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# Intraday Stock Trading Using Machine Learning

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***Abstract:*** ***With the advent of technological marvels like global digitization, the prediction of the stock market has entered a technologically advanced era, revamping the old model of trading. With the ceaseless increase in market capitalization, stock trading has become a center of investment for many financial investors.Many analysts and researchers have developed tools and techniques that predict stock price movements and help investors in proper decision-making. Advanced trading models enable researchers to predict the market using non-traditional textual data from social platforms. The application of advanced machine learning approaches such as text data analytics and ensemble methods have greatly increased the prediction accuracies. Meanwhile, the analysis and prediction of stock markets continue to be one of the most challenging research areas due to dynamic, erratic, and chaotic data. This study explains the systematics of machine learning-based approaches for stock market prediction based on the deployment of a generic framework. Findings from the last decade (2011–2021) were critically analyzed, having been retrieved from online digital libraries and databases like ACM digital library and Scopus. Furthermore, an extensive comparative analysis was carried out to identify the direction of significance. The study would be helpful for emerging researchers to understand the basics and advancements of this emerging area, and thus carry-on further research in promising directions.***

***Keywords: generic review; machine learning; stock market prediction; support vector machine***

## I. INTRODUCTION

Stock market is considered chaotic, complex, volatile and dynamic. Undoubtedly, its prediction is one of the most challenging tasks in time series forecasting. Stock market is basically non-linear in nature and the research on stock market is one of the most important issue in recent years. People invest in stock market based on some prediction. For prediction of the stock market prices people search such methods and tools which will increase their profits, while minimizing their risks. Prediction plays a very important role in stock market business which is very complicated and challenging process. Employing traditional methods like fundamental and technical analysis may not ensure the reliability of the prediction. It is considered as an example of time series forecasting that examines previous data in a timely manner and estimates future data values. Driving profits from trading is an important factor for stock market prediction,

## II. MACHINE LEARNING APPROACH

Because of global digitization, SMP has entered a technological era. Machine learning in stock price prediction is used to discover patterns in data [1]. Usually, a tremendous amount of structured and unstructured heterogeneous data is generated from stock markets. Using machine learning algorithms, it is possible to quickly analyze more complex heterogeneous data and generate more accurate results. Various machine learning methods have been used for SMP [2]. The machine learning approaches are mainly categorized into supervised and unsupervised approaches. In the supervised learning approach, named input data and the desired output are given to the learning algorithms. Meanwhile, in the unsupervised learning approach, unlabeled input data is provided to the learning algorithm, and the algorithm identifies the patterns and generates the output accordingly. Furthermore, different algorithmic approaches have been used in SMP, such as the Support Vector Machine (SVM), k Nearest Neighbors (kNN), Artificial Neural Networks (ANN), Decision Trees, Fuzzy Time-Series, and Evolutionary Algorithms. The SVM is a supervised machine learning technique that limits error and augments geometric margins, and is a pattern classification algorithm [2]. In terms of accuracy, the SVM is an important machine learning algorithm compared to the other classifiers [3]. In the kNN, stock prediction is mapped into a classification based on closeness. Using Euclidean distance, the kNN classifies the –k‖ nearest neighbors in the training set. The ANN is a nonlinear computational structure for various machine learning algorithms to analyze and process complex input data together. The FIS (Fuzzy Inference Systems) apply rules to fuzzy sets and then apply de-fuzzification to give crisp outputs for decision making [5]. The evolutionary algorithms include gene-inspired neuro-fuzzy and neuro-genetic algorithms, mimic the natural selection theory of species, and can give an optimal output.

