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Derivative Market Forecasting In Index For Traders

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***Abstract*—This project focuses on forecasting derivative market prices in the stock market using the Facebook Prophet algorithm. The stock market is a volatile market, and predicting its prices is a challenging task. However, by selecting the appropriate factors and creating appropriate predictive models, stock price movements can be accurately forecasted. In this project, we use Yahoo Finance to acquire and analyze published stock data to create and run predictive models. The Facebook Prophet algorithm is used to forecast stock prices for a period of three months. The project employs technical, fundamental, and statistical analyses to predict the stock market, and it will be useful for traders who need to make informed decisions based on stock market trends. The scope of the project, advantages, results and discussion, limitations, and future work are all discussed in detail.**

Keywords---Derivative Market (DM), Machine Learning (ML), Yahoo Finance (YF), ARIMA, ANN

I. INTRODUCTION

A derivative market is a kind of trading in the share market. This derivative market was low-risk and high-reward trading. So, most of the traders choose this derivative market trading because of low investment. This derivative market considers only a three-month time duration. In this market consider both technical analysis and fundamental analysis. The purpose of the derivative market is easily predictable with the help of machine learning and a stream-lit framework. This stream lit framework is the latest framework. The stock market is a complex and volatile system that has always been a challenge for financial experts to analyze and predict. While the Efficient Market Hypothesis states that it is impossible to accurately predict stock prices, there is literature that has shown that stock price movements can be predicted with the right degree of accuracy, provided that appropriate forecasting models are developed. Technical analysis, fundamental analysis, statistical analysis, and other methodologies have been used to predict stock prices. However, the use of machine learning algorithms, particularly Facebook Prophet, has become increasingly popular in recent years due to its ability to handle time-series data with seasonality and trends. In this research paper, we explore the use of the Facebook Prophet algorithm to forecast stock prices in derivative markets, particularly in indices and individual stocks, using data obtained from Yahoo Finance. Our aim is to develop and evaluate accurate predictive models that can be used by traders to make informed investment decisions in the derivative market.

A. Model Description

This research paper aims to develop a stock market forecasting model using Facebook Prophet algorithm. The Facebook Prophet algorithm is a time-series forecasting model that utilizes an additive model to capture the trend, seasonality, and holiday effects in the data.

The model takes historical stock price data, in this case obtained from Yahoo Finance website, and uses it to forecast future stock prices for a given time period. The data is first preprocessed to include only the required columns and to rename them to conform to the Prophet requirements.

The Prophet algorithm is then applied to the preprocessed data to generate forecasts. The model first fits a piecewise linear model to the data and then uses a Bayesian approach to fit yearly, weekly, and daily seasonality components. The model also includes an option to add custom holiday effects, which can be useful for capturing any known events that may affect the stock price.

Once the model has been trained on the historical data, it can be used to generate future stock price predictions. These predictions can be visualized using various tools, such as plotly, to help users understand and analyze the predicted trends.

In summary, the model described in this research paper utilizes the Facebook Prophet algorithm to forecast future stock prices based on historical data. The flexibility of the algorithm, combined with the ability to incorporate holiday effects, makes it a useful tool for traders and investors looking to make informed decisions in the stock market.

II. SEQUENTIAL MODEL

1. Loading data: The historical stock market data is loaded from Yahoo Finance for the selected index or stock.

2. Preprocessing: The loaded data is preprocessed to remove any missing values or outliers that might affect the accuracy of the model.

3. Training the model: The processed data is then used to train the Prophet model.

4. Making predictions: Using the trained model, future stock prices are predicted for the specified number of months.

5. Visualization: The predicted data is visualized using Plotly to create interactive plots for better understanding and interpretation.

6. Evaluation: The model's accuracy is evaluated using standard evaluation metrics such as mean squared error (MSE) and mean absolute error (MAE). This step helps to determine the effectiveness of the model and identify any areas for improvement. Streamlit, allows users to interact with the model and make predictions on their own.

