"Comparing Predictive Models for Stock Market Performance: Statistical vs. Machine Learning Approaches"

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Abstract: Despite the efficient market theory, achieving 100% accuracy in stock market forecasting remains challenging. However, both statistical models and Machine Learning (ML) techniques can enhance stock market predictions. In this empirical study, we compare the performance of ML models—such as LSTM, Random Forest, XG Boost, and Artificial Neural Networks—in forecasting stock market direction with more traditional statistical methods like logistic regression. We propose an improved forecasting approach to enhance accuracy in investment decisions. Additionally, we evaluate each model's risk, maximum drawdown, returns, and categorization accuracy. Our findings demonstrate that the suggested approach reduces risks while increasing stock market returns.

Key Research Questions:

1. How do ML models perform compared to traditional statistical methods in stock market prediction?
2. What investment strategy can improve prediction efficiency?

Keywords: stock market prediction, machine learning, statistical models, investment strategy, risk assessment, empirical study

This well-defined subject enables an exhaustive inquiry of the relative usefulness of statistical and machine learning models in stock market prediction, providing insightful information to both academics and investors.

Introduction

Predicting stock market movements is a difficult challenge in financial forecasting owing to its volatility and complexity. Statistical models and machine learning have become widely used methods for examining past data and forecasting future events based on patterns and trends. Neural networks and support vector machines are two examples of machine learning methods that have demonstrated promise in identifying non-linear correlations in data sets.

In contrast, mathematical equations are used by statistical models like GARCH and ARIMA to model time series data. Both strategies have advantages and disadvantages when it comes to stock market forecasting. Using an empirical review of past data, this study compares how well statistical models and machine learning forecast stock market patterns.

The subject of stock market prediction remains a challenging and significant area of study for investors. Accurately predicting stock market movements and choosing promising investments can be difficult due to the unpredictability of stock markets (Kumar et al., 2022). Numerous studies in the literature refute the claim made by certain proponents of the efficient market hypothesis that it is difficult to anticipate stock prices with accuracy.

These studies have demonstrated that predictive models may produce accurate and trustworthy forecasts of future stock values when they are used with the appropriate technique. Several mathematical techniques and learning aids, such as machine learning algorithms, have been investigated by researchers in order to do this. Particularly in the area of stock price prediction, machine learning techniques have become increasingly prominent in financial market analysis. These models can give useful insights for investor decision-making and are able to learn from a variety of input feature sets. Statistical models have also been actively employed in stock market prediction, alongside machine learning algorithms. Although it might be difficult to draw a clear distinction between statistical and machine learning models, one can judge a model by looking at whether it considers history data of the target or a variety of input characteristics. (Chatterjee et al., 2021).

This empirical study aims to compare and evaluate the effectiveness of both machine learning models and statistical models in stock market prediction (Kumar et al., 2022).

Based on variables including variable selection, optimisation strategies, and methodologies employed, the study will compare and analyse these models' accuracy. Through a thorough analysis of 90 carefully chosen research publications, this study seeks to offer important new perspectives on the best practices for stock market forecasting. This empirical study compares the performance of statistics and machine learning models in stock market prediction,

acknowledging the difficulties and significance of stock market prediction in making profitable investment decisions. It is impossible to overestimate the importance of precise stock market forecasts in the ever evolving world of today.First of all, Accurate stock market predictions are essential for making wise financial decisions in the quickly evolving world of today.

These forecasts are used by investors to spot possible trends and choose which companies to purchase and sell. However, because the data is noisy and fluctuating, it is difficult to forecast moves in the stock market. (Leverett et al., 2022). The question of whether it is feasible to foresee stock prices precisely is hotly contested; proponents of the efficient market hypothesis contend that precise stock price prediction is unattainable. (Chatterjee et al., 2021).

However, there is evidence in the literature that suggests that predictive models, when properly developed and optimized, can provide precise and reliable predictions of future stock prices (Leverett et al., 2022). A variety of learning and mathematical approaches are used to provide reliable stock market forecasts (Chatterjee et al., 2021). These resources comprise machine learning and statistical models. (Huang et al., 2018).While models based on machine learning may learn from numerous input features and adjust to shifting market conditions, statistical models often rely on historical data and statistical approaches to create predictions (Kumar et al., 2022).

Given that both statistical and machine learning models may be applied to stock market prediction, it is not always easy to distinguish between the two (Chatterjee et al., 2021). The purpose of this empirical study is to evaluate the predictive power of statistical and machine learning models for stock market analysis. The study will carry out an extensive literature assessment of certain research publications in order to offer insightful information about the best practices for stock market prediction (Kumar et al., 2022).

Literature review

Paper (1): “This article compares the performance of Support Vector Machine (SVM) and Long Short-Term Memory (LSTM) in stock prediction. Accuracy serves as the evaluation metric for assessing algorithm efficiency.”

Paper (2): “In this study, we compare LSTM and RNN models for stock market prediction using a dataset sourced from Yahoo Finance. The dataset is updated daily, and our machine learning approach achieves improved accuracy, as discussed by the authors.”

Paper (3): “The authors of this paper compare traditional statistical models with machine learning forecasting models, including linear regression, backpropagation neural networks, time series ARIMA, and LSTM. They find that the effectiveness of these models varies across different situations.”

Paper (4): “This article employs an ensemble-based model that combines multi-layer perceptron, long short-term memory, and convolutional neural network architectures to estimate sentiment in social media posts.”