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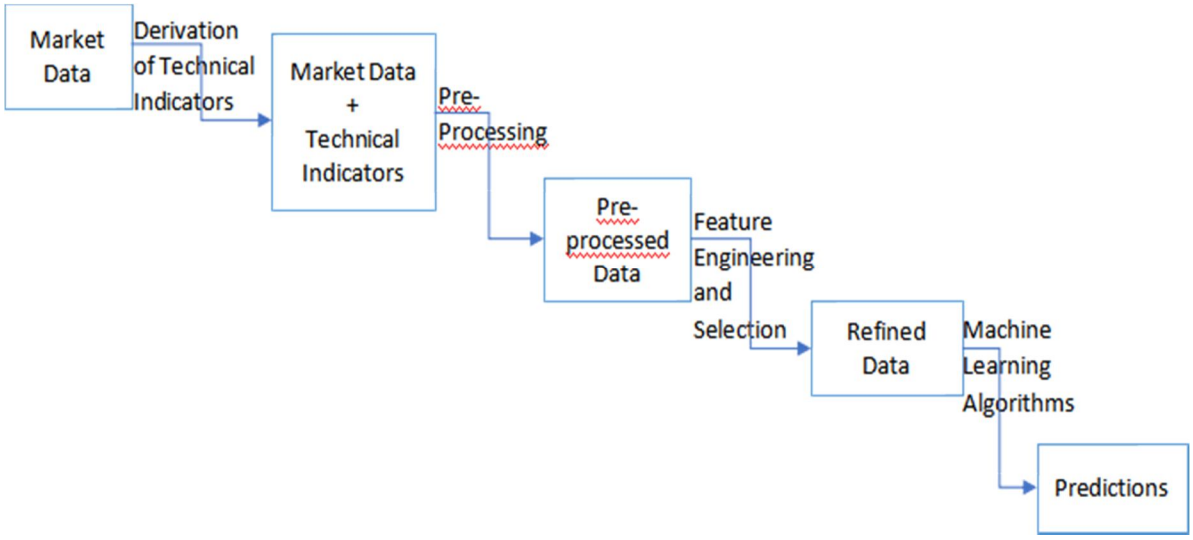
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*A. Regression Algorithms (RA)*

Regression is a predictive approach that models the relationship between a dependent variable and independent variables [6]. Different regression approaches have been used in previous studies: simple linear regression [6-7], multiple regression [7- 8], decision tree regression [8], logistic regression [7], support vector regression (SVR) [8], and ensemble regression [9]. For example, the authors in

[10] developed a model that predicts the stock price of a user-specified company a few days ahead. Regression analysis and candlestick pattern detection were applied to the data, which were collected from multiple sources. The model predicted the market movement to a satisfactory level of efficiency. Furthermore, different machine learning algorithms were used, and an improved accuracy of 85% was achieved.

## III. OBJECTIVE PROCESS FOR STOCK MARKET PREDICTION




Market data are the temporal historical price-related numerical data of financial markets. Analysts and traders use the data to analyze the historical trend andthe latest stock prices in the market. They reflect the information needed for the understanding of market behavior. The market data are usually free, and canbe directly downloaded from the market websites.Various researchers have used this data for the prediction of price movements using machine learning algorithms. The previous studies have focused on two types of predictions. Some studies have used stock index predictions like the Dow Jones Industrial Average (DJIA) [5], Nifty [6], Standardand Poor's (S&P) 500 [7], National Association of Securities Dealers Automated Quotations (NASDAQ) [8], the Deutscher Aktien Index (DAX) index [9], and multiple indices []. Other studies have used individual stock prediction based on some specific companies like ,Apple [], Google [12], orgroups of companies [14].

- Function to normalize stock prices based on theirinitial price

```
def normalize(df):
x = df.copy()
for i in x.columns[1:]:
x[i] = x[i]/x[i][0]return x
```

- Make Prediction

```
predicted_prices = regression_model.predict(X)predicted_prices
```

- Append the predicted values into a list

```
Predicted = []
for i in predicted_prices:Predicted.append(i[0])
```

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- Append the close values to the list

```
close = []
for i in price_volume_target_scaled_df:
close.append(i[0])
```

- Create a dataframe based on the dates in theindividual stock data

```
df_predicted = price_volume_target_df[['Date']]df_predicted
Add the close values to the dataframedf_predicted['Close'] = close df_predicted
Add the predicted values to the dataframedf_predicted['Prediction'] = Predicted df_predicted
```

