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Stock Price Prediction Using Machine Learning

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Abstract- This project explores the application of machine learning techniques for predicting stock prices, a key challenge in the financial industry. By analyzing historical stock data, including price trends, trading volumes, and other relevant market indicators, the study aims to forecast future stock prices with high accuracy. Various machine learning models, including regression analysis, support vector machines (SVMs), and deep learning methods, are employed to capture complex patterns in the data. The goal is to provide traders and investors with a predictive tool to enhance decision-making and optimize financial strategies. The results of this project highlight the potential of machine learning in transforming stock market predictions and improving investment outcomes. Furthermore, the project investigates feature selection techniques to identify the most impactful variables for prediction, improving model efficiency. Through extensive testing and model evaluation, it demonstrates how machine learning can adapt to the dynamic nature of financial markets. Ultimately, this approach can potentially automate and optimize trading strategies for better returns.

Keywords- Machine Learning, Stock Price Prediction, Financial Markets, Historical Data Analysis, Regression Analysis.

I. INTRODUCTION

The modern advances in artificial intelligence have led to the creation of new mathematical tools like deep learning and reinforcement learning. Businesses use data science and analytics to obtain solutions for various business issues. Stock trading is one of the most important activities in the finance world. Stocks are an equity investment that denotes a part of ownership in an organization or a company; it entitles you to be a part of that company's earnings and assets. Stock market prediction can be defined as determining the future value of a stock or other financial instrument that is traded on a financial exchange. The successful prediction of a stock's future price can lead to hefty profits. Financial information is a significant component of all electronic data. An average stock exchange creates nearly trillions of Gigabytes (GB) of trade and order book data in a month. In recent years, the rising popularity of machine learning in various industries has enlightened many traders to apply machine learning techniques to the field, and some of them have produced quite promising results.

Machine Learning (ML) provides a unique perspective to us on understanding the stock market and financial data. Customers can determine whether it is worth investing in a particular stock. The pricing of the complex financial product needs many statistical computations and simulations based on the data. The computations are ready-to-use data resources and information for future applications. Algorithmic Trading not only makes purchase or sell decisions but also recommends the product efficiently. In Indian stock markets, a leading part of trading decisions is made using computer programs.

For decades, computer algorithms have been built and tweaked to try to predict the stock market and make the appropriate investment at the right time. Machine Learning can additionally implement

algorithms to identify unusual patterns of behaviour based on past behaviours. The stock market has an extremely volatile nature. The major goal is to minimize the uncertainty of the returns by accurately predicting the future stock prices and also identifying their fluctuations in advance to reduce risks.

II. LITERATURE SURVEY

TITLE: Stock Market Prediction Using Machine Learning
AUTHOR: V Kranthi Sai Reddy1
YEAR: 2018
DESCRIPTION: In the finance world, stock trading is one of the most important activities. Stock market prediction is an act of trying to determine the future value of a stock or other financial instrument traded on a financial exchange. This paper explains the prediction of a stock using Machine Learning. The technical and fundamental time series analysis is used by most of the stockbrokers while making stock predictions. The programming language used to predict the stock market using machine learning is Python.
In this paper, we propose a Machine Learning (ML) approach that will be trained from the available stock data and gain intelligence, and then use the acquired knowledge for an accurate prediction. In this context, this study uses a machine learning technique called Support Vector Machine (SVM) to predict stock prices for the large and small capitalizations and in the three different markets, employing prices with both daily and up-to-the-minute frequencies.

TITLE: Prediction of Stock Market performance by using machine learning techniques
AUTHOR: Kamran Raza
YEAR: 2017
DESCRIPTION: One decision in the Stock Market can make a huge impact on an investor's life. The stock market is a complex system and often covered in mystery; it is, therefore, very difficult to analyze all the impacting factors before making a decision. In this research, we have tried to design a stock market prediction model that is based on different factors. The model was built to predict the performance of the KSE-100 index. The prediction model predicts the market as positive or negative with the help of different attributes. These factors include price fluctuation of fuel, commodity, foreign exchange, interest rate, general public sentiment, related NEWS, and Auto-Regressive Integrated Moving Average (ARIMA) and Simple Moving Average (SMA) predicted values with the help of historical data of the market.