Paper (5): “In this paper, the authors explore the effectiveness of machine learning methods for stock prediction. They consider Self-Organizing Maps (SOM), Support Vector Regression (SVR), SVM, RNN, and LSTM, as well as analyze existing research papers to assess the advantages and disadvantages of these algorithms.”

Paper (6): “This paper utilizes Support Vector Machine (SVM) to predict stock prices for large and small capitalizations across three different markets. The model incorporates both daily and up-to-the-minute price data.”

Paper (7): “The authors of this paper compare various algorithms for stock price prediction, evaluating them using RMSE metrics. They select the best-performing algorithm for predicting the stock price of a specific stock.”

Paper (8): “In this article, the authors propose input training parameters based on stock indicators. They create a sliding window approach to predict future prices using LSTM, ANN, support vector machine regression, and linear regression. The differences between these methods are analyzed.”

Paper (9): “This article provides insights into various modern prediction techniques, particularly machine learning and sentiment analysis. It highlights relevant datasets, prediction types, and metrics useful for predicting stock prices.”

Paper (10): “In this article, a comprehensive assessment of 22 research publications recommends various approaches, including computation techniques, machine learning algorithms, performance metrics, and top journals. These recommendations guide the selection of relevant studies.”

Paper (11): “This paper presents a review of machine learning techniques and algorithms for stock price prediction, including forecasting and Long Short-Term Memory (LSTM) models.”

Paper (12): “In this paper, the authors propose a grounded recommender system for safe stock trading. The system is based on LSTM and utilizes deep learning libraries such as Keras API and TensorFlow in Python.”

Paper (13): “This paper explores three well-known machine learning algorithms—Support Vector Regression (SVR), Multilayer Perceptron (MLP), and Multiple Linear Regression—for predicting future stock prices.”

Paper (14): “The authors analyze existing and novel methods for stock market prediction, considering three different approaches: fundamental analysis, ǫ-analysis, and Ã-analysis.”

Paper (15): “In this paper, the authors present a strategy for accurate stock price prediction, accounting for multiple factors affecting stock prices. They utilize four efficient machine learning models—KNN, Naive Bayes, SVM classifiers, and Random Forest classifiers—to analyze and forecast stock values under various market conditions.”

Paper (16): “The authors propose an approach that integrates mathematical operations, machine learning, and external factors to enhance stock price forecast accuracy. This approach aims to produce profitable trades using Long Short-Term Memory (LSTM) models.”

Paper (17): “This paper outlines a systematic literature review process to identify relevant peer-reviewed journal papers from the last two decades. The authors classify studies with similar methods and situations into either the machine learning or deep learning approach.”

Paper (18): “Wang et al., as discussed by the authors, propose a stock price prediction approach using Long Short-Term Memory (LSTM) networks. The model leverages historical stock price data as input and trains an LSTM model to predict future stock prices.”

Paper (19): “In this article, the authors compare and analyze the best machine learning model for predicting the exact closing amount of the next few days. They use three to four months of Nifty50 Indian stock data from Yahoo Finance.”

Paper (20): “This article employs multilayer linear regression, convolutional neural network (CNN), and Long Short-Term Memory (LSTM) algorithms to predict the closing price of five companies operating in different sectors.”

Paper (21): “This article explores three prominent regression techniques—Support Vector (SVR), Random Forest (RFR), and Linear Regression (LR)—for predicting stock prices.”

Paper (22): “In this study, the authors compare the performance of Support Vector Regression (SVR) and Recurrent Neural Network (RNN) models using time series data from Astra Agro Lestari shares.”

Paper (23): “This paper compares various machine learning methods on five financial news datasets related to a company. The domains in which the company is assessed as positive or negative achieve accuracies of 93.90%, 92.31%, 92.27%, 85.44%, 84.65%, 94.13%, 82.83%, 72%, 70%, and 95.11%, respectively.”

Paper (24): “In this paper, an LSTM-based Recurrent Neural Network (RNN) model predicts stock prices using opening prices, aiming for high accuracy.”

Paper (25): “The authors employ machine learning techniques to predict the stock market’s future trend based on current market values. Their focus includes Machine Learning, Analysis, and Long Short-Term Memory (LSTM) technology.”

Paper (26): “This paper combines ARIMA and machine learning techniques to predict stock prices using three gate structures. The Oblivion Gate removes data that doesn’t match the algorithm, leaving only relevant data.”

Paper (27): “The authors highlight proper machine learning techniques for predicting stock prices and emphasize the use of deep learning algorithms in the banking and healthcare sectors.”

Paper (28): “In this paper, the authors compare machine learning algorithms on open datasets to assess their performance and identify the most reliable forecasting model.”

Paper (29): “A comprehensive evaluation of various machine learning algorithms applied to stock market prediction emphasizes the effectiveness of simpler models. Peak prediction accuracy reaches approximately 91% across different algorithms.”

Paper (30): “This article analyzes existing and new methods of stock market prediction, considering fundamental analysis, traditional analysis, and new approaches. However, none of them are suitable for individual stocks.”

Paper (31): “The authors use different algorithms—Gated Recurrent Unit (GRU), Long Short-Term Memory (LSTM), Support Vector Regressor (SVR), Decision Tree (DT), Random Forest (RDF), Lasso Regression, Bayesian Ridge Regression (RBR), Gradient Boost, and Stochastic Gradient Descent Algorithm (SGDA)—to predict financial markets.”

Paper (32): “A comparative analysis between three machine learning algorithms—linear regression, support vector machines (SVM), and random forest—is performed to predict stock prices, including sentiment analysis.”