- Plot the results

```
interactive_plot(df_predicted, "Original Vs.Prediction")
```




Figure 1 Forecasting on Monthly Basis

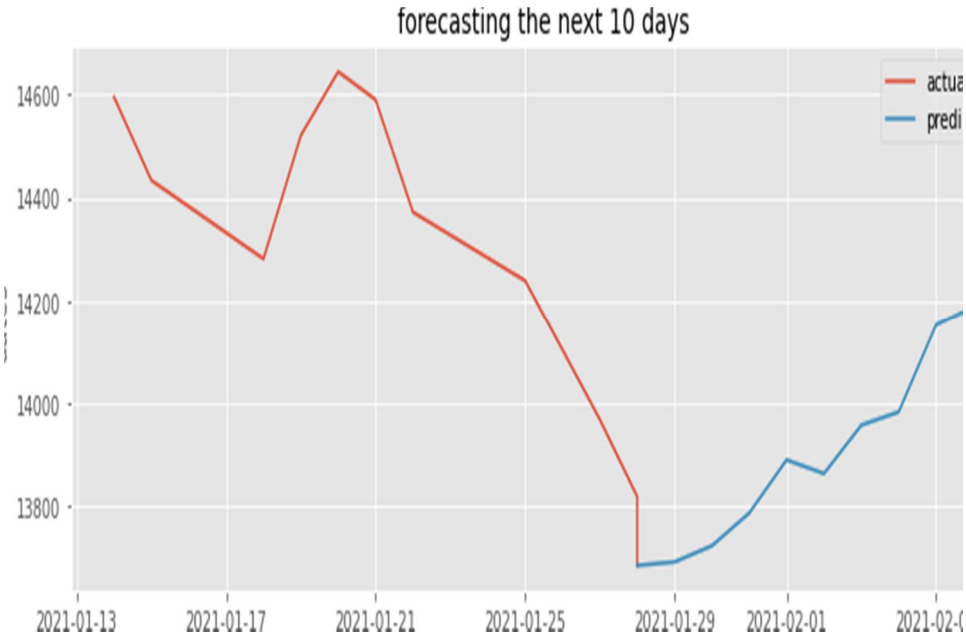



Figure 2 Forecasting the Next Days

## IV. COMPARATIVE ANALYSIS

The distribution of machine learning algorithms used for SMP is shown in Figure , where the SVM was themost popular technique used. However, the ANN and DNN have attracted the research community's attention for the last few years. Traditional neural network approaches may not make accurate SMPs as initially; the weight of the randomly selected problems may suffer from the local optimal, and results in incorrect predictions [13]. The deep learning approaches are used to analyze complicated patterns in the stock data, and provide much better results

