PROJECT REPORT
ON

"Stock Price Prediction"

SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENT FOR SEMESTER VII OF
B . E (Information Technology)

SUBMITTED BY

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UNDER THE GUIDANCE OF BINCY IVIN

DEPARTMENT OF INFORMATION TECHNOLOGY
V.E.S INSTITUTE OF TECHNOLOGY
2023-24

Certificate

This is to certify that the project entitled

"Stock Prices Prediction using Machine learning"

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In partial fulfillment of the degree of BE. (Sem VI) in Information Technology for the project is approved.

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Date: / /2023
Place: VESIT, Chembur

College Seal

Declaration

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the sources. I also declare that I have adhered to all academic honesty and integrity principles and have not misrepresented, fabricated, or falsified any idea/data/fact-soft-source submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources that have thus not been properly cited or from whom proper permission has not been taken when needed.

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(Signature)

Anjali punsi

Ronak Karia

Diya theryani

ACKNOWLEDGEMENT

The project report on "**Stock prices prediction using machine learning**" is the outcome of the guidance, moral support, and devotion bestowed on our group throughout our work. For this, we acknowledge and express our profound sense of gratitude to everybody who has been the source of inspiration throughout t h e project preparation. First and foremost, we offer our sincere phrases of thanks and innate humility to H.O.D Dr.(Mrs.)Shalu Chopra, Project guide Prof. Bincy Ivin for providing valuable inputs and consistent guidance and support provided by them. At the outset, we must tender our intimacy for receipt of affectionate care to Vivekanand Education Society's Institute of Technology for providing such a stimulating atmosphere and conducive work environment.

Abstract

In this project we attempt to implement machine learning approach to predict stock prices. Machine learning is effectively implemented in forecasting stock prices. The objective is to predict the stock prices in order to make more informed and accurate investment decisions. We propose a stock price prediction system that integrates mathematical functions, machine learning, and other external factors for the purpose of achieving better stock prediction accuracy and issuing profitable trades. There are two types of stocks. You may know of intraday trading by the commonly used term "day trading." Interday traders hold securities positions from at least one day to the next and often for several days to weeks or months. LSTMs are very powerful in sequence prediction problems because they're able to store past information. This is important in our case because the previous price of a stock is crucial in predicting its future price. While predicting the actual price of a stock is an uphill climb, we can build a model that will predict whether the price will go up or down.

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Chapter 1

Introduction

1.1 Introduction

Stock price prediction is the process of forecasting the future price movements of publicly traded companies' stocks. It is a crucial aspect of financial analysis as it helps investors, traders, and financial institutions make informed decisions regarding their investments. A stock price predictor is a tool that utilizes various statistical and machine learning techniques to predict future stock prices based on historical price data and other relevant factors such as company financials, market trends, and global events. The predictor typically takes into account a range of variables that can impact stock prices, including economic indicators, company-specific data, and market trends. Stock price prediction has become increasingly important in recent years, with the rise of algorithmic trading and the use of artificial intelligence in finance. Accurately predicting stock prices can give investors a competitive edge and help them make better investment decisions. However, it is important to note that stock price prediction is not an exact science, and there is always a degree of uncertainty involved.

1.2 Aim and Objectives

1. The main aim of stock price prediction is to provide investors, traders, and financial institutions with insights into the future price movements of a company's stock.
2. The ultimate goal is to enable these stakeholders to make informed decisions about buying, selling, or holding stock, based on a prediction of its future value.
3. The objectives of stockprice prediction include: Identifying trends and patterns: By analyzing historical stock pricedata, stock price prediction models can identify trends and patterns that may indicate future price movements.
4. These insights can help investors make more informed decisionsabout when to buy or sell a stock. Mitigating risks: Stock price prediction models can also be used to identify potential risks associated with a particular stock, allowing investors to adjust their investment strategy accordingly.
5. Improving investment performance: By providing insights into future price movements, stock price prediction models can help investors improve their investment performance by making more informed decisions about which stocks to buy and sell.

1.3 Motivation for the Work

- Financial gain: One of the primary motivations for investors and traders to predict stock prices is to make a profit. By accurately predicting the future movements of a

stock, theycan buy low and sell high, thus maximizing their profits.