Paper (33): “The stock market’s high volatility, rapid changes, and nonlinear behavior pose challenges for precise stock price forecasting. Multiple factors, both macro and micro, such as politics, global economy, unexpected events, and firm financial success, contribute to this complexity.”

Paper (34): “In this article, the authors explore several machine learning techniques, including linear models and various artificial neural networks, to develop a valid forecast. They test these models using the daily EURUSD pair dataset from the foreign exchange market and the daily S&P 500 dataset from the US stock market. The results demonstrate that the ARIMA model outperforms other models in forecasting stock price direction.”

Paper (35): “This article compares Long Short-Term Memory (LSTM), encoder-decoder, and gated recurrent unit (GRU) models for predicting stock market prices.”

Paper (36): “The authors present a comprehensive review of prediction techniques used for stock market price and return forecasting. These techniques include soft computing methods, back-propagation techniques, Neural Network (NN) approaches, and various other techniques.”

Paper (37): “In this paper, three types of models used for predicting stock prices—both long-term and short-term—are discussed. Empirical results are presented to demonstrate the feasibility and significance of these models.”

Paper (38): “The authors explore machine learning models such as Artificial Neural Network (ANN), Auto Regressive Integrated Moving Average (ARIMA), Linear Regression (LR), and Random Forest (RF) for short-term stock price prediction.”

Paper (39): “This article compares LSTM, ARIMA, and SARIMAX models for stock price prediction. Interestingly, the error for the ARIMA model is lower compared to the SARIMAX model.”

Paper (40): “The performance of LSTM and gated recurrent units (GRU), along with their combination using the attention mechanism, is investigated using stock data from three different stock indices: the KSE 100 index, the DSE 30 index, and the BSE Sensex.”

Paper (41): “A comprehensive review of applying and comparing Machine Learning (ML) algorithms and Econometric Models in stock market prediction is available in this article. The mentioned models are categorized into ML algorithms (including Linear Regression, K-nearest neighbors, Support Vector Machine, and Long Short-Term Memory) and econometric models (including Autoregressive Integrated Moving Average (ARIMA), CAPM, and Fama-French Factor Model).”

Paper (42): “In this article, the authors use LSTM to predict stock market prices, applying various machine learning techniques such as linear regression (LR), support vector machine (SVM), decision tree (DT), and long short-term memory (LSTM).”

Paper (43): “Wang et al., as discussed by the authors, propose a stock price prediction approach using Long Short-Term Memory (LSTM) networks. The model leverages historical stock price data as input and trains an LSTM model to predict future stock prices.”

Paper (44): “In this paper, the authors compare the performance of LSTM and ARIMA models using data from the top three Indian hospitality industries. The results indicate that individual models perform well when the data aligns with the model and appropriate parameters are used.”

Paper (45): “Wang et al., as discussed by the authors, propose a time series relational model (TSRM) that integrates time and relationship information to predict stock prices in the Chinese Shanghai and Shenzhen stock markets. The TSRM shows improvements in cumulative returns (44% and 41% compared to the baseline) and reductions in maximum drawdown (4.9% and 6.6%, respectively).”

Paper (46): “In this paper, the authors explore both traditional models and machine learning models for forecasting stock time-series data. They predict stock prices and stock price sub-correlations using the ARIMA (autoregressive integrated moving average) and LSTM (long short-term memory) neural network models.”

Paper (47): “Wang et al., as discussed by the authors, investigate stock forecasting based on multiple factors. They consider linear models and machine learning scenarios, including multiple linear regression, exponential weighted moving average (EWMA), extreme gradient advance (XGBoost), and long-term short-term memory (LSTM).”

Paper (48): “In this paper, a machine learning technique called Support Vector Machine (SVM) is used to predict stock prices for large and small capitalizations across three different markets. The model incorporates both daily and up-to-the-minute price data.”

Paper (49): “This paper compares a non-linear, RNN (Recurrent Neural Networks)-based stock index prediction model with a linear, technical indicator-based prediction model. Interestingly, the exponential moving average outperforms the LSTM in stock price prediction.”

Paper (50): “The article presents a survey of machine learning methods used in forecasting stock prices. It discusses the development context of the task and analyzes the development trend based on previously published papers.”

Paper (51): “In this article, a machine learning-based stock price prediction method is proposed to predict the upcoming value of stocks traded on a stock exchange. However, predicting stock prices with great accuracy remains challenging due to various influencing factors.”

Paper (52): “The authors aim to predict future prices of stocks from companies in different sectors traded on the Borsa Istanbul (BIST) 30 Index. They employ XGBoost, Support Vector Machines (SVM), KNN, and Random Forest (RF) algorithms.”

Paper (53): “This paper uses LSTM and ARIMA to predict the stock market trend and approximate the share price of a stock based on historical data.”

Paper (54): “The authors utilize a dynamic dataset of a company to predict future stock prices and exchanges. The dataset includes the closing price of the stock over the last 290 working days.”

Paper (55): “In this article, the performance of different machine learning algorithms—such as k-nearest neighbor (KNN), linear regression, random forest (RF), support vector regression (SVR), and decision tree (DT)—is analyzed using datasets from stock market IT sector companies TCS and Wipro.”

Paper (56): “Four machine learning methods—Least Absolute Shrinkage and Selection Operator (LASSO), Extreme Gradient Boosting (XGBoost), Back Propagation Neural Network (BPNN), and Long Short-Term Memory neural network (LSTM)—are adopted to predict an acquired indicator. Results show that LSTM outperforms other algorithms over the entire time period.”

Paper (57): “In this article, a recurrent-oriented Short-Term Long Memory (LSTM) algorithm is developed and employed to predict the stock price of a company based on historical prices.”

