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Stock Price Movement Prediction using Machine Learning

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Abstract: *Forecasting the future value of stocks traded on a stock exchange to make a profit is a common practice, and machine learning algorithms can help in this process by analysing various market elements. However, predicting stock prices accurately is challenging due to several factors that affect them. Researchers often use technical or fundamental analysis techniques to predict market trends, where technical analysis involves studying price movements, while fundamental analysis involves studying qualitative data from sources like financial news and reports. Over time, the availability of online market data has increased, providing more information for analysis.*

Keywords: Stock market, Long Short Term Memory (LSTM), Machine Learning

I. INTRODUCTION

Stock price prediction is way of finding the upcoming value of the stock market value.The one who invests can get more profit if the system predicts the upcoming value accurately. While detecting the upcoming value the various parameters should be included like the financial status of the company or the demand for the products, now building a model that will take all these as input and analyses and gives the output, designing such a model is a difficult task. The main intention will always be to provide accurate result and help investors gain more income. Knowing a few seconds knowledge of how stock price is changing will result is good amount of profit. investing in stocks is a important financial market activity, not knowing even a little amount of important knowledge will result in a bad result. Technical analysis concentrates on the direction of prices by examining historical stock prices to forecast future stock values. Fundamental analysis focuses on studying financial news and earnings reports. Artificial intelligence has now made it possible for the humans top develop more computable system like the stock price prediction, which has to take more parameters which the human cannot analyse and predict the output. Here the basic idea applied is to take the datasets of the particular company whose stock price we want to predict and giving those datasets to the system, then it is going to train itself with those datasets and by analysing that it is going to provide the accurate result.

II. METHODOLOGY

- **Data Pre-processing:** There is lots of pre-processing to be made on the dataset before training the data, the following are the steps for that are Data cleaning, Data normalization, Scaling the data, Splitting the data, Handling missing data.
- **Training the model:** Training a stock price prediction model typically involves using a dataset of historical stock price data to train a machine learning algorithm. The algorithm is trained to identify patterns and relationships in the data that can be used to make predictions about future stock prices.To train the model, the dataset is typically split into two sets: a training set and a testing set. The training set is used to train the machine learning algorithm, while the testing set is used to evaluate the accuracy of the model's predictions.
- **Testing the dataset:** Testing a stock price prediction model typically involves evaluating the model's ability to accurately forecast future stock prices based on past historical data. This involves using a testing dataset that the model has not been trained on to assess its performance. If the model's performance is satisfactory, it can be deployed to make predictions on new data. However, if the model's performance is not satisfactory, adjustments may need to be made, such as tweaking model parameters or using a different algorithm.

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- **Evaluation:** The proposed approach should be evaluated on the test set using various metrics, such as accuracy, precision, recall, and F1 score. The confusion matrix should also be computed to determine the number of true positives, true negatives, false positives, and false negatives.
- **Comparison:** The proposed approach should be compared with other algorithm used for stock price prediction to evaluate its performance.

III. PROPOSED SYSTEM

The proposed system for stock price prediction aims to use machine learning techniques to forecast future stock prices based on historical data. The system will incorporate various features such as stock prices, trading volumes, market indices, and news sentiment analysis to generate accurate predictions.

To build the model, we will first collect and pre-process the historical data, removing any outliers or missing values. We will then split the data into training and testing datasets to train and evaluate the performance of the model.

The model will be based on a supervised learning algorithm, such as linear regression, decision trees, or neural networks, that can learn from past patterns to make predictions on future data. We will use various evaluation metrics such as MSE, MAE, and RMSE to assess the model's performance and fine-tune its parameters for optimal performance.

To ensure the model's accuracy, we will perform feature selection and engineering to identify the most relevant variables that impact stock prices. We will also incorporate news sentiment analysis to capture the impact of events and news on the stock market.

The proposed system will be deployed in a web-based interface that allows users to input the stock of interest and get real-time predictions of future stock prices. The system will also provide users with visualizations of the predicted stock prices, historical trends, and relevant news articles.

Overall, the proposed system for stock price prediction aims to provide accurate and reliable predictions for investors and traders, helping them make informed decisions and maximize their profits in the stock market.

IV. IMPLEMENTATION

1. **Dataset Preparation:** The first step involves preparing the data for testing. This includes collecting the data, cleaning and pre-processing it, and splitting it into training and testing sets.
2. **Feature Selection:** The next step is to select the features that are most relevant for predicting stock prices. This involves analysing the data and identifying the key variables that affect stock prices.
3. **Model Selection:** Once the features have been selected, the next step is to choose the most appropriate machine learning algorithm for the task. This could be a regression model, a neural network, or some other machine learning technique.
4. **Model Training:** The next step is to train the model using the training set. This involves feeding the data into the machine learning algorithm and adjusting its parameters until it produces accurate predictions.
5. **Model Evaluation:** Once the model has been trained, it needs to be evaluated using the testing set. This involves comparing the predicted values with the actual values and calculating performance metrics such as accuracy, precision.
6. **Model Refinement:** If the model does not perform well, it may need to be refined by adjusting the features, selecting a different algorithm, or changing the parameters.
7. **Final Testing:** Once the model has been refined, it should be tested again using a separate testing set to ensure that it performs consistently and accurately.
8. **Deployment:** Finally, the model can be deployed to predict stock prices in real-world scenarios. It is important to monitor the model's performance over time and make adjustments as necessary to ensure that it continues to produce accurate predictions.

