Forecasting Stock Market Trends through Advanced Machine Learning Techniques

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Abstract— *The stock market involves buying and selling shares representing ownership in businesses. Stock market prediction aims to forecast future stock values accurately, considering various influencing factors. This paper explores stock prediction using Machine Learning, particularly focusing on Python as the programming language. The proposed ML approach utilizes available stock data to make accurate predictions, employing techniques like Monte Carlo across different market segments and frequencies.*

I. INTRODUCTION

Stock market prediction involves analyzing stocks through fundamental and technical analyses. Machine learning techniques have gained traction in recent years for predicting stock prices. Short-term predictions appear random, while long-term trends often follow linear curves. Accurate prediction methods include time series forecasting, technical analysis, and machine learning modeling. Datasets for prediction models include various stock market variables. Traditional methods treat prediction as multivariate analysis, while machine learning models can treat it as regression or classification problems

II. LITERATURE REVIEW

2.1 Survey Of Stock Market Prediction Using Machine Learning Approach

The stock market is complex, and predicting its prices is crucial yet challenging. Traditional methods like fundamental and technical analysis may not always provide reliable predictions. Regression analysis is commonly used for prediction. This paper surveys efficient regression approaches for stock market price prediction. Future research could enhance results by incorporating more variables.

2.2 Stock Market Prediction Using Machine Learning Techniques

Tapas Ranjan Baitharua, Subhendu Kumar Panib - 2016

The main objective of this research is to predict the market performance of Karachi Stock Exchange (KSE) on day closing using different machine learning techniques. The prediction model uses different attributes as an input and predicts market as Positive & Negative. The attributes used in the model includes Oil rates, Gold & Silver rates, Interest rate, Foreign Exchange (FEX) rate, NEWS and social media feed. The old statistical techniques including Simple Moving Average (SMA) and Autoregressive Integrated Moving Average (ARIMA) are also used as input. The machine learning techniques including Single Layer Perceptron (SLP), Multi-Layer Perceptron (MLP), Radial Basis Function (RBF) and Support Vector Machine (SVM) are compared. All these attributes are studied separately also. The algorithm MLP performed best as compared to other techniques. The oil rate attribute was found to be most relevant to market performance. The results suggest that performance of KSE-100 index can be predicted with machine learning techniques.

2.3 Machine Learning Techniques And Use Of Event Information For Stock Market Prediction: A Survey And Evaluation

Paul D. Yoo, Maria H. Kim, Tony Jan

This paper surveys machine learning techniques for stock market prediction. The prediction of stock markets is regarded as a challenging task of financial time series prediction. In this paper, we present recent developments in stock market prediction models, and discuss their advantages and disadvantages. In addition, we investigate various global events and their issues on predicting stock markets. From this survey, we found that incorporating event information with prediction model plays very

important roles for more accurate prediction. Hence, an accurate event weighting method and a stable automated event extraction system are required to provide better performance in financial time series prediction.

2.4 A Machine Learning Model For Stock Market Prediction:

Osman Hegazy, Omar S. Soliman And Mustafa Abdul Salam

Stock market prediction aims to forecast future stock prices, crucial for maximizing investor gains. This paper proposes a machine learning model integrating PSO and LS-SVM algorithms for accurate prediction. By optimizing LS-SVM using PSO, overfitting and local minima issues are addressed, enhancing prediction accuracy. Evaluation against benchmark datasets demonstrates superior performance compared to an artificial neural network with LM algorithm.

2.5 Stock Market Prediction Using Machine Learning

V Kranthi Sai Reddy

In the finance sector, stock trading holds significant importance. Stock market prediction involves forecasting future stock values, often using Machine Learning. This paper discusses stock prediction using Python and Machine Learning, specifically employing Support Vector Machine (SVM) technique. By training on available stock data, the proposed ML approach aims for accurate predictions across various market sizes and frequencies.