Paper (58): “The article builds six Machine Learning (ML) techniques—Support Vector Regression (SVR), K-nearest neighbor (KNN), Decision trees (DTs), Random Forest, Artificial

Neural Networks (MLPs), and deep learning—for predicting the future closing price of five companies in the S&P500 index."

Paper (59): "In this article, the authors develop a stock market prediction model using artificial neural networks (ANNs). The model outperforms other prediction techniques currently available to academics in terms of stock market price prediction."

Paper (60): "The authors investigate the predictability of economic movement using the Support Vector Machine Algorithm (SVM). SVM is a specific type of learning algorithm characterized by volume control of the decision function, kernel function behavior, and compound scarcity."

Analysis

S.No	Title	Methods Used	Results	Conclusions
1	Stock Market Analysis and Prediction using Machine Learning Algorithm	Support Vector Machine Algorithm (SVM) is used.	The paper investigates the predictability of economic movement with SVM.	SVM algorithm is used for predicting economic movement.
2	An Evaluation of Stock Market Prediction using Supervised Machine Learning Techniques	Support Vector Machine (SVM)	Support Vector Machine (SVM) has an accuracy of 91%	Support Vector Machine (SVM) delivers better performance in stock market prediction.
3	Stock Market Price Prediction Using Machine Learning Techniques	LSTM (Long Short-Term Memory)	Comparative study of LSTM and RNN for stock market prediction	Automated approach for stock market prediction not available.
4	Stock Price Prediction with Traditional Statistics and Machine Learning	Traditional statistical model	Different models have different prediction effects.	Different models have better prediction effects in different situations.
5	Stock Market Prediction from Sentiment and Financial Stock Data Using Machine Learning	Ensemble-based model	Next-hour prediction performance: 74.3%	Combining sentiment analysis and financial data improves stock market prediction performance
6	Stock prediction in machine learning: Comparison and analysis	SOM, SVR (Support vector regression) SVM, RNN, LSTM	SOM algorithm has the advantage of exploiting neighbor relationship in clustering., SOM algorithm has the disadvantage of requiring parameter selection.	SOM algorithm requires parameter selection and grid type determination.
7	Stock Market Prediction Using Machine Learning	Technical and fundamental analysis	Paper proposes ML approach for stock prediction	Stock market prediction using SVM
8	Machine Learning Approaches in Stock Price Prediction	Various algorithms for stock price prediction	Comparison of algorithms for stock price prediction. Selection of best algorithm based on RMSE metrics	Studied various algorithms for stock price prediction. Compared algorithms using RSME metrics

9	Comparison of Different Machine Learning Prediction about Stock based on Multi-Factor Input-Taking the Nasdaq Index as an Example	Support Vector Machine, Random Forest, Linear Regression	Neural network approach effective for stock return forecasting.	The neural network approach is effective for stock return forecasting.
10	Stock Market Price Prediction using Machine Learning Techniques: A Review	Technical, fundamental, and econometric models , Machine learning algorithms for stock estimation	The paper provides an insight into various modern prediction techniques, including machine learning and sentiment analysis. The paper discusses data sets, prediction types, metrics used, and future scope.	Machine learning is a useful tool for stock estimation. Stock price estimation can be accurately made using a machine learning algorithm.
11	Stock Market Prediction using Machine Learning Techniques: A Systematic Review	LSTM (Long Short Term Memory), CNN (Convolutional Neural Networks), RNN (Recurrent Neural Networks), SVM (Support Vector Machines), RF (Random Forests), SVR (Support Vector Regressions)	LSTM is the most commonly used technique for stock price prediction. Other methods like CNN, RNN, SVM, RF, and SVR also produced encouraging results.	LSTM is the most commonly used technique for stock price prediction. Other methods like CNN, RNN, SVM, RF, and SVR also show promising results.
12	Stock Price Prediction Using Machine Learning	Machine learning techniques, LSTM (Long/Short Term Memory)	The paper reviews studies on machine learning techniques and algorithms for stock price prediction. The paper emphasizes the importance of stock market prediction for trading strategies.	Machine learning can be used for stock price prediction. Stock market prediction is important for trading strategies.
13	Stock Market Prediction	LSTM grounded recommender system	Delicacy rate improved to 75 in stock prediction.	LSTM-based recommender system improves stock prediction accuracy to 75%

14	Google Trends and Technical Indicator based Machine Learning for Stock Market Prediction	SVR, MLP, Multiple Linear Regression used for stock price prediction	SVR outperformed MLP and Multiple Linear Regression	SVR outperformed MLP and Multiple Linear Regression
15	Stock Market Price Prediction by LSTM & Linear Regression Algorithm using Machine Learning	Fundamental analysis, LSTM & Linear Regression Algorithm	The paper analyzes existing and new methods of stock market prediction. The paper takes three different approaches to the problem: Fundamental analysis, LSTM, and Linear Regression algorithms.	Analyzed existing and new methods of stock market prediction. Took three different approaches: Fundamental analysis, LSTM, Linear Regression
16	A Comparative Study of the Stock Market using Machine Learning Algorithms	K-Nearest Neighbors (KNN), Naive Bayes, SVM classifiers, and Random Forest classifiers. Multiple machine learning algorithms used for stock price prediction.	The paper presents a strategy for accurate stock price prediction. The strategy utilizes four machine learning models for analysis and forecasting.	The paper presents a strategy for accurate stock price prediction using machine learning algorithms. The proposed strategy is evaluated and found to be robust and reliable for stock price forecasting.
17	Stock Market Prediction Using Machine Learning	Python technique for forecasting stock values. Integration of mathematical operations and machine learning	The paper proposes an approach to enhance stock price forecast accuracy. The paper suggests using LSTMs for sequence prediction in stock price forecasting.	Python is successfully used for stock price prediction. LSTM is effective for sequence prediction in stock forecasting.
18	An Analytic Review on Stock Market Price Prediction using Machine Learning and Deep Learning Techniques	Machine learning and deep learning algorithms. SVM, DT, LR, NN, kNN, ANN, and CNN	The paper aims to identify future directions for machine learning stock market prediction research. The paper provides a systematic literature review process to discover relevant peer-reviewed journal papers.	Machine learning techniques can improve stock market prediction compared to conventional methods. The paper provides a systematic literature review on machine learning stock market prediction.