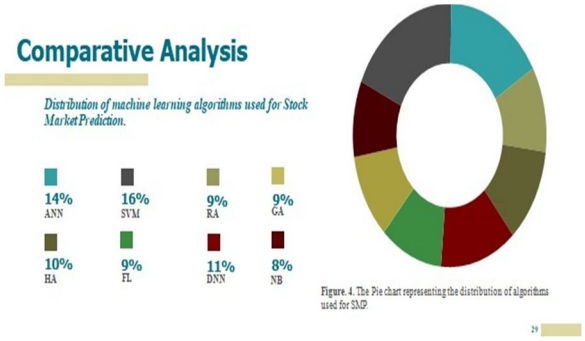


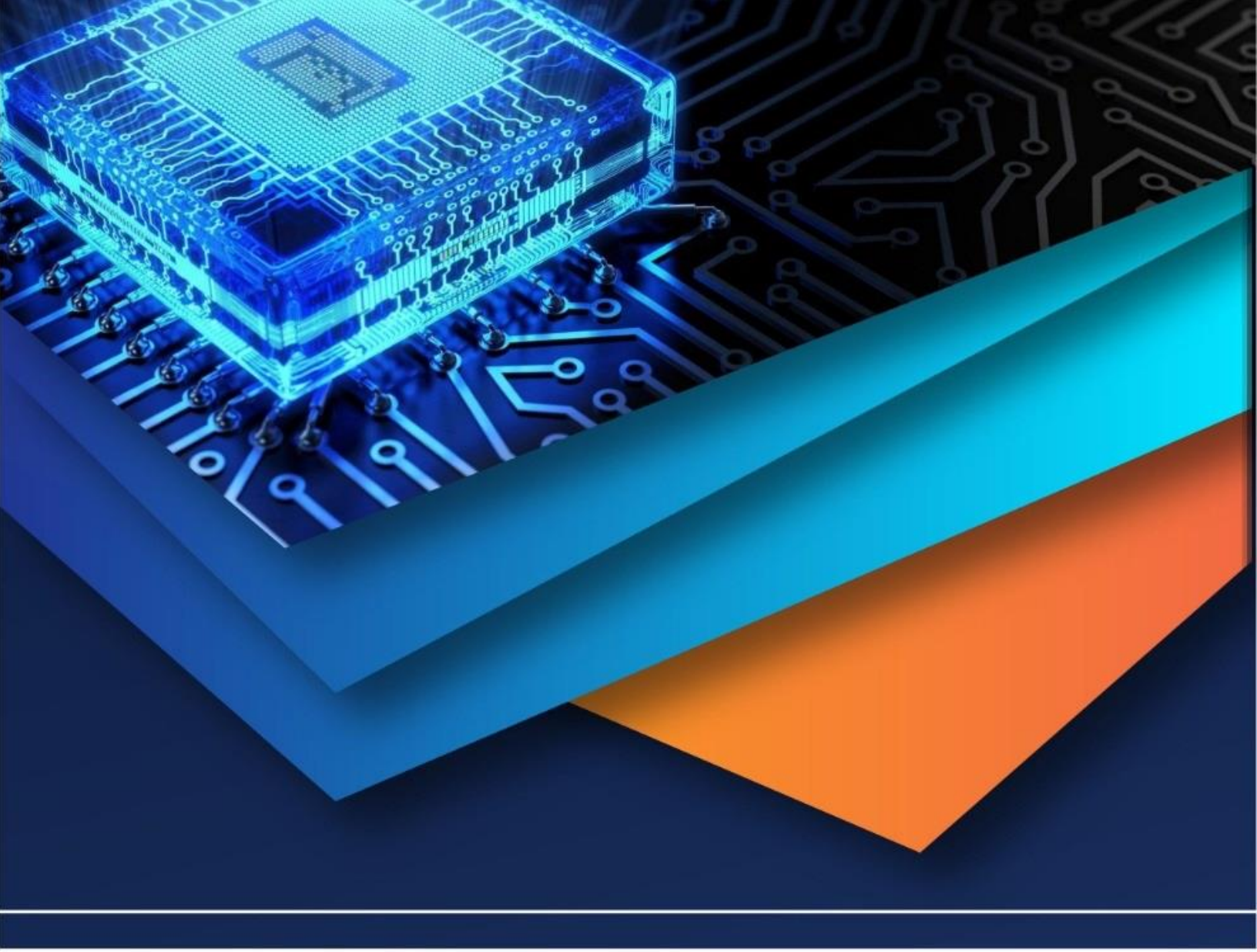

Figure 3: Comparative Analysis

## V. CONCLUSION

Financial markets provide an excellent platform for investors and traders, who can trade from any gadget that connects to the internet. Over the last few years, people have become more attracted to stock trading. Like any other walk of life, the stock market has also changed due to the advent of technology. Now, people can make their investments grow. Online trading has only changed the way individuals purchase and sell stocks. The budgetary markets have advanced rapidly, and have formed an interconnected global marketplace. These advancements pave the way to new opportunities. Electronics 2021, 10, 2717
18 of 25 In contrast to conventional frameworks, SMP is currently performed using machine learning, big data analytics, and deep learning, which provide more optimal decision making. Stock markets, nowadays, are vulnerable to social media sentiments and cyber attacks. Researchers can play a significant role and flourish in these areas by developing the frameworks for better and more secure trading.

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