Problem Statement

- Employing traditional methods like technical and fundamental analysis may not ensure the reliability of the prediction.
- Although one can never be sure of the rise and fall of the Market, predicting it to a great extent is very much possible using the modern techniques of Machine Learning (ML), Data Mining.
- Existing paper survey various approaches including Support Vector Machine (SVM), Random Forests (RF) in stock Prediction and have a high possibility of advancement in the future

Disadvantages

- Feature Extraction is very complex
- Given Less Accuracy
- Performance level is very low

III. PROPOSED WORK

- We will develop a financial data predictor program in which there will be a dataset storing all historical stock prices and data will be treated as training sets for the program. The main purpose of the prediction is to reduce uncertainty associated to investment decision making.
- We propose a Machine Learning (ML) approach that will be trained from the available stocks data and gain intelligence and then uses the acquired knowledge for an accurate prediction.
- Our proposed system uses a BOOTSTRAP AND Monte cario methods 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.

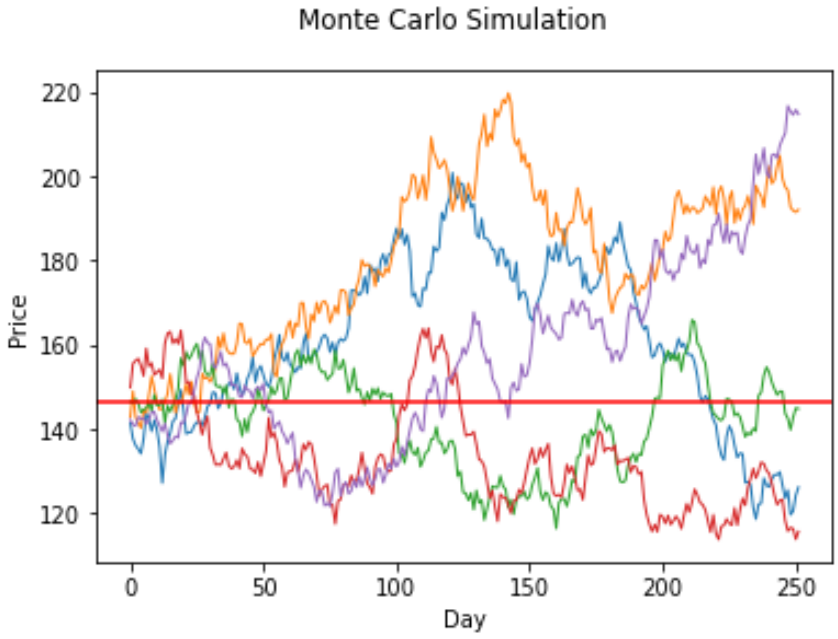
Advantages

- High Performance and accuracy.
- Easily Extract the Features.
- High Level Prediction of Risk Analysis

IV. IMPLEMENTATION

0	1	2	3	4	5
0	141.280951	142.800718	146.438541	149.808738	142.140061
1	137.638922	148.912853	146.062301	155.476929	140.986500
2	136.062392	142.688561	147.085394	156.170871	140.694814
3	135.173333	141.370801	145.994278	156.622109	142.801831
4	134.114904	140.184093	143.888110	154.952246	142.368012
...	...	...	...	...	...
247	125.463686	196.615962	142.494383	115.746214	216.568912
248	119.617563	192.555893	139.782984	116.543737	215.265475
249	120.482257	191.767196	142.718962	116.290094	214.465282
250	124.255340	191.403152	144.905510	113.796409	215.651696
251	126.140778	191.971187	144.731523	115.646880	214.635932

252 rows × 5 columns



V. CONCLUSION AND FUTURE WORK

In this paper, we utilize data from global financial markets and machine learning algorithms to predict stock index movements. Monte Carlo simulations help model uncertain outcomes. Our machine learning models for daily stock trend prediction demonstrate high efficiency, leading to practical trading models generating higher profits than selected benchmarks.

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