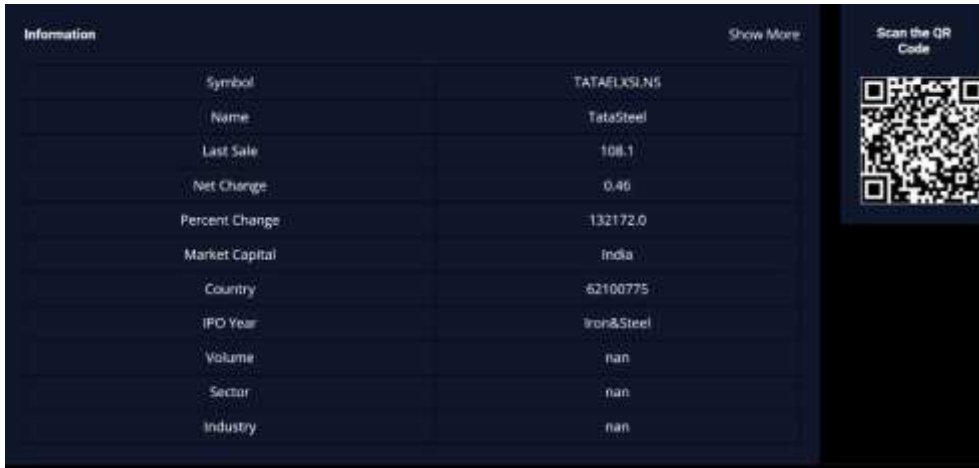
Fig. 5. Recent and prediction stock display for ADANIGREEN upto 90 days.

The website's first tab displays the results for the top six firms; the forecast section makes predictions for the remaining stocks. The following table displays the comparison between actual and anticipated stock values for several NIFTY trading companies over a three-day period from May 10 to May 12.

Table 1. actual and predicted value

COMPANY NAME	ACTUAL VALUES	PREDICTED VALUES
Adani Green	896.45 INR	894.16 INR
Tata Motors	513.80 INR	515.70 INR
Axis Bank	911.00 INR	908.80 INR
Reliance Industries	2481.90 INR	2479.80 INR
State Bank of India	578.10 INR	575.00 INR

The predictor will indicate that the data is insufficient if the user inputs the incorrect ticker symbol or time period. In this sense, machine learning-based stock prediction has shown great promise in stock market forecasting and can assist a large number of individuals who are new to the stock market or who wish to profit from stocks.



Information		Show More
Symbol	TATAELXSI.NS	
Name	TataSteel	
Last Sale	108.1	
Net Change	0.46	
Percent Change	132172.0	
Market Capital	India	
Country	-62100775	
IPO Year	Iron&Steel	
Volume	nan	
Sector	nan	
Industry	nan	

Scan the QR Code




Fig. 6. Predicted page of Tata Elxsi

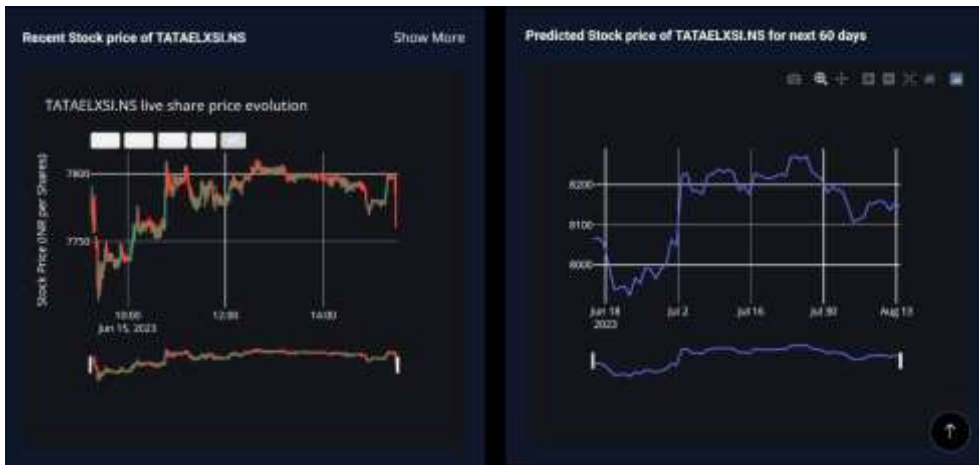


Fig. 7. Prediction Graph of Tata Elxsi



J3 Predictor

Welcome Guest

- Home
- Market
- Ticker Info

Information		Show More
Symbol	AXISBANK.NS	
Name	AxisBank	
Last Sale	873.8	
Net Change	1.16	
Percent Change	208.977.09	
Market Capital	India	
Country	23404247	
IPO Year	Banks-PrivateSector	
Volume	nan	
Sector	nan	
Industry	nan	

Scan the QR Code



Fig. 8. Prediction page of AXIS BANK.

