A STOCK RECOMMENDER FOR SAFE TRADING USING MACHINE LEARNING ALGORITHMS

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ABSTRACT

In today's fast-paced financial environment, the need for dependable stock recommendation systems has become increasingly crucial, as individuals seek to make well-informed investment decisions amidst market uncertainties and risks. This project proposes employing advanced computer programs, such as Google's TensorFlow's Keras API, to create a specialized model that predicts potential future movements in stock prices. By examining past data using sophisticated algorithms, like LSTM, ANN, and CNN, this model aims to forecast whether a stock's price will increase or decrease in the future. Although some individuals previously believed predicting stock prices was impossible, new technology has instilled hope that we can become more adept at it. Our research indicates that utilizing these computer programs can help individuals make safer decisions when buying and selling stocks, thereby making the financial world more accessible for everyone.

Keywords: LSTM, ANN, CNN, Stock Market.

I.INTRODUCTION

In the world of money and investing, things are always changing, especially in the stock market. Figuring out where stock prices might go is tough but really important for people who invest. This project uses a smart computer program called machine learning to try to predict where stock prices might go. We focus on using a type of machine learning called Long Short-Term Memory (LSTM) neural networks with Google's TensorFlow's Keras API. Some old ideas say it's impossible to predict stocks using old data because stock prices already show everything we know. But new computer tools challenge that idea. We think LSTM networks can find patterns and connections in old stock market data that we didn't see before Our goal is to show that this smart computer program can help investors understand and maybe even make money in the stock market by predicting future trends better than we thought possible. We want to prove that our model can help investors make better decisions and maybe even earn some profit.

II.LITERATURE SURVEY

[1] "Bhawna Panwar Gaurav, Novel Algorithmic Trading Strategy Using Data-Driven Innovation Stock Market Prediction Using Linear Regression and SVM(2020)" The study developed an innovative trading approach using data-driven insights, leveraging Linear Regression for precise stock market predictions, yielding profitable outcomes.

[2] "Md. Arif Istiake Sunny ,Deep Learning-Based Stock Price Prediction Using LSTM and Bi-Directional LSTM Model(2020)"

The study presents Improved stock price predictions achieved by LSTM & Bi-LSTM models show promising accuracy and potential in financial forecasting.

[3] "Y. Guo,An adaptive SVR for high-frequency stock price forecasting(2018)"

The study Developed adaptive SVR model accurately forecasting high-frequency stock prices, enhancing predictive accuracy and robustness in volatile markets

[4] "Hadavandi, Integration of genetic fuzzy systems and arti cial neural networks for stock price forecasting(2010)".

The study proposes an integrated approach using genetic fuzzy systems and artificial neural networks for stock market prediction, which outperforms previous methods in terms of accuracy. It employs stepwise regression analysis and self-organizing map neural networks to identify influential factors and cluster data, respectively, showcasing its effectiveness in forecasting stock prices.

[5]" Michael Hagenau, Automated News Reading: Stock Price Prediction Based on Financial News Using Context-Specific Features(2012)"

The research investigates predicting stock price effects using financial news through enhanced text mining methods. By employing more expressive features and incorporating market feedback, it achieves higher classification accuracies, reducing overfitting and offering a transferable methodology to other domains with textual data.

[6] "Dr. Bhargavi, Relative Strength Index for Developing Effective Trading Strategies in Constructing Optimal Portfolio(2017)"

In this study Using Relative Strength Index helps create powerful trading strategies, enhancing portfolio construction for optimal outcomes in investments.

[7] "Yulius Hari, Forecasting System Approach for Stock Trading with Relative Strength Index and Moving Average Indicator"

This study focuses on enhancing forecasting accuracy for stock selection, crucial for maximizing investor profits. It offers insights into using the Relative Strength Index (RSI) for selecting stocks, particularly beneficial for swing traders

[8] "Anitha Julian, Safe Trade – A Stock Recommender using Machine Learning Algorithms(2023)"

This study demonstrates how machine learning, specifically a trained algorithm on various historical datasets, can provide valuable insights for stock market forecasting, aiming for measurable gains and risk mitigation.