19	Stock Price Prediction Using Machine Learning	LSTM networks for stock price prediction.	LSTM-based approach achieves promising prediction accuracy, Outperforms other traditional methods in stock price prediction	LSTM-based approach achieves promising prediction accuracy, Potential benefits for financial analysts, investors, and traders
20	Data Analysis and Price Prediction of Stock Market Using Machine Learning Regression Algorithms	Linear Regression (LR), Decision Tree (DT), Support Vector Regression (SVR), SARIMAX (Integrated Seasonal Integrated Season with EXogenous features), Gated Recurrent Unit (GRU – deep learning)	GRU provides low error values in all three performance metrics. GRU gives accurate predictions compared to other regression models.	GRU provides low error values in performance metrics.. GRU gives accurate predictions compared to other models.
21	Stock Prices Prediction Using Machine Learning	Multilayer Linear-Regression, Convolutional Neural Network (CNN), and long short-term memory (LSTM) algorithms	LSTM outperforms other models for each company's dataset. Best sequence length for prediction is 5	Multilayer Linear-Regression, CNN, and LSTM algorithms were used for stock price prediction.
22	Stock Price Prediction By Applying Machine Learning Techniques	Support Vector Regression (SVR), Random Forest Regression (RFR)	SVR, RFR, and Linear Regression used for prediction. Accuracy measured using MSE, MAE, and RMSE.	SVR, RFR, and Linear Regression used for stock prediction. Model accuracy compared using MSE, MAE, and RMSE.
23	Comparison of Stock Price Predictions Using Support Vector Regression and Recurrent Neural Network Methods	Support Vector Regression (SVR), Recurrent Neural Network (RNN)	SVM RMSE: 132.42, RNN RMSE: 354.86	SVM has lower RMSE (132.42) than RNN (354.86). Accuracy level of SVM is higher than RNN.

24	Comparison of Machine Learning Algorithm for Stock Price Prediction Using Sentiment Analysis	Linear Regression, Ridge Regression, Lasso Regression, Random Forest, Naive Bayes, Logistic Regression, LSTM, ARIMA	Accuracies of different machine learning models for stock price prediction using sentiment analysis are provided.	Comparison of 13 machine learning algorithms for stock price prediction.
25	Stock Market Portfolio Prediction Using Machine Learning	ARIMA model, Linear regression	The paper builds a LSTM-based RNN model for accurate stock rates. The limitations of ARIMA and TSLM models are discussed.	Limitations of ARIMA and TSLM models identified. LSTM-based RNN model yields accurate stock rates.
26	Stock Market Prediction using Machine Learning Technique	Machine Learning, LSTM (Long Short Term Memory) technology	The paper focuses on stock market prediction using machine learning techniques. Specifically, it discusses the use of LSTM technology for forecasting stock trends.	Machine learning is a promising approach for stock market prediction. LSTM technology is used for forecasting stock market trends.
27	Enhancing Stock Market Prediction with ARIMA and Machine Learning	ARIMA model	The paper discusses the use of ARIMA and machine learning techniques for stock market prediction.	Predicting stock prices using ARIMA and machine learning
28	Stock Market Prediction using Machine Learning Techniques: Literature Review Analysis	Machine learning and deep learning algorithms. Long short-term memory and gated recurrent unit techniques	Long short-term memory and gated recurrent unit techniques provide the best results. The study focuses on the banking and healthcare sectors.	Long short-term memory and gated recurrent unit techniques provide the best results. The study focuses on the banking and healthcare sectors.

29	Comparison of Machine Learning Algorithms for Prediction of Stock Prices	Regression analysis on one dataset. Classification analysis on another dataset	Comparison of machine learning algorithms on open datasets. Regression and classification analysis performed on different datasets	Comparison of machine learning algorithms on open datasets. Assessment of performance and identification of best algorithm
30	Evaluating the Performance of Diverse Machine Learning Approaches in Stock Market Forecasting	ARIMA, TBATS, Holt-Winters, Random Forest, ANN, RNN, LSTM, and others. Leading and lagging technical indicators, extensive EDA, feature collinearity assessment	Peak prediction accuracy of approximately 91% across different algorithms.Simpler models like Linear Regression, MLP, and Theta Model yield impressive results with a MAPE of 1.	Various machine learning algorithms were evaluated for stock market prediction.. Simpler models like Linear Regression and MLP yielded impressive results.
31	Stock market price prediction by lstm& linear regression algorithm using machine learning	Enhanced NN method for stock price prediction, Sentiment analysis of news articles using three different methods	LSTM outperformed all other methods in stock market price prediction. Moving Average showed the highest deviation in the prediction.	Combination of sentimental analysis, stock trend analysis, and deep learning increases accuracy in stock market prediction. More input data and modification of deep learning module can generate more accurate predictions.
32	Machine Learning and Deep Learning based Stock Market Prediction considering Covid-19 as a Feature	Gated Recurrent Unit (GRU), Long Short-Term Memory (LSTM)	Deep learning models accurately estimate financial indexes. Gated Recurrent Unit performs better than existing models.	Deep learning models accurately estimate financial indexes. Gated Recurrent Unit performs better than existing models.
33	A Comparative Study on Different Machine Learning Algorithms for Predictive Analysis of Stock Prices	Linear regression, support vector machines (SVM), and random forest algorithms. Incorporation of sentiment analysis into the prediction models	Comparative analysis of linear regression, SVM, and random forest algorithms for stock price prediction. Incorporating sentiment analysis into prediction models.	Linear regression, support vector machines (SVM), and random forest algorithms were compared for stock price prediction. Incorporating sentiment analysis into the prediction models was also explored.