- Risk management: Stock price prediction can also be used to manage risk. By identifying potential risks associated with a stock, investors can adjust their investment strategy to mitigate those risks.
- Decision-making: Stock price prediction can also help investors and traders make more informed decisions about which stocks to buy or sell. By providing insights into futureprice movements, investors can make better decisions about when to enter or exit a particular stock.
- Innovation: There is also a motivation for researchers and data scientists to develop betterstock price prediction models using innovative technologies such as machine learning andartificial intelligence. These models can provide more accurate predictions and help investors make better decisions.

1.3 Scope of Project

The scope of a stock price prediction project can vary depending on the specific goals and objectives of the project. However, some common elements of such a project could include: Data collection: The project would involve collecting historical stock price data for the company or companies of interest. This data could include information such as daily closing prices, trading volumes, and other financial indicators. Data pre-processing: Once the data has been collected, it would need to be pre-processed to remove any anomalies or errors and prepare it for analysis. Feature engineering: Feature engineering involves selecting and transforming the relevant features from the pre-processed data that can be used to predict stock prices. Model selection: There are several machine learning models that can be used for stock price prediction, such as regression models, neural networks, decision trees, and ensemble models. The appropriate model selection would depend on the specific requirements of the project .Moel training and evaluation: The selected model would be trained using the pre-processed data and evaluated for its accuracy and performance using appropriate metrics such as Mean Absolute Error (MAE) or Root Mean Squared Error (RMSE).Deployment: Once the model has been trained and evaluated, it can be deployed to make predictions for future stock prices. Monitoring and refinement: The model's performance would need to be monitored over time, and periodic refinement of the model may be required to ensure that it continues to provide accurate prediction

1.4Contribution

A stock price prediction project can contribute to the field of finance in several ways. Some potential contributions are: Improved decision-making: Accurate stock price predictions can help investors and traders make better-informed decisions about when to buy or sell a stock. This can lead to more profitable investments and reduced risk. Risk management: Stock price prediction models can help investors and traders identify potential risks associated with a particular stock, allowing them to adjust their investment strategy accordingly. Innovation: Developing better stock price prediction models using innovative technologies such as machine learning and artificial intelligence can lead to new and innovative approaches to financial analysis and investment.

Chapter 1

1.5 Organization of the report

This report is organized into the following sections: Stock price prediction is the process of forecasting the future price movements of publicly traded companies' stocks. It is a crucial aspect of financial analysis as it helps investors, traders, and financial institutions make informed decisions regarding their investments The research methodology for a stock price prediction project involves a combination of quantitative a nd qualitative data analysis techniques. It may also involve the use of machine learning algorithms, statistical models, and other data analysis tools. The key to a successful stock price prediction project is to ensure that the methodology is sound and the data is relevant and reliable. The study underscores the potential of machine learning in stock price prediction, while also emphasizing the need for caution and a realistic understanding of the limitations and challenges of this approach. The industry of stock price prediction is highly competitive, and success in this field requires a deep understanding of financial markets, strong analytical skills, and the ability to adapt to changing market conditions. The industry is also subject to regulations and oversight from government agencies, such as the Securities and Exchange Commission (SEC), to ensure that investors are protected from fraudulent or unethical practices.

Chapter 2

Literature Survey

2.1 Problem Definition IEEE PAPERS

Name:- "Stock_Market_Prediction_Using_Machine_Learning"
Year:-MAY 2018
This paper provides a comprehensive survey of machine learning techniques used for stock price prediction. The authors review various machine learning algorithms, including artificial neural networks, support vector regression, and decision trees, and examine their application in predicting stock prices. They also discuss the challenges associated with stock price prediction, such as volatility and the influence of external factors, and explore potential solutions to these challenges. The authors conclude by discussing the limitations of current approaches and identifying future research directions.

Name:- "Stock_Market_Prediction_Using_Machine_Learning"
Year:-April 2020
This paper Stock Price Prediction using machine learning helps you discover the future value of company stock and other financial assets traded on an exchange. The entire idea of predicting stock prices is to gain significant profits. Predicting how the stock market will perform is a hard task to do. There are other factors involved in the prediction, such as physical and psychological factors, rational and irrational behavior, and so on. All these factors combine to make share prices dynamic and volatile. This makes it very difficult to predict stock prices with high accuracy.