[9] "Pooja Talreja, Forecasting Stock Market Trend Using Relative Strength Index(2014)"

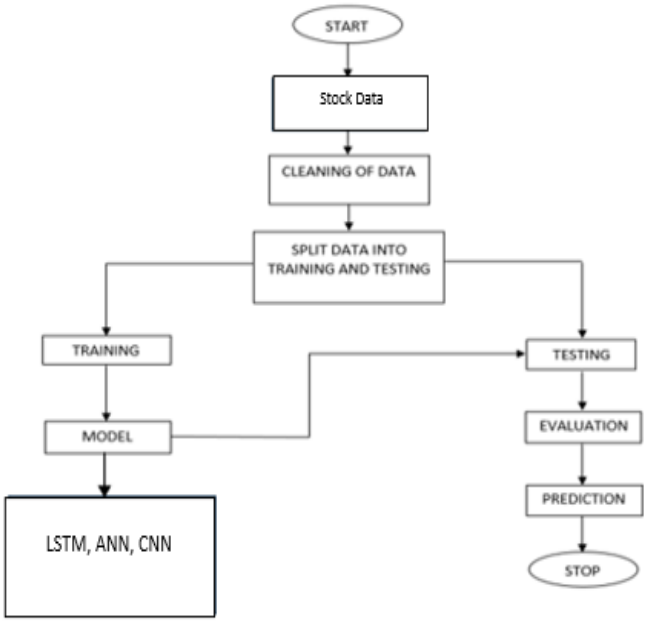
This paper emphasizes the importance of accuracy in forecasting methods and explores stock selection techniques, particularly using the Relative Strength Index (RSI) for swing traders, aiming to maximize investor profits through informed investment decisions.

III.SYSTEM IMPLEMENTATION

- **Proposed Approach**

The Proposed Approach uses TensorFlow's Keras API to build a system that predicts stock prices using LSTM neural networks. This Proposed Approach focuses on forecasting a stock's value over the next few days. By challenging the idea that stock markets are completely efficient, it shows that accurate predictions are possible. The goal is to give investors better tools for decision-making, helping them make more money and avoid losses in the stock market.

- **System Architecture**



1.Stock Data: This represents the dataset we are working. It likely needs some cleaning before it can be used to train a model.

2.Cleaning of Data: This step involves removing any errors or inconsistencies from the data. This may include removing missing values, outliers, or formatting the data into a consistent format.

3.Split Data into Training and Testing: The data is then divided into two sets: training data and testing data. The training data is used to train the machine learning model,and the testing data is used to evaluate the performance of the trained model.

4.Training: The machine learning model is trained on the training data. This involves feeding the data into the model and allowing it to learn the patterns in the data.

5.Model: This represents the machine learning model that is being trained. There are different types of models, including LSTM (long short-term memory), ANN (artificial neural network), and CNN (convolutional neural network).

6.Testing: Once the model is trained, it is evaluated on the testing data. This involves making predictions on

the testing data and comparing those predictions to the actual values.

IV.EXPERIMENTS & RESULTS

The project aims to predict stock price using machine learning techniques. The dataset comprised 4431 rows and 7 columns including Date, Open, High, Low, Close, Adj Close, and Volume. Models such as LSTM, ANN and CNN were trained to predict the stock price.

Steps involved in LSTM Algorithm:

1.**Data Preprocessing**: Normalize the input data and Split the data into training and testing and Reshape the data to fit the LSTM input shape, usually in the form [samples, time steps, features].

2.**Define the LSTM Model:** Create a Sequential model and add one or more LSTM layers to the model and Specify the parameters.

3.**Compile the Model:** Choose an appropriate optimizer (Adam) and a loss function (mean squared error) and Compile the model with the chosen optimizer and loss function.

4.**Train the Model:** Fit the model to the training data using the fit() method.

5.**Evaluate the Model:** Evaluate the trained model's performance on the testing set using evaluation metrics such as mean squared error, mean absolute error(MAE), root mean squared error(RMSE). Compare the model's performance with other algorithms.

$$\text{Mean Squared Error} = \frac{1}{n}\sum_{i=1}^{n}(y_i - \hat{y}_i)^2$$

$$\text{MAE} = \frac{1}{n}\sum_{i=1}^{n}|y_i - \hat{y}_i|$$

$$\text{RMSE} = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(y_i - \hat{y}_i)^2}$$

Where ,y_i =True values

$\hat{y}_i$=Predicted Values

Compare the model's performance with other algorithms.

6.**Predictions:** Use the trained LSTM model to make predictions on the data.