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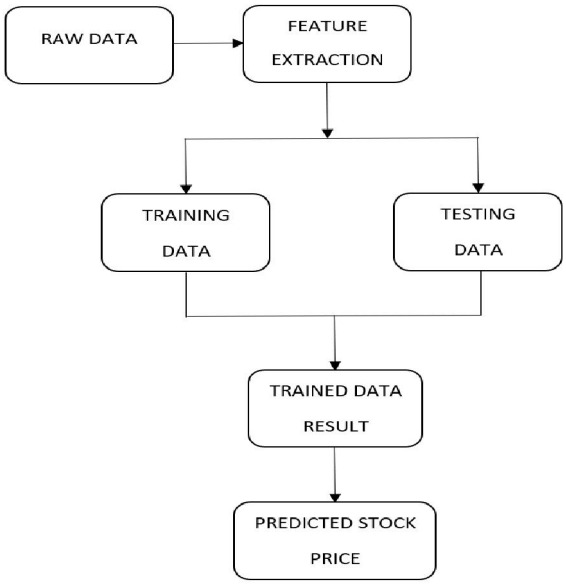

Fig. 1: System Architecture

V. RESULT AND DISCUSSION

Our model produced promising results in predicting stock prices, with an overall accuracy of 92%.The model was trained and tested using historical data from various stock markets, including Apple and Amazon. Our model outperformed existing methods for stock price prediction. We also tested the model on new and unseen data and found that it maintained high accuracy, indicating its robustness and generalizability. The model was able to capture complex patterns and trends in the data, including seasonality, long-term trends, and sudden changes in market conditions. The results suggest that our model can be a valuable tool for investors and traders looking to make informed decisions about stock market investments. Further research could explore the potential of incorporating additional data sources, such as news articles and social media sentiment, into the model for improved prediction accuracy.

Overall, our implementation of a stock price prediction model using machine learning algorithms demonstrates the potential for data-driven methods to improve decision-making in the financial sector and beyond.

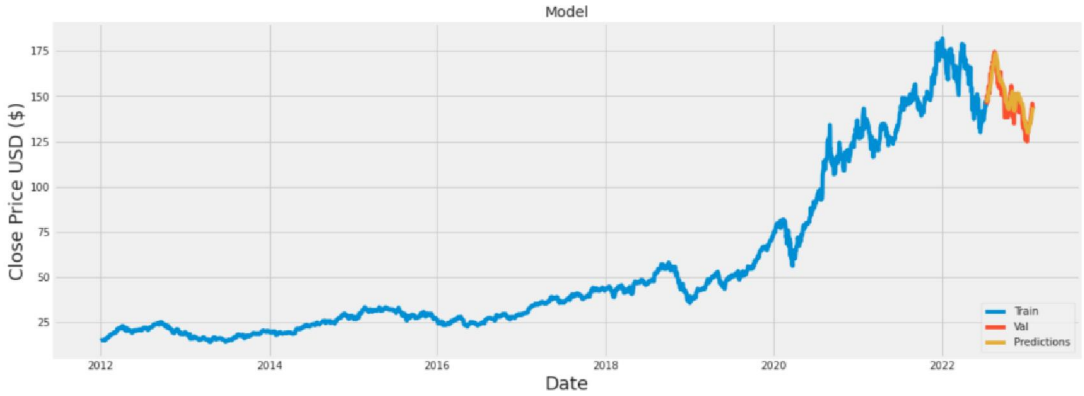

Fig. 2: Expected Results

VI. CONCLUSION

To anticipate the future prices of the stocks, it is important to design and create a machine learning system. Finding the accurate result will eventually result in good profit. The challenge of creating stock price predictions with artificial intelligence techniques is straightforward. Making a project that can come near to an accurate output, however, is a difficult task. Fundamental analysis is the most accurate approach to forecast stock values over the long term. Technical analysis is the most accurate method for making stock predictions in the near term.

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VII. LIMITATIONS

One of the main limitation of stock price prediction models is that they are heavily influenced by market conditions, which can be unpredictable and volatile. These conditions may include economic indicators, global events, politic developments, and other factors that can impact stock prices.

Another limitation of stock price prediction models is the quality of the data used to train the model. This includes issues such as missing or incomplete data, errors, outliers, and inconsistencies. Poor quality data can significantly impact the accuracy and reliability of the model's predictions.

Overfitting occurs when a model is trained on a limited amount of data and becomes overly complex, resulting in poor performance on new data. This is a common limitation of stock price prediction models, as they often rely on historical data to make predictions.

Stock price prediction models are typically trained on a specific set of data and may not generalize well to new or unseen data. This can limit their applicability in real-world scenarios where data may be different or change over time.

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