Name**:- "Machine Learning for Stock Market Prediction With Step-by-Step Implementation"**
Year:-October 2021
This paper data on which we will be working before we begin implementing the software to anticipate stock market values. In this section, we will examine the stock price of Microsoft Corporation (MSFT) as reported by the National Association of Securities Dealers Automated Quotations (NASDAQ). The stock price data will be supplied as a Comma Separated File (.csv) that may be opened and analyzed in Excel or a Spreadsheet. MSFT's stocks are listed on NASDAQ, and their value is updated every working day of the stock market. It should be noted that the market does not allow trading on Saturdays and Sundays. Therefore, there is a gap between the two dates. The Opening Value of the stock, the Highest and Lowest values of that stock on the same day, as well as the Closing Value at the end of the day are all indicated for each date.

Chapter 2

ame**:- "Machine Learning to Predict Stock Prices"**
Year:-December 2019
LSTMs are an improved version of recurrent neural networks (RNNs). RNNs are analogous to human learning. When humans think, we don't start our thinking from scratch each second. For example, in the sentence "Bob plays basketball", we know that Bob is the person who plays basketball because we retain information about past words while reading sentences. Similarly, RNNs are networks with loops in them, which allow them to use past information before arriving at a final output. However, RNNs can only connect recent previous information and cannot connect information as the time gap grows. This is where LSTMs come into play; LSTMs are a type of RNN that remember information over long periods of time, making them better suited for predicting stock prices.

2.2 Comparing existing systems

There are numerous systems for predicting the stock market, and each system has its own strengths and weaknesses. Here are some of the most popular systems and how they compare:

1. Technical analysis: This system relies on past market data, such as stock prices and volume, to identify patterns and trends that may predict future price movements. Technical analysis can be useful for short-term predictions and can be used to generate trading signals. However, it is not always reliable for predicting long-term trends or major market events.
2. Fundamental analysis: This system evaluates a company's financial health, such as its earnings, assets, and liabilities, to determine its intrinsic value and predict future price movements. Fundamental analysis is more reliable for long-term predictions and can help identify undervalued or overvalued stocks. However, it can be time-consuming and requires a deep understanding of the company's financial statements.
3. Sentiment analysis: This system analyzes social media and news sentiment to determine market sentiment and predict future price movements. Sentiment analysis can be useful for short-term predictions and can help identify market trends. However, it is not always reliable, as social media and news sentiment can be influenced by a variety of factors.
4. Machine learning: This system uses algorithms and historical market data to predict future price movements. Machine learning can be more accurate than other systems and can be used for both short-term and long-term predictions. However, it requires a large amount of data and can be complex to set up and maintain.

In conclusion, each system has its own strengths and weaknesses, and the best system will depend on your specific investment goals and preferences. It is important to do your own research and evaluate different systems to determine which one is right for you.

Chapter 3

Design Implementation

3.1 Proposed System

We propose a stock price prediction system that integrates mathematical functions, machine learning, and other external factors for the purpose of achieving better stock prediction accuracy and issuing profitable trades. There are two types of stocks. You may know of intraday trading by the commonly used term "day trading." Interday traders hold securities positions from at least one day to the next and often for several days to weeks or months. LSTMs are very powerful in sequence prediction problems because they're able to store past information. This is important in our case because the previous price of a stock is crucial in predicting its future price. While predicting the actual price of a stock is an uphill climb, we can build a model that will predict whether the price will go up or down.

3.2 Requirement Gathering and Analysis

Component diagram is a special kind of diagram in UML. The purpose is also different from all other diagrams discussed so far. It does not describe the functionality of the system but it describes the components used to make those functionalities. Component diagrams are used in modeling the physical aspects of object-oriented systems that are used for visualizing, specifying, and documenting component-based systems and also for constructing executable systems through forward and reverse engineering. Component diagrams are essentially class diagrams that focus on a system's components that often used to model the static implementation view of a system.