The evaluation metrics of the LSTM,ANN,CNN algorithms are below:

LSTM:

```
Mean Squared Error: 1380.308443521826
Root Mean Squared Error: 37.15250252031249
Mean Absolute Error: 66.857897953125
```

ANN:

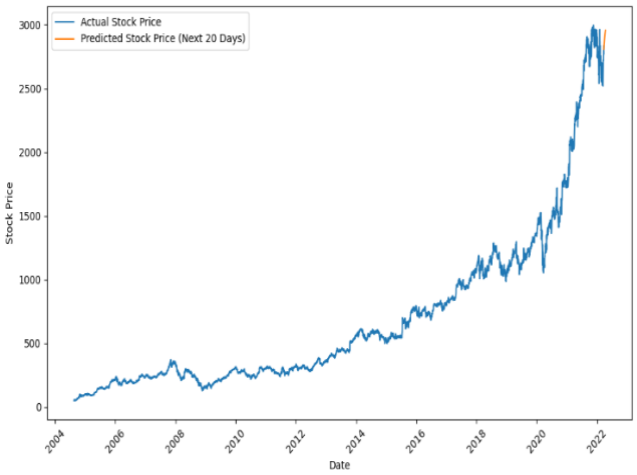
```
Mean Squared Error: 305474.1324062884
Root Mean Squared Error: 552.6971434757813
Mean Absolute Error: 552.6971434757813
```

CNN:

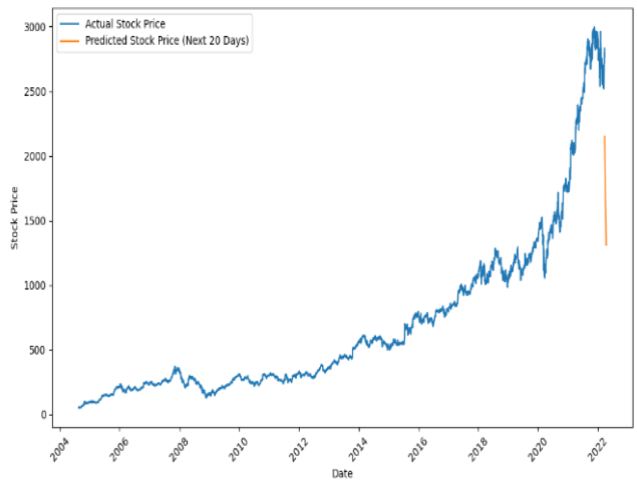
```
Mean Squared Error: 3939.5481895958083
Root Mean Squared Error: 62.765820233593764
Mean Absolute Error: 95.49956043828126
```

Results:

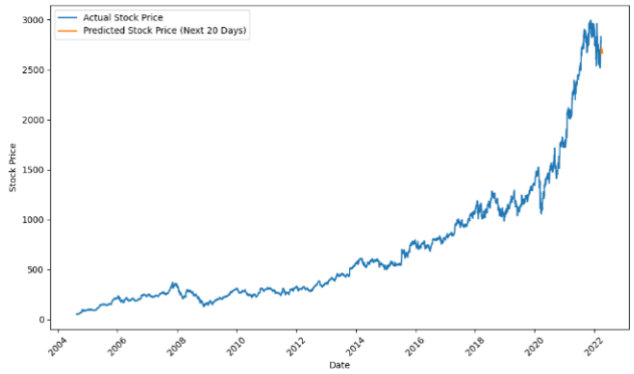
LSTM:



ANN:



CNN:



Lower Root Mean Squared Error values indicate better performance, as they represent smaller errors between the predicted values and the actual values. When evaluating the Root Mean Square Error (RMSE) values, LSTM consistently exhibits the lowest RMSE value when compared to both ANN and CNN algorithms, indicating its superior performance in predicting stock prices.

V.CONCLUSION

Using LSTM neural networks with TensorFlow's Keras API shows great promise for predicting stock market trends. Even though the idea that markets are always efficient poses a challenge, our research proves that accurate predictions are possible, especially in spotting trends. With advanced machine learning tools, investors can make better decisions and reduce losses. This study confirms that machine learning can give investors valuable insights, especially when using LSTM, ANN, and CNN technologies. It's a way to make smarter and more profitable investment choices in the ever-changing stock market world.

VI.FUTURE ENHANCEMENT

In the future, we can make this stock market forecasting project even better. We could improve the LSTM neural network by adding attention mechanisms or mixing LSTM with other methods like CNN. Also, we could analyze news articles or social media to understand how people feel about the market, which could make our predictions better. Making the model easier to understand and combining different methods for more accurate predictions are also important. Finally, we could use reinforcement learning to find the best trading strategies based on our predictions.

VII.REFERENCES

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