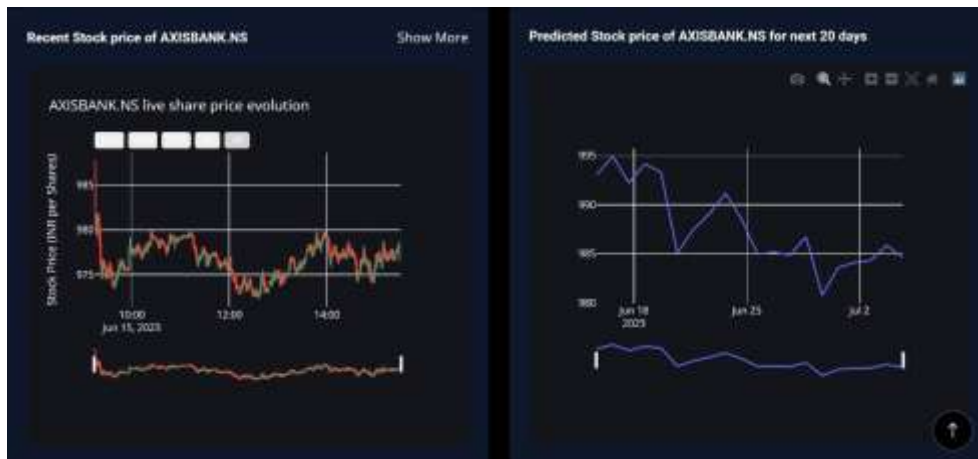


Fig. 9. Prediction graph of AXIS BANK

V. Conclusion

Given how frequently the stock market fluctuates, many people want to predict future stock values in an effort to improve their fortune. The stock market's volatility has prevented current solutions that use state-of-the-art technologies like Deep Learning, AI, and Neural Networks from producing accurate forecasts. Thus, this review work's primary objective is to analyze the existing techniques for stock market prediction using a linear regression algorithm. Linear regression is a supervised machine learning technique that creates a linear relationship between independent and dependent variables. A study of research publications indicates that selecting a suitable dataset is essential for effective linear regression stock market prediction. The trials showed that the linear regression approach outperformed other machine learning strategies in terms of accuracy. Many experts did, however, add that they intended to look into the possibility of using neural networks to predict the stock market in the future.

improved accuracy of predictions. As machine learning algorithms continue to advance, future stock price forecasts should become more accurate. Natural language processing is used to extract information from news stories and other text sources (NLP). NLP can be used to learn about a company's financial performance, competitive environment, and other factors that may impact its stock price. Machine learning systems can then be taught with this data to provide predictions that are more accurate. Machine learning is being used to predict the impact of non-financial events on stock values. Non-financial events, such as natural disasters or political scandals, can significantly affect stock values. By using machine learning to predict how these events would impact stock prices, investors can lower the risk in their portfolios. the use of machine learning to predict the stock market's response to climate change. By using machine learning to predict the impact of climate change on the stock market, investor portfolios can be made less risky.

Overall, there is a lot of promise in using machine learning to predict stock prices. The accuracy of machine learning algorithms is increasing as more data becomes accessible for their training. Furthermore, there is constant development of new machine learning algorithms. Because of these factors, future stock price forecasts are probably going to be more accurate.

References

- [1] P. Balasubramanian, C. P. S. Badarudeen, H. Sriraman, A systematic literature survey on recent trends in stock market prediction, *PeerJ Comput Sci* 10 (2024) e1700, <https://doi.org/10.7717/peerj-cs.1700>.
- [2] X. Gong, W. Zhang, W. Xu, Z. Li, Uncertainty index and stock volatility prediction: evidence from international markets, *Financ. Innov.* 8 (2022) 57, <https://doi.org/10.1186/s40854-022-00361-6>.
- [3] C. Granger, S.-H. Poon, Forecasting volatility in financial markets: a review, *J. Econ. Literat.* 41 (2003) 478–539, <https://doi.org/10.1257/002205103765762743>.
- [4] S. Latif, N. Javaid, F. Aslam, A. Aldegheshem, N. Alrajeh, S.H. Bouk, Enhanced prediction of stock markets using a novel deep learning model PLSTM-TAL in urbanized smart cities, *Heliyon* 10 (2024) e27747, <https://doi.org/10.1016/j.heliyon.2024.e27747>.

- [5] V.-D. Ta, C.-M. Liu, D.A. Tadesse, Portfolio optimization-based stock prediction using long-short term memory network in quantitative trading, *Appl. Sci.* 10 (2020) 437, <https://doi.org/10.3390/app10020437>.
- [6] S. Saha, On the effects of policy uncertainty on stock prices: an asymmetric analysis, *Quant. Finance Economics* 3 (2019) 412–424, <https://doi.org/10.3934/QFE.2019.2.412>.
- [7] W. Kristjanpoller, V. Michell, A Stock Market Risk Forecasting model through integration of switching regime, ANFIS and GARCH techniques, *Appl. Soft Comput.* 67 (2018), <https://doi.org/10.1016/j.asoc.2018.02.055>.
- [8] S.Shukla and B.Shah's "Stock Price Prediction Using Multiple Linear Regression Models" *International Journal of Engineering Science Invention (IJESI)*. Published in October 2018.
- [9] N.Rouf and S.Singh's "Stock Price Prediction Using Machine Learning Techniques: A Decade Survey on Methodologies, Recent Developments, and Future Directions" MDPI. Published in November 2021.
- [10] V. Gururaj, S. V R and A.karthick's "Stock Price Prediction Using Linear Regression and Support Vector Machines". *International Journal of Applied Engineering Research*. Published in 2019.
- [11] N. Karlsson's "Comparison of Linear Regression and Neural Network for Stock Price Prediction".
- [12] P.Soni, Y.Tewari, D. Krishnan-"Machine Learning approaches in Stock Price Prediction: A Systematic Review", *Journal of Physics Conference Series*. Published in 2022.
- [13] M.Vijh, D.Chandola's "Stock Closing Price Prediction using Machine Learning Techniques". *International Conference on Computational Intelligence and Data Science (ICCIDS)*.
- [14] K.Daniel's "A Study on Stock Price Prediction Using Linear Regression and Random Forest Regression" (2022).
- [15] O. E. Orsel, S. S. Yamada-"Comparative Study of Machine Learning Models for Stock Price Prediction" (2022).