34	Stock Market Price Prediction Using Machine Learning	Algorithmic trading with pre-programmed and automated strategies. Machine Learning models such as LSTM for stock price prediction	LSTM accurately forecasts stock prices. Algorithmic trading uses pre-programmed and automated strategies	Stock market price prediction is challenging due to multiple factors. Machine learning models like LSTM can accurately forecast stock prices.
35	A comparative study of machine learning techniques for stock price prediction	Linear models, Artificial neural networks	Linear models are efficient on the EURUSD dataset. ARIMA model is better at forecasting stock price direction.	Linear models are efficient for predicting EURUSD dataset. ARIMA model is better at forecasting stock price direction.
36	Comparative Analysis of LSTM, Encoder-Decoder and GRU Models for Stock Price Prediction	LSTM, Encoder-Decoder, GRU models compared for stock price prediction.	LSTM, Encoder-Decoder, and GRU models compared for stock prediction. Deep learning and machine learning algorithms used for stock price forecasting.	LSTM, Encoder-Decoder, and GRU models compared for stock prediction. Deep learning algorithms show promise in stock price prediction.
37	Machine Learning-Based Stock Market Prediction	Fuzzy time series data for accurate stock market prediction. Implementation of soft computing techniques and Neural Network (NN) techniques.	The paper presents a comprehensive review of several prediction techniques used for stock market price and return forecasting. The paper compares different forecasting models used in stock market forecasting.	Various techniques like fuzzy time series and neural networks are used for stock market prediction. The paper provides a comprehensive review and comparison of different prediction models.
38	Stock price prediction based on SVM, LSTM, ARIMA	SVM, LSTM, ARIMA models used for stock price prediction	The paper presents empirical results to prove the feasibility and significance of the models.	Three models (SVM, LSTM, ARIMA) are used to predict stock prices.

39	Comparative Analysis of various Machine Learning Algorithms for Stock Price Prediction	Artificial Neural Network (ANN), Auto Regressive Integrated Moving Average (ARIMA), Linear Regression (LR), Random Forest (RF)	ARIMA gives more accurate results for stock price prediction. Optimal model for short term stock price prediction	ARIMA gives more accurate results for stock price prediction. Optimal model for short term stock price prediction
40	Stock Price Prediction for Market Forecasting Using Machine Learning Analysis	LSTM, ARIMA, and SARIMAX models were used for stock price prediction. ARIMA model had less error compared to SARIMAX model.	Comparison of LSTM, ARIMA, and SARIMAX models for stock price prediction. ARIMA model has less error compared to SARIMAX model.	LSTM, ARIMA, and SARIMAX models were compared for stock price prediction. ARIMA model had less error compared to SARIMAX model.
41	Stock Market Index Prediction Using Machine Learning and Deep Learning Techniques	LSTM + Attention	RNN-based models with attention mechanism outperformed other machine learning models.	RNN-based models with attention mechanism perform well.
42	A Comparative Analysis of the Application of Machine Learning Algorithms and Econometric Models in Stock Market Prediction	Machine Learning algorithms (Linear Regression, K-nearest neighbors, Support Vector Machine, Long Short-Term Memory)	ML algorithms have higher accuracy than Econometric Models in stock market prediction.	Comparison of ML algorithms and Econometric Models
43	Predicting Stock Market Price Using Machine Learning Techniques	Linear regression (LR), Support vector machine (SVM), Decision tree (DT), Long short-term memory (LSTM)	• LSTM provides better accuracy in forecasting stock prices. • SVM and decision tree algorithm are less accurate.	• LSTM provides better accuracy in forecasting stock prices. • SVM and decision tree algorithm are less accurate.
44	Stock Price Prediction Using Machine Learning	LSTM networks for stock price prediction.	LSTM-based approach achieves promising prediction accuracy, Outperforms other traditional methods in stock price prediction	LSTM-based approach achieves promising prediction accuracy, Potential benefits for financial analysts, investors, and traders

