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Review on Visualisation and Forecasting Stocks Using Dash

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ABSTRACT

Investing in the stock market presents a mix of challenges and rewards. Price fluctuations can occur rapidly for reasons making it tricky to anticipate. Nevertheless, the stock market offers opportunities for investors to grow their wealth. Effective forecasting of price changes is essential, for success in investing. Utilizing machine learning and data visualization can be beneficial in this regard. Artificial Neural Networks (ANN) have shown promise in predicting stock prices by analyzing data to foresee future trends aiding investors in making informed decisions. However, the effectiveness of these algorithms extends beyond their accuracy alone. Factors such as model efficiency and success rate also play a role in determining their utility for financial gains.The analysis of stock market data holds importance with data visualization playing a role in this process. It enables investors to spot patterns and trends that may not be readily apparent within the data itself. Pythons Dash library serves as an asset, for creating visual representations of financial information. Leveraging the finance Python library allows us to present company data in a more user friendly and intuitive manner. This examination will explore how machine learning algorithms and data visualization tools are applied in forecasting stock market trends.In summary, using both machine learning and data visualization provides a strong tool for predicting stock market trends. With the help of these technologies, we can better comprehend market patterns and make smarter investment choices.

Keywords: Stock Market, Machine Learning, Dash Python, finance, Predictions, ANN (Artificial Neural Networks), Financial Times Series Forecasting, Regression.

I. INTRODUCTION

Investing in stocks is a big deal. In the past, experts made different ways to understand stocks and tell where the price might go. This helps people who invest in stocks. They need to know if a stock will go up or down. To get this right, computers and special programs are used. Then these results are checked using different types of programs with different things to look at.

Investing in stocks needs time, smarts, and knowing past info. The stock market has loads of info that changes. Many things affect stock prices, from how a company does to the whole economy. So, to deal with stocks well, it's key to look at stock data a lot to find links and change the bucks based on these links.

Pics of data are great as they show a lot in a small space. They help folks know loads of hard data, even if they know just a bit. Pics are a top way to let investors see how stocks move and know more on each stock.

II. LITERATURE REVIEW

In their study, De Faria et al. used a statistical approach to predict Brazilian stock indices. They found that both the artificial neural network (ANN) and adaptive ESM model were effective in making predictions. The results showed that the ANN model slightly outperformed the ESM in terms of the Root Mean Square Error (RMSE) [1].

In their study, Dutta and colleagues utilized financial ratios as independent variables in a logistic regression model to examine the correlation between these ratios and stock performance. Their research primarily aimed at classifying companies as either good or poor performers based on their one-year results [2].

Devi and colleagues attempted to tackle certain factors that had not been previously considered in many stock analysis studies, including the dimensionality and expectations of novice investors. The researchers used historical data from four Indian midcap companies to build and train the ARIMA model [3].

Ariyo and colleagues examine the common practice of constructing ARIMA models. To select the best model from among the ARIMA models produced, the researchers consider factors such as the

standard error of regression, adjusted R-squared, and Bayesian information criteria. The top-performing ARIMA model, according to these criteria, successfully predicted the stock prices of Nokia and Zenith Bank [4].

Phetchanchai and colleagues introduced a new method for examining financial time series data by looking at the zigzag pattern in the data. They used the PIP technique to identify these zigzag movements and utilized the Zigzag based Mary tree (ZM-tree) to establish the key points. The new technique showed superior results in reducing dimensionality compared to other methods such as Specialized Binary Trees [5].

In their study, Cervelló-Royo and colleagues presented a trading strategy that revolves around chart patterns, specifically the flag pattern. This approach builds upon previous research by incorporating two additional parameters, stop loss and take profit, to enable a more fluid analysis of operation closures [6].

Chen and Chen developed a new method for identifying bull flag patterns on the TAIEX and NASDAQ indices, blending together the strengths of PIP and template matching techniques [7].