Chapter 3

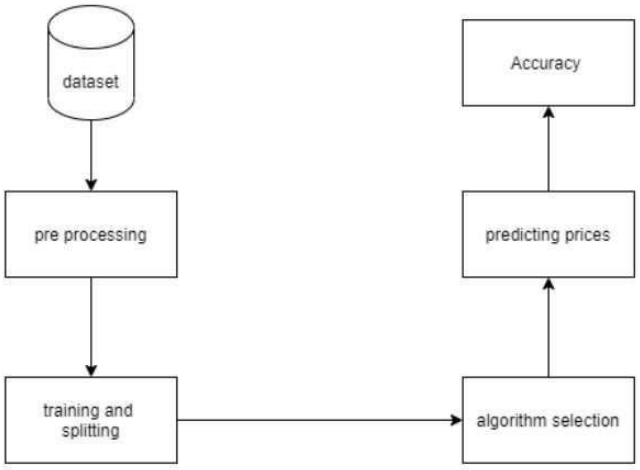


Fig. 13: Components present in the system

3.3 Hardware Requirement

2. Windows XP, Windows 7 (32/64 bit) or higher
3. Minimum 4 GB RAM and higher
4. 10 GB available space on the hard disk
5. At least one Internet Browser e.g., Chrome, Firefox, Microsoft Edge etc.

3.4 Software Requirement

1. Frontend: python
2. Python models and libraries

3.5 Flowchart

3.5.1 Functionality Flowchart

Figure 3.1: Functionality flowchart

1) Preprocessing of data

Fig. 5: Pre-processing of data

2) Overall Architecture

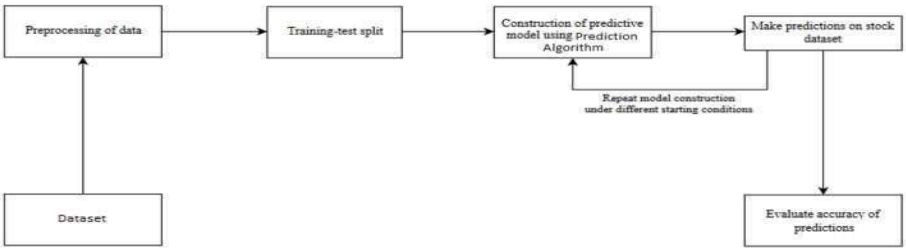


Fig. 6: Overall Architecture

3.2.1 Timeline Chart

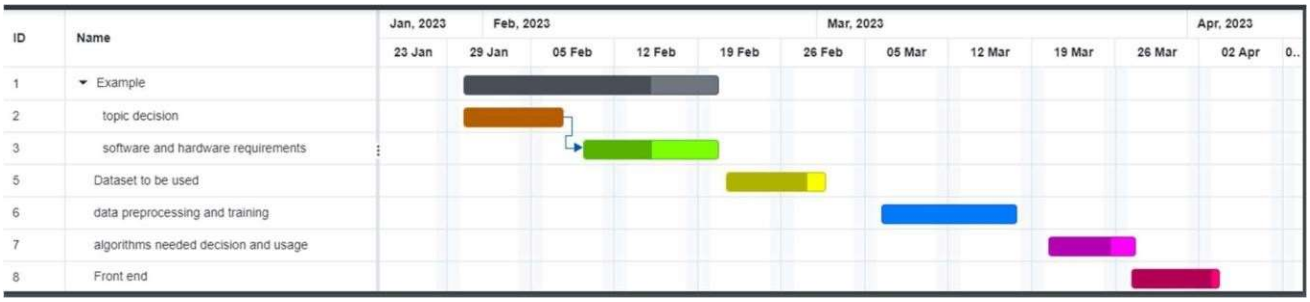


Figure 3.2: Timeline chart

3.3 Algorithm

LSTM:-

LSTM (Long Short-Term Memory) models are a popular choice for stock price prediction because they are well-suited for modeling sequential data, such as time-series data. Hereis an outline of the steps involved in building an LSTM model for stock price prediction: Data preparation: Collect and preprocess historical stock price data, including market indicators, company fundamentals, news articles, and social media sentiment.
Convert the data into a suitable format, such as a time-series dataset with multiple input features and a single output variable (the stock price).

Feature engineering: Select and engineer the most informative and predictive features that can help explain the variability in stock prices, such as financial ratios, trading volumes, market volatility, and macroeconomic indicators. Normalize the input data to have zero mean and unit variance, to improve the performance of the LSTM model.