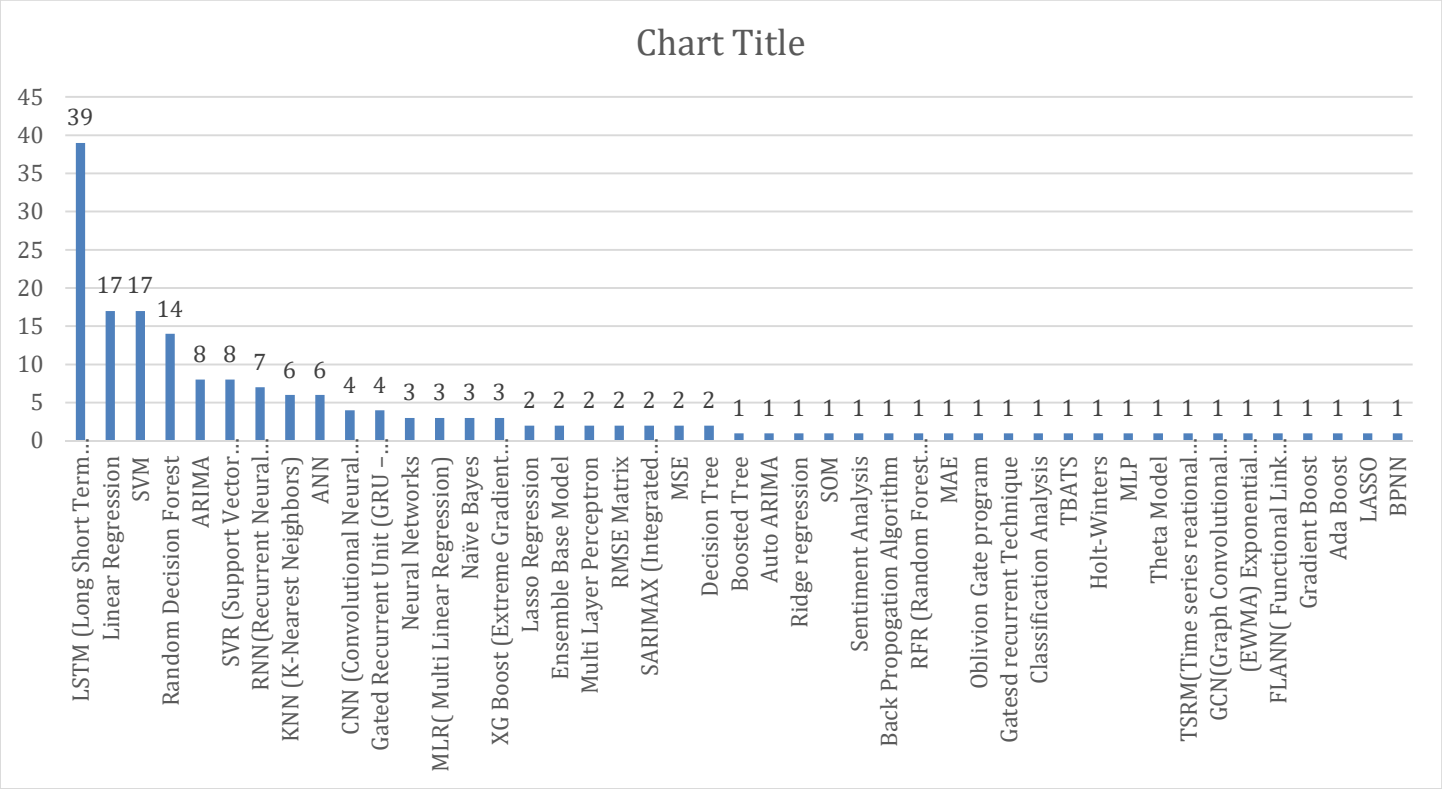
45	Comprehensive Study of Machine learning Algorithms for Stock Market Prediction during COVID-19	LSTM and ARIMA models for stock market prediction	LSTM and ARIMA models produce reasonably accurate results.	LSTM outperformed ARIMA in forecasting stock market trends during COVID-19.
46	Stock Market Analysis Using Time Series Relational Models for Stock Price Prediction	Time series relational model (TSRM)	Cumulative returns improved by 44% and 41%.	Improvement in cumulative returns by 44% and 41% in Chinese stock markets
47	ARIMA vs LSTM Algorithm – A Comparative Study Based on Stock Market Prediction	ARIMA (autoregressive integrated moving average model), LSTM (long short-term memory) neural network model	ARIMA and LSTM models were used to predict stock time-series data. The paper compared the performance of these models for stock market prediction.	ARIMA and LSTM models used for stock market prediction. Machine learning models outperform traditional models
48	Stock price prediction based on multifactorial linear models and machine learning approaches	Multiple linear regression, Exponential weighted moving average (EWMA), Extreme gradient advance (XGBoost), Long-term short-term memory (LSTM)	Multiple linear regression model has better prediction effect than XGBoost and LSTM. XGBoost and LSTM cannot fully utilize their advantages in this scenario.	Multiple linear regression model performs better than XGBoost and LSTM. XGBoost and LSTM do not perform well with less data.
49	Stock Market Prediction Using Machine Learning	Technical and fundamental analysis	Paper proposes ML approach for stock prediction	Stock market prediction using SVM
50	A comparative analysis of stock price prediction techniques	Linear model: MA (moving average) and EMA (exponential moving average), Nonlinear model: LSTM (long short-term memory) approach	Exponential moving average outperforms LSTM in stock price prediction. No other results or findings are mentioned in the abstract.	-
51	Stock Price Prediction Using Machine Learning Strategies	Deep learning methods: LSTM, GRU, RNN, hybrid methods.	Results presented through performance metrics: RMSE, MAPE, MAE, MSE	Summarizes machine learning methods used in stock price prediction