The techniques used for prediction include four different versions of Artificial Neural Network (ANN), including Single Layer Perceptron (SLP), Multi-layer Perceptron (MLP), Radial Basis Function (RBF), and Deep Belief Network (DBN). Other techniques include Support Vector Machine (SVM), Decision Tree, and Naïve Bayes. All these techniques were compared to find the best predicting model. The results showed that MLP performed best and predicted the market with an accuracy of 77%. Each factor was studied independently to find out its association with market performance. The change in Petrol prices showed the strongest association with market performance. The results suggested that the behavior of the market can be predicted using machine learning techniques.

TITLE: Stock Market Prediction Using Machine Learning Techniques
AUTHOR: Nusrat Rouf 1, Majid Bashir Malik 2, Tasleem Arif 3
YEAR: 2021
DESCRIPTION: 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, has greatly increased the prediction accuracy. 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 help emerging researchers to understand the basics and advancements of this emerging area, and thus carry on further research in promising directions.

III.SYSTEM ANALYSIS

1. Proposed Systems

The proposed system uses the Support Vector Machine (SVM) algorithm to predict stock prices. Historical stock data, such as open, close, high, low, and volume, are used as input features. Data preprocessing techniques are applied to clean and normalize the dataset. SVM is trained to learn patterns and trends from past stock behavior. It predicts future stock prices by mapping the data into a higher-dimensional space. This system helps investors make data-driven financial decisions.

Advantages

- Scalability
- Continuous Learning
- Automated Predictions

2. Existing system

Existing stock price prediction systems often rely on traditional statistical methods, which struggle to capture non-linear market patterns. They are highly sensitive to noise and sudden market fluctuations, reducing prediction accuracy. Many cannot adapt to real-time data and dynamic market conditions. Overfitting is common, especially when dealing with limited or unbalanced datasets. Additionally, they may ignore important external factors like news, sentiment, or global events that influence stock prices.

Disadvantages

- Data Quality Issues
- Overfitting Risk
- Complexity

IV. MODULES

- Data Collection and Preprocessing
- Exploratory Data Analysis (EDA)
- Model Selection and Training
- Model Evaluation and Validation
- Stock Price Prediction and Analysis

Kernel functions

- Linear
- Polynomial
- Gaussian Radial Basis Function (RBF)
- Sigmoid

V. ALGORITHMS

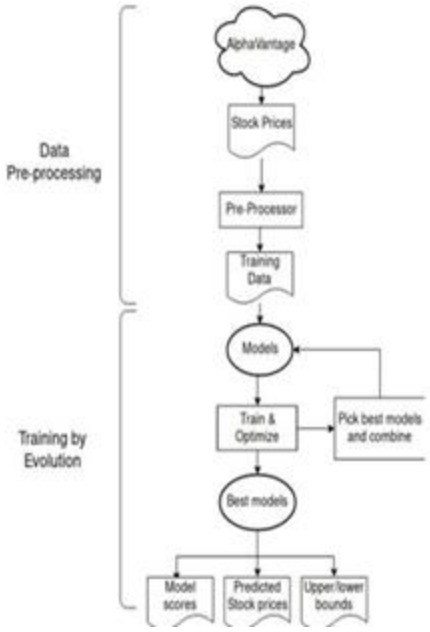
Support Vector Machine Algorithm

Most Of The Tasks Machine Learning Handles Right Now Include Things Like Classifying Images, Translating Languages, Handling Large Amounts Of Data From Sensors, And Predicting Future Values Based On Current Values. You Can Choose Different Strategies To Fit The Problem You're Trying To Solve.

Supervised Vs Unsupervised Learning

Two Of The Most Commonly Used Strategies In Machine Learning Include Supervised Learning And Unsupervised Learning.

VI. SYSTEM DESIGN



VII. CONCLUSIONS

In Conclusion, This Project Demonstrates The Effectiveness Of Support Vector Machine (SVM) In Predicting Stock Prices Based On Historical Market Data. By Leveraging Technical Indicators And Carefully Preprocessing The Data, the SVM model Can Capture Non-Linear Patterns And Provide Reliable Forecasts. The System Supports Informed Investment Decisions By Offering Data-Driven Insights Into Potential Stock Price Movements. While Stock Markets Remain Inherently Volatile And Influenced By Many External Factors, The Use Of SVM provides A Solid Foundation For Building Intelligent, Adaptable, And Efficient Stock Prediction Models. Future Improvements Could Include Incorporating Sentiment Analysis And Real-Time Data For Enhanced Accuracy.

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