Data splitting: Split the dataset into training, validation, and testing sets, typically using an80-10-10 ratio.LSTM model architecture: Define the architecture of the LSTM model, which involves setting the number of hidden layers, number of neurons in each layer, and other hyperparameters. A typical LSTM model architecture consists of one or more LSTM layers,followed by one or more fully connected layers, and an output layer. The input to the LSTM model is a sequence of historical data, and the output is the predicted stock price for the next time step.

Training the model: Train the LSTM model using the training dataset and evaluate its performance on the validation set. The training process involves optimizing the model weights using backpropagation through time (BPTT) algorithm.

Hyperparameter tuning: Perform hyperparameter tuning to optimize the performance of the model, by varying the hyperparameters such as the number of hidden layers, the numberof neurons, the learning rate, and the regularization parameters.

Model evaluation: Evaluate the performance of the model on the testing set, using appropriate metrics such as accuracy, precision, recall, and F1 score.

Model deployment: Deploy the trained LSTM model to make predictions on new data, and monitor its performance over time.

Overall, building an LSTM model for stock price prediction involves data preparation, featureengineering, data splitting, LSTM model architecture design, model training, hyperparameter tuning, model evaluation, and deployment. The effectiveness of the model depends on the quality of the data, the choice of features, the architecture of the LSTM model, and the accuracy of the hyperparameters.

3.4 Cost Estimation

The cost estimation for stock price prediction using machine learning for us in this project is nothing

3.5 Feasibility Study

A feasibility study of stock price prediction would typically involve analyzing the potential benefits and limitations of using predictive models to forecast future stock prices. Here are some key factors that could be considered in such a study: Data availability: The availability and quality of historical data is crucial for developing accurate predictive models. Therefore, it is important to determine the sources and accessibility of relevant financial and economic data, such as market indicators, company fundamentals, news articles, and social media sentiment.

Model selection: There are many different types of predictive models that can be used for stock price prediction, including regression models, time-series models, neural networks, and deep learning algorithms. It is important to evaluate the strengths and weaknesses ofeach model type and choose the most appropriate one based on the specific objectives andrequirements of the project.

Feature selection: The selection of relevant features, or predictors, is critical to the success of a predictive model. It is important to identify the most informative and predictive features that can help explain the variability in stock prices, such as financial ratios, trading volumes,market volatility, and macroeconomic indicators.

Evaluation metrics: The performance of a predictive model should be evaluated using appropriate metrics such as accuracy, precision, recall, and F1 score. It is important to define the evaluation criteria in advance and compare the results with relevant benchmarks to assess the usefulness and practicality of the model.

Risks and limitations: Predictive models are subject to various risks and limitations, such as data quality issues, overfitting, model complexity, and changing market conditions. It is important to identify and mitigate these risks through appropriate validation and testing procedures, and to recognize the limitations of the models and communicate them to stakeholders.

Overall, a feasibility study of stock price prediction would involve a thorough analysis of the benefits and risks associated with using predictive models to forecast future stock prices, and would require careful consideration of the data, model selection, feature selection, evaluation metrics, and risks and limitations involved in such a project.

Chapter 4 Results and Discussion

4.1 Code

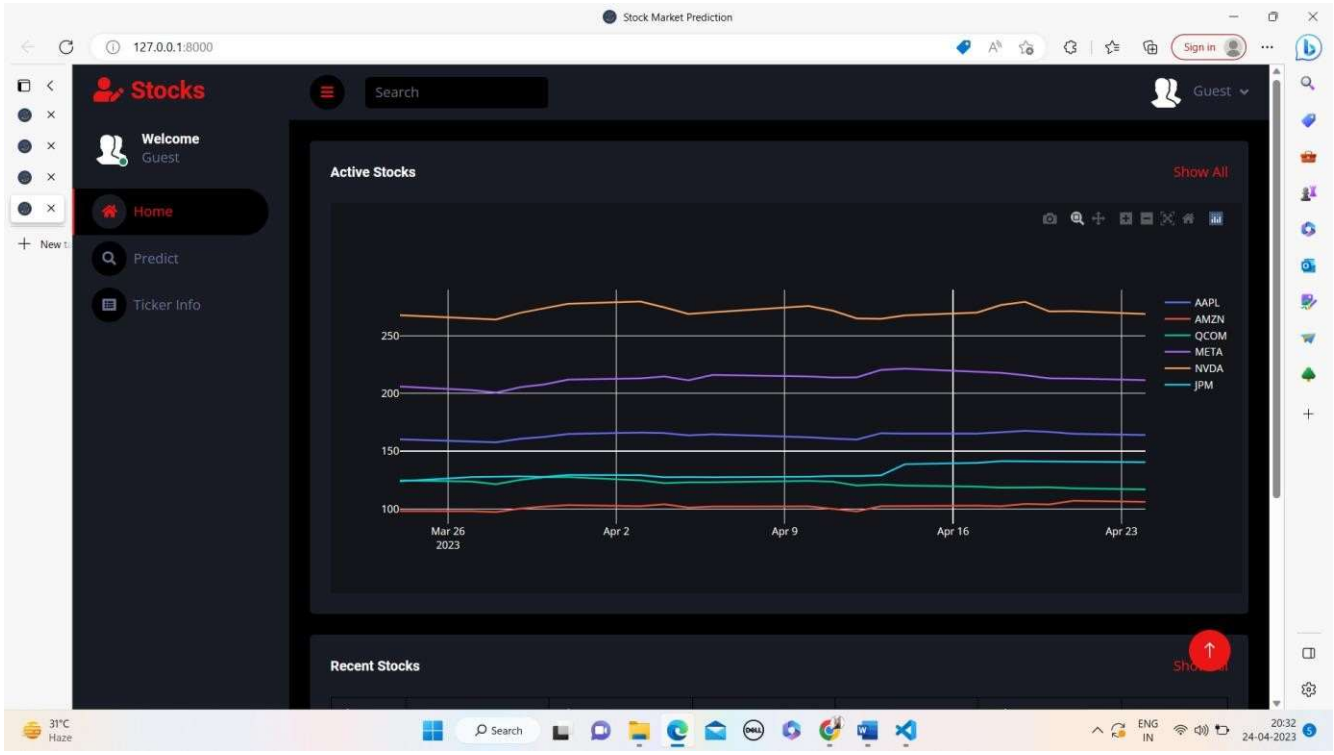
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import pandas_datareader as data
from sklearn.preprocessing import MinMaxScaler
from keras.layers import Dense, Dropout, LSTM
from keras.models import Sequential
from keras import models
import streamlit as st
from sklearn.metrics import r2_score

start = '2010-01-01'
end = '2022-03-03'

st.title('Stock Trend Prediction')
user_input = st.text_input('Enter Stock Ticker')
df = data.DataReader(user_input, 'yahoo', start, end)

#Describing Data
st.subheader('Data from 2010-2022')
#n_years = st.slider('Years of prediction:', 1, 4)
#period = n_years * 365
st.write(df.describe())

#Visualization
st.subheader('Closing Price vs Time Chart')
fig = plt.figure(figsize = (12,6))
plt.plot(df.Close)
st.pyplot(fig)

st.subheader('Closing Price vs Time Chart with 100MA')
ma100 = df.Close.rolling(100).mean()
fig = plt.figure(figsize = (12,6))
plt.plot(ma100)
plt.plot(df.Close)
plt.legend()
st.pyplot(fig)
```

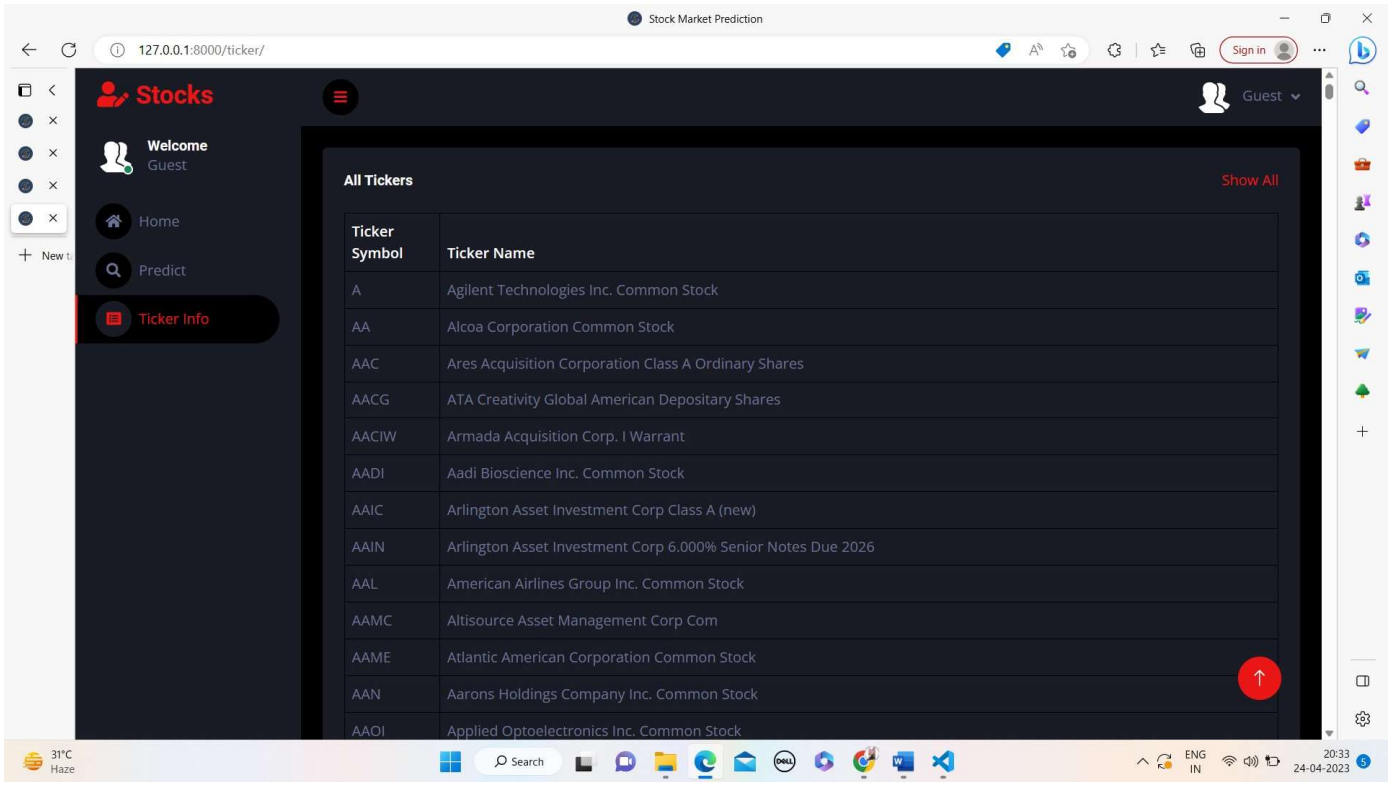
```
st.subheader('Closing Price vs Time Chart with 100MA & 200MA')
ma100 = df.Close.rolling(100).mean()
ma200 = df.Close.rolling(200).mean()
fig = plt.figure(figsize = (12,6))
plt.plot(ma100, 'r', label = 'MA100')
plt.plot(ma200, 'g', label = 'MA200')
plt.plot(df.Close, 'b', label = 'Original Price')

plt.legend()
st.pyplot(fig)

data_training = pd.DataFrame(df['Close'][0:int(len(df)*0.70)])
data_testing = pd.DataFrame(df['Close'][int(len(df)*0.70): int(len(df))])

scaler = MinMaxScaler(feature_range=(0,1))
data_training_array = scaler.fit_transform(data_training)

x_train = []
y_train = []


for i in range(100, data_training_array.shape[0]):
   #appending data in our x_train, (i-100 because it should start from 0)

y_test = y_test / scale_factor
r_sqaured = r2_score(y_test, y_predicted)
print(r_sqaured)

st.subheader('Predictions vs Original')
fig2 = plt.figure(figsize=(12,6))
plt.plot(y_test, 'b', label = 'Original Price')
plt.plot(y_predicted, 'r', label = 'Predicted Price')
plt.xlabel('Time(days)')
plt.ylabel('Price')
plt.legend()
st.pyplot(fig2)
```

4.2 Software Results

Component diagram is a special kind of diagram in UML. The purpose is also different from all other diagrams discussed so far. It does not describe the functionality of the system but it describes the components used to make those functionalities. Component diagrams are used in modeling the physical aspects of object-oriented systems that are used for visualizing, specifying, and documenting component-based systems and also for constructing executable systems through forward and reverse engineering. Component diagrams are essentially class diagrams that focus on a system's components that often used to