52	Stock Price Movement Prediction Using Machine Learning	LSTM, Linear regression	Emperical study of 12 papers. LSTM algorithm provides greater accuracy in stock price forecasting.	Machine learning is useful for stock price prediction. Technical and fundamental analysis are commonly used.
53	Sector-Based Stock Price Prediction with Machine Learning Models	SVM, KNN, XGBoost, RF algorithms used for stock price prediction.	-	Machine learning algorithms can predict stock prices.
54	Time Series Prediction: Comparative Study of ML Models in the Stock Market	ARIMA, XGBoost, and LSTM models were used in this paper. FLANN (Functional link artificial neural network) model was also proposed.	XGBoost performed the best with an accuracy of 98.92%. The performance of the models was evaluated using metrics such as MSE, MAE, RMSE, and MAPE.	XGBoost model performed best with 98.92% accuracy.Comparative study of ML models for stock market prediction.
55	Stock Market Prediction using Machine Learning Models	Linear Regression, Decision Tree, Random Forest, SVR, LSTM, Lasso Regression, KNN, Bayesian Ridge, Gradient Boosting, and Ada Boost. Suitable technique chosen for effective prediction of stock market.	The paper utilizes machine learning models to predict stock market prices.. Various techniques such as Linear Regression, Decision Tree, Random Forest, etc. are used.	Multiple machine learning models were used to predict stock market prices. The suitable technique for the dataset was chosen for effective prediction.

56	Comparative Study of Machine Learning Models Implemented on Stock Market Datasets	The paper analyzes machine learning algorithms such as k-nearest neighbor, linear regression, random forest, and support vector regression. The paper implements these algorithms on two different datasets of stock market IT sector companies TCS and Wipro.	Random forest is the best-fitted algorithm for stock market prediction. Ensemble learning enhances overall accuracy of the model.	Random forest is the best-fitted algorithm for stock market prediction. Ensemble learning enhances overall accuracy of the model.
57	Stock Index Spot–Futures Arbitrage Prediction Using Machine Learning Models	LASSO, XGBoost, BPNN, LSTM for prediction	LSTM outperforms all algorithms with 58.18% arbitrage return.	LSTM outperforms other algorithms in forecasting stock index arbitrage.
58	Stock Market Prediction Using Deep Learning	LSTM based model for stock price prediction. Recurrent oriented Short-Term Long Memory (LSTM) algorithm	LSTM algorithm performs better than its counterparts. Shows definite accuracy in predicting stock prices	LSTM based algorithm performs better than its counterparts. Shows definite accuracy in predicting stock prices
59	Predicting Stock Market Price Movement using Machine Learning Techniques	Support Vector Regression (SVR), K-nearest Neighbor (Knn), Decision trees (DTs), Random Forest, Artificial Neural Networks (MLPs), Deep learning technique (LSTM)	No best ML technique for predicting stock trends. MLP and LSTM techniques show promising performance	No best ML technique for predicting stock trends. MLP and LSTM techniques show promising performance.

60	Design Analysis and Implementation of Stock Market Forecasting System using Improved Soft Computing Technique	Artificial neural networks (ANNs) Technical analysis, fundamental analysis, time series analysis, statistical analysis	ANN outperforms other prediction techniques in stock market price predictions. ANN is a useful technique for predicting stock market movements globally.	Artificial neural networks (ANN) outperform other prediction techniques for stock market price predictions. ANN is a useful technique for predicting stock market movements globally.

Proposed System



By examining every paper, we learned that more papers employed the LSTM algorithm to forecast stock prices, historical stock price values taken over a period of time for a specific interval. The major tools utilised LSTM (Long Short Term Memory) Appears to be the most frequently mentioned model with a count of 39. LSTM is a type of recurrent neural network (RNN) architecture commonly used for sequence prediction tasks. Linear Regression and SVM (Support Vector Machine): Both have 17 mentions each. Linear regression is a simple model for predicting continuous outcomes based on linear relationships. SVM is a powerful classification algorithm that finds optimal hyperplanes to separate data points. Random Decision Forest: Mentioned 14 times. A type of ensemble learning method that combines multiple decision trees to improve prediction accuracy. ARIMA (Auto Regressive Integrated Moving Average): Occurs 8 times. ARIMA is a popular time series forecasting model that considers autoregressive, differencing, and moving average components. SVR (Support Vector Regression) and RNN (Recurrent Neural Networks): Both models have 8 mentions. SVR is an extension of SVM for regression tasks. RNNs are designed for sequence data and have memory to handle sequential dependencies. KNN (K-Nearest Neighbours), ANN (Artificial Neural Networks), and CNN (Convolutional Neural Networks): Each model appears 6 times. KNN is a simple instance-based

learning algorithm. ANN and CNN are neural network architectures used for various tasks, including image recognition. Gated Recurrent Unit (GRU), Neural Networks, and MLR (Multi Linear Regression): Each model has 4 mentions. GRU is another type of RNN. Neural networks refer to a broad category of models. MLR is a linear regression model with multiple predictors. Naïve Bayes, XG Boost (Extreme Gradient Boosting), and Lasso Regression: Each model occurs 3 times. Naïve Bayes is a probabilistic classifier. XG Boost is a gradient boosting algorithm. Lasso Regression includes L1 regularization. The remaining models (Ensemble Base Model, Multi-Layer Perceptron, RMSE Matrix, etc.) have 2 or 1 mention each.

Final Analysis

Creating a machine learning system is crucial for anticipating future stock prices. Accurate predictions can lead to profitable outcomes. While the challenge of using artificial intelligence (AI) techniques for stock predictions is straightforward, achieving near-accurate results remains difficult. Fundamental analysis provides a reliable approach for long-term stock value forecasts, while technical analysis excels in short-term predictions. Additionally, sentiment analysis enhances results. Among various tools, LSTM, Linear Regression, SVM, Random Forest, and RNN are commonly used for forecasting, each yielding different outcomes. Ultimately, the accuracy of the study relies more on machine learning algorithms than on statistical tools

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