Jorge Garcia and colleagues proposed a robust mechanism for DJIA dynamic trading based on filtered flag pattern detection using pattern matching, depending on Cervello-Royo et al. The authors set up several filters based on the exponential moving averages (EMA) and prices of the observed patterns [8].

Kim and colleagues created a Pattern Matching Trading System (PMTS) using the Dynamic Time Warping (DTW) algorithm to trade index futures on the Korea Composite Stock Price Index (KOSPI 200). By utilizing morning time series data from 9:00 a.m. to 12:00 p.m. as input for the sliding windows, the researchers employed DTW to identify similar patterns in the data [9].

In their study, Di Persio and Honchar compared three Recurrent Neural Network models - a basic RNN, LSTM, and GRU - to determine which one was most effective at predicting Google stock prices. The analysis showed that the LSTM performed the best, achieving a 72% accuracy over a five-day period. Additionally, the authors were able to uncover the hidden dynamics of RNN in their research[10].

In a study conducted by Roondiwala and colleagues, they utilized an LSTM network to forecast Nifty prices by incorporating features such as OHLC. Their findings revealed that the LSTM model achieved an RMSE of 0.00859 for the test dataset in terms of daily percentage changes [11].

Yang and team proposed an ensemble of multi-layer feedforward networks for predicting Chinese stock market trends. They trained three component networks using backpropagation and Adam algorithms, along with the bagging approach. The results suggest that the Chinese markets exhibit a moderate level of predictability, with satisfactory levels of accuracy, precision, and recall [12].

In their research, Zhang and colleagues developed a system for predicting stock price trends. This system takes into account both the movement of stock prices and the rate at which they grow or decline within specific time intervals. The researchers used a random forest model to analyze historical data from the Shenzhen Growth Enterprise Market in China. They categorized different stocks into four main classes based on the shapes of their closing prices: upward trend, downward trend, stable trend, and uncertain trend. This approach allowed them to predict stock price movements more accurately [13].

Hossain and colleagues developed a hybrid model using deep learning techniques, combining LSTM and GRU architectures, to analyze the S&P 500 time series data from 1950 to 2016. The input data was first processed by the LSTM network for an initial prediction, then passed to the GRU network for the final prediction. This model achieved a Mean Squared Error (MSE) of 0.00098, outperforming other neural network methods [14].

In a study by Powell and colleagues, they compared the supervised technique Support Vector Machine (SVM) with the unsupervised technique K-means. They utilized Principal Component Analysis (PCA) to decrease the dimensions or features. Both models were evaluated on S&P 500 data and showed similar performance - SVM achieved 89.1% accuracy while K-means achieved 85.6% accuracy. They also investigated the impact of various distance measures on clustering accuracy and found that the Canberra distance metric performed best [15][16].

III. CONCLUSION

Lately, there has been a trend of more individuals getting involved in the stock market with the aim of making profits. However, there is also the realization that there is a significant risk of potentially losing all investments. Data visualization plays a crucial role in assisting traders to make timely decisions and effectively process vast amounts of intricate data. Utilizing Dash for visualizing and forecasting stocks can provide valuable insights into market trends and potential

investment prospects. The interactive and customizable features of Dash enable analysts to create dynamic visualizations for real-time monitoring of stock performance, analysis of historical data, and forecasting future trends. Dash provides a key advantage for stock visualization and forecasting through its flexibility. Users can seamlessly integrate multiple data sources, technical indicators, and visualization methods to tailor dashboards to their unique requirements. This adaptability enables analysts to experiment with various forecasting models, modify constraints in real-time, and integrate fresh data to improve the accuracy and relevance of their predictions.

Moreover, Dash allows users to interact with the data, uncover connections between variables, and reveal hidden patterns that might not be immediately obvious from static charts or graphs. This interaction promotes a better grasp of market dynamics and assists stakeholders in making well-informed choices. Nevertheless, it is crucial to acknowledge the constraints of stock prediction, regardless of the technology employed. Stock markets are impacted by various elements such as economic indicators and investor sentiment, which can be challenging to measure and forecast with precision.

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