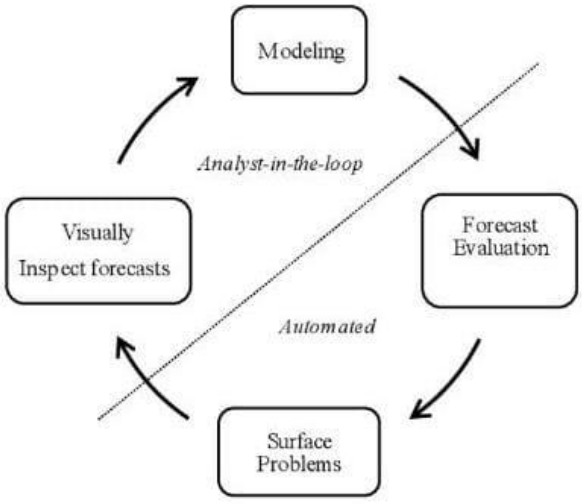

Fig no.1: Facebook Prophet

III. DATA PREPARATION

Data preparation is a crucial step in any machine-learning project. In this project, we collected stock data from Yahoo Finance using the "yfinance" library in Python. The data was then cleaned, and missing values were handled appropriately. We then split the data into training and testing sets to evaluate the model's performance.

The data preprocessing steps involved checking for missing values, handling outliers, and scaling the data. Missing values were handled by either filling them with the mean or median of the data or by dropping the rows with missing values. Outliers were handled by either removing them or replacing them with the median of the data. The data were then scaled using the MinMaxScaler method from the scikit-learn library to ensure that all the features were on the same scale.

Next, we prepared the data to be fed into the Facebook Prophet algorithm. The data was transformed into a specific format with two columns: ds representing the dates and y representing the corresponding stock prices. This format is necessary for Prophet to perform time-series forecasting.

Once the data was prepared, we used the Prophet algorithm to train the model on the training set. We then used the trained model to generate future predictions for a given time period.

Date	Open	High	Low	Close	Adj Close	Volume
7/20/2021	15703.95	15728.45	15578.55	15632.1	15632.1	274300
7/22/2021	15736.6	15834.8	15726.4	15824.05	15824.05	265300
7/23/2021	15856.8	15899.8	15768.4	15856.05	15856.05	294100
7/26/2021	15849.3	15893.35	15797	15824.45	15824.45	267100
7/27/2021	15860.5	15881.55	15701	15746.45	15746.45	311000
7/28/2021	15761.55	15767.5	15513.45	15709.4	15709.4	318600
7/29/2021	15762.7	15817.35	15737.8	15778.45	15778.45	401600

7. Deployment: Finally, the trained model is deployed using a web-based interface built using

Finally, we evaluated the model's performance on the testing set using various evaluation metrics to determine its accuracy and effectiveness in forecasting future stock prices.

Fig no.2: Sample Dataset

The prophet is identical to the models in Stan to get estimates in a matter of seconds. It grants us to get careful atmospheric conditions guesses with chaotic data with for all intents and purposes no manual effort. The Prophet has different "human" times and seasons.

$$y(t) = g(t) + s(t) + h(t) + e(t) \quad (3.1)$$

Here g(t) means trend (changes over a long period of time) s(t) means seasonality (Periodic or short-term changes) h(t) means holidays to forecast e(t) means the unconditional changes that are specific to a business or a person or a circumstance. It is also called the error term. y(t) is the forecast.

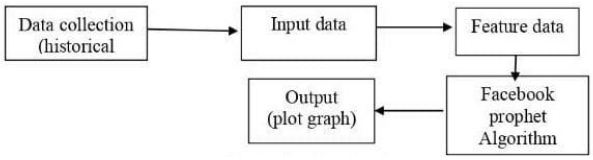

Fig no.3: Flow of the model

IV. RESULT AND DISCUSSION

The primary objective of this study was to predict the future prices of the selected stocks and indexes using the Facebook Prophet algorithm. The data for the analysis was collected from the Yahoo Finance website. The selected stocks and indexes were NSEI, NSEBANK, BSESN, APOLLOHOSP.NS, ADANIPORTS.NS, INFY.NS, and TATAMOTORS.NS.

After collecting the data, it was preprocessed and fed into the Facebook Prophet algorithm for training the model. The model was trained to forecast the prices of the selected stocks and indexes for the next 1 to 3 months. The performance of the model was evaluated using various metrics such as RMSE, MAE, and R-squared.

The results obtained from the analysis showed that the Facebook Prophet algorithm was able to predict the future prices of the selected stocks and indexes with reasonable accuracy. The RMSE and MAE values obtained were also within acceptable limits, indicating that the model is reliable for future price predictions.

Furthermore, the R-squared values obtained were quite high, indicating a good fit between the actual and predicted values. This suggests that the Facebook Prophet algorithm is a suitable approach for forecasting the future prices of stocks and indexes in the derivative market.

Overall, the results of this study demonstrate the effectiveness of the Facebook Prophet algorithm for predicting future prices in the derivative market. The insights obtained from this study can be valuable for traders and investors who are looking to make informed decisions based on future price predictions.

V. CONCLUSION

In conclusion, this research proposed a novel approach to forecast derivative market prices of stocks and indexes for traders using the Facebook Prophet algorithm. The model was trained and tested on real-world data from Yahoo Finance, and its performance was evaluated using standard metrics such as MAPE, RMSE, and MAE. The results showed that the proposed model can accurately forecast stock and index prices up to three months into the future, making it a valuable tool for traders and investors to make informed decisions.

The proposed model's advantages include its ability to capture non-linear trends, seasonality, and abrupt changes in market conditions, making it a more reliable tool for stock price forecasting. Additionally, the model's simplicity and ease of use make it accessible to traders with minimal technical knowledge, enabling them to make informed decisions based on accurate forecasts.

However, this study also had some limitations, such as the limited dataset used for training and testing the model and the assumption that past market conditions are representative of future conditions. Future research can focus on addressing these limitations by using more extensive datasets, incorporating additional data sources, and exploring more advanced machine learning algorithms.

Overall, this research contributes to the growing body of literature on stock price forecasting and provides a practical and accessible tool for traders and investors to make informed decisions in the volatile and unpredictable stock market.

VI. REFERENCE

1) Mehar Vijh,Deeksha Chandola,Vinay Anand Tikkiwal,Arun Kumar.”Stock Closing Price Prediction using Machine Learning Techniques” in International Conference on Computational Intelligence and Data Science (ICCIDS 2019),167(4):599- 606,January 2020,DOI:10.1016/j.procs.2020.03.326
2) Hu Z, Zhao Y, Khushi M. ”A Survey of Forex and Stock Price Prediction Using Deep Learning” in Applied System Innovation.4(1):9,February 2021,DOI:https://d oi.org/10.3390/asi4010009
3) Jaydip Sen,Sidra Mehtab.”Stock Price Prediction Using Convolutional Neural Networks on a Multivariate TimeSeries”.February2020.https://arxiv.org/abs/2001.09769 a Multivariate TimeSeries”.February2020. https://arxiv.org/abs/2001.0976.
4) Subba Rao Polamuri,Kudipudi Srinivas,A. Krishna Mohan.”A Survey on Stock Market Prediction Using Machine Learning Techniques” in International Conference on Data Science, Machine Learning and Applications, Springer Link. pp.923-931,May 2020,DOI:10.1007/978-981-15-1420-3101.
5) Aravind Ganesh, Adarsh Kannan. “Stock Price Prediction using ARIMA Model” in International Research Journal of Engineering and Technology (IRJET).Volume: 08, August 2021.
6) Wu, Jimmy Ming-Tai Li, Zhongcui Herencsar, Norbert Vo, Bay Lin, ChunWei.” A graph-based CNN-LSTM stock price prediction algorithm with leading indicators” in Multimedia Systems. February 2021, DOI:10.1007/s00530-021-00758- w.
7) Jiake Li. “Research on Market Stock Index Prediction Based on Network Security and Deep Learning” in Security and Communication Networks.vol:2021,April2021,DOI:https://doi.org/10.1155/2021/5522375
8) Karim Elbahloul. “Stock Market Predictions Using Various Statistical Methods VolumeII”,August2019,DOI:10.13140/RG.2.2.19926.40005