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STOCKMARKET PRICE PREDICTION AND TREND ANALYSIS USING MACHINE LEARNING ALGORITHMS

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ABSTRACT

Machine learning has significant applications in the stock price prediction. Our project revolves around stock market price prediction and trend analysis, employing cutting-edge machine learning techniques and harnessing the extensive data from Yahoo Finance. By combining historical stock data, day trading strategies, moving average analysis, and support and resistance techniques, our model aims to provide accurate and actionable insights for investors. Through rigorous training and testing of the machine learning algorithms, our project endeavors to forecast future price movements with improved precision. Investors can leverage these predictions to make informed decisions, enhancing their day trading strategies and optimizing their investment choices. The inclusion of moving average analysis and support and resistance techniques adds further depth to our model's predictive capabilities. By identifying key price levels and potential turning points, our project aids investors in understanding market trends and potential areas of support and resistance. Our objective is to empower investors with a comprehensive toolset for informed decision-making in the volatile stock market. By utilizing advanced machine learning and integrating various technical analysis methods, our project aspires to enhance investors' understanding of market dynamics, bolster day trading strategies, and ultimately improve overall investment performance. With a focus on accuracy and reliability, this project represents a valuable resource for traders seeking to navigate the complexities of the stock market with confidence.

INTRODUCTION

The stock market is a vast array of investors and traders who buy and sell stock, pushing the price up or down. The prices of stocks are governed by the principles of demand and supply, and the ultimate goal of buying shares is to make money by buying stocks in companies whose perceived value (i.e., share price) is expected torise. Stock markets are closely linked with the world of economics —the rise andfall of share prices can be traced back to some Key Performance Indicators (KPI's).The five most commonly used KPI's are the opening stock price (`Open'), end-of-day price (`Close'), intraday

low price (`Low'), intra-day peak price (`High'), andtotal volume of stocks traded during the day (`Volume'). Economics and stock prices are mainly reliant upon subjective perceptions about the stock market. It is near impossible to predict stock prices to the T, owing to the volatility of factors that play a major role in the movement of prices. However, it is possible to make an educated estimate of price movements. Stock prices never vary in isolation: the movement of one tends to have an avalanche effect on several other stocks as well. This aspect of stock price movement can be used as an important tool to predict the price movements of many stocks at once. Due to the sheer volume of money involved and number of transactions that take place every minute, there comes a trade-off between the accuracy and the volume of predictions made; as such, most stock prediction systems are implemented in a distributed, parallelized fashion. These are some of the considerations and challenges faced in stock market analysis. Investors, traders, and financial institutions constantly seek accurate predictions to make informed decisions and maximize profits. Machine learning algorithms, with their ability to process large volumes of data and recognize intricate patterns, have become invaluable tools in this domain. Machine learning models leverage historical market data, such as stock prices, trading volumes, and other relevant indicators, to identify trends and patterns. By analyzing these patterns, machine learning algorithms can make predictions about future stock prices and market trends.

Stock market prediction is basically defined as trying to determine the stockvalue and offer a robust idea for the people to know and predict the market andthe stock prices. Stock Price Prediction using Random Forest Classifier with Moving Averages. In the ever-evolving landscape of financial markets, accurate prediction of stock prices remains a formidable challenge. While moving averages have been widely employed as a tool for capturing underlying trends, their effectiveness in isolation may not always lead to optimal predictions. The motive of this is to enhance stock price prediction accuracy by leveraging the power of ensemble learning, specifically the Random Forest Classifier, in addition with moving averages. The central problem this project aims to address is: "How can the predictive accuracy of stock price movements be improved by integrating the Random Forest Classifier with moving averages, and how does this approach compare to traditional moving average-based predictions?"

Stock market price prediction and trend analysis are crucial challenges in the financial industry. Investors and traders require accurate forecasts to make informed decisions, maximize profits, and minimize risks. Traditional methods of analysis often struggle to capture the complex patterns and dynamic nature of financial markets. Hence, there is a growing need for sophisticated machine learning algorithms to predict stock prices and analyze market trends.

LITERATURESURVEY

Investing money into unpredictable, unstable, and uncontrollable facets can be extremely risky. Like the lottery, the success of stock market trading is partly attributed to luck. Many people have lost vast amounts of money through poor investment decisions that they’ve made. Recently, investors with shares in loan-giving companies and American car manufacturers, which were previously a fairly stable investment, have suffered severe losses due to the economic crisis. Investors must understand and accept this risk as an intrinsic part of investing. There are, however, attractive benefits to successful financial investments. With intelligent decisions, investing can yield significant capital gains, stability, and security. By analyzing the trends of the stock market, the companies one is invested in, and by following an investment strategy, one can be successful in the stock market. There has been much research into various ways of analyzing the stock market as a means of facilitating intelligent investment decisions. These “intelligent decisions” are paramount to the success of an investment, and will be examined in this experiment.

PROPOSED SYSTEM

In this proposed system, we focus on predicting the stock values using machine learning algorithms like Random Forest and Support Vector Machines. We proposed the system “Stock market price prediction” we have predicted the stock market price using the random forest algorithm. In this proposed system, we were able to train the machine from the various data points from the past to make a future prediction. We took data from the previous year stocks to train the model. We majorly

used two machine-learning libraries to solve the problem. The first one was NumPy, which was used to clean and manipulate the data, and getting it into a form ready for analysis. The other was scikit, which was used for real analysis and prediction. We used the python pandas library for data processing which combined different datasets into a data frame. The tuned up dataframe allowed us to prepare the data for feature extraction. The dataframe features were date and the closing price for a particular day. We used all these features to train the machine on random forest model and predicted the object variable, which is the price for a given day. We also quantified the accuracy by using the predictions for the test set and the actual values. The proposed system touches different areas of research including data pre-processing, random forest. Two versions of prediction system will be implemented; one using linear regression and other using Support Vector Machines. The experimental objective will be to compare the forecasting ability of machine learning algorithms. We will test and evaluate both the systems with same test data to find their prediction accuracy.

RESULTS

Based on the training data the random forest generates random decision trees to envelope different features which are most probable for the prediction. The output results in the target variable either reaching '1' indicating the price may increase or '0' indicating the price may decrease.

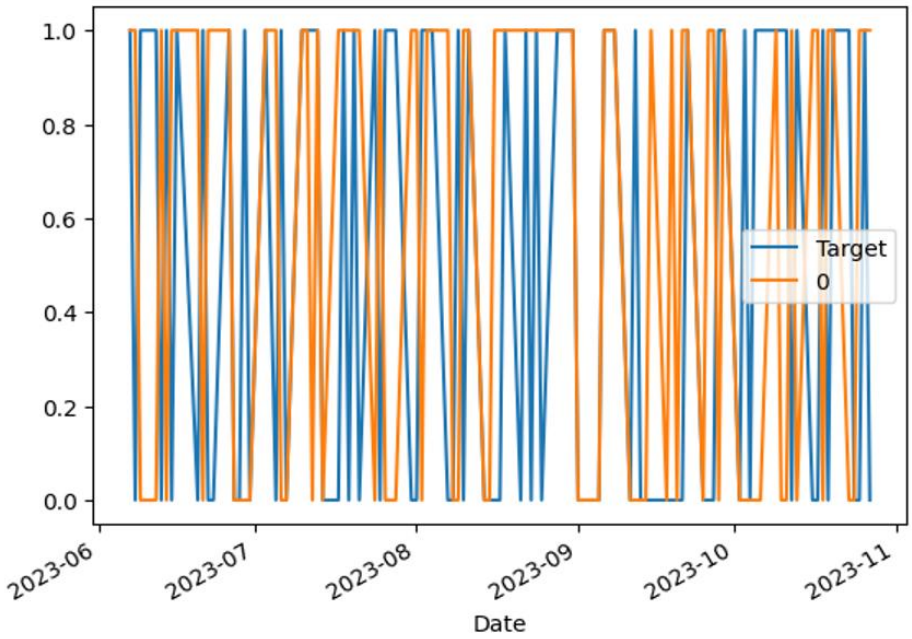

Fig. 1 The Actual vs Prediction of the Target

The analysis of the trend is done while training the model since 50 Day moving average and 200 Day moving average are the most used averages which helps in identifying trends and also the changes in trends.

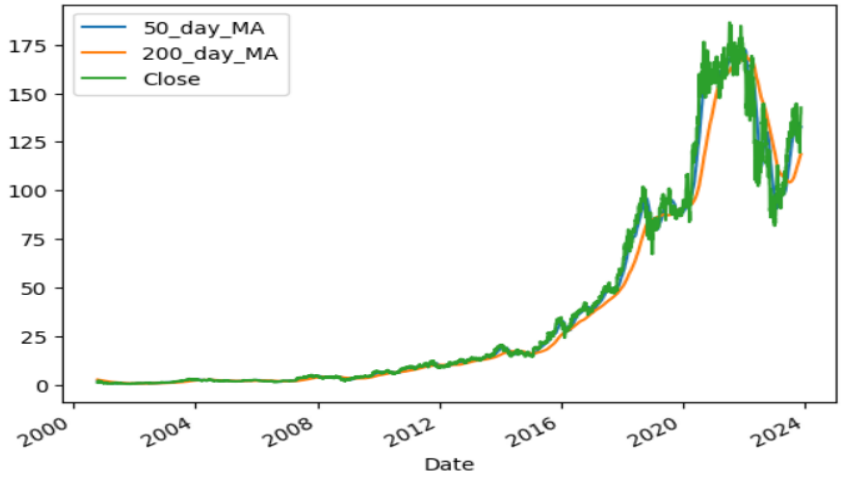

Fig.2 Trend Analysis for Amazon

As we can see from the above graph the 50 day moving average and 200 day moving average acted as support in uptrend and as resistance in downtrend. The user can estimate a trend by seeing the crossover of 50 and 200 day moving averages. Whenever the 50 day MA crosses 200 day MA from below then it is the starting of uptrend and this event is known as “Golden Crossover”. And similarly whenever the 50 day MA crosses 200 day MA from above it indicates the beginning of the downtrend and this event is known as “Death Crossover”. Through the process done, we have proved and increased the accuracy of the Random Forest Classifier with the Backtesting system by enhancing the model. In the previous model, we have calculated the accuracy score and noted it to be 48.7%. After checking the dataset with the functions, we have calculated the accuracy score and noted it to be 50.03% improvement, using the above information we have confirmed that the research work aligns with the preexisting model. After enhancing the model, we have calculated the accuracy score again and noted it to be 52.6%.

CONCLUSION

It is quite challenging to predict the stock market because of its nonlinear, dynamic, and complicated character. Yet, in recent times, stock forecasting has found machine learning approaches to be beneficial. Several algorithms, including SVM, LSTM and others, have been investigated for their reliability in stock market forecasting. However, there hasn't been much use of ensemble learning techniques in this area. Our prediction model in this study, which was developed using a random forest classifier, yielded some quite outstanding outcomes. Through the calculation of several metrics, including accuracy the stability of our approach has been assessed. In this project, we developed a stock market price prediction system using the Random Forest Classifier algorithm. The program takes a user-input stock ticker, fetches historical data from Yahoo Finance, and performs a comprehensive analysis including trend analysis based on 50-day and 200-day moving averages.

The Random Forest Classifier was trained on a combination of moving averages and technical indicators to predict the stock price trend. The model was evaluated for its accuracy, and the trading decision was made based on the predicted trend and a user-defined probability threshold. If the predicted trend was an uptrend and the probability of the prediction exceeded the threshold, a trade was recommended. Conversely, for a downtrend, a trade was suggested if the probability was below the threshold. Additionally, a visualization of the stock price along with the 50-day and 200-day moving averages was provided for a better understanding of the historical price movements.

However, it's important to note that the model's predictions and trading decisions are based on historical data and certain assumptions. Real-world trading involves significant risks, and decisions should be made after careful consideration of market conditions, thorough analysis, and risk management strategies. This project serves as an educational and illustrative example of using

machine learning algorithms for stock price prediction and should not be used for actual trading without proper validation, back testing, and consultation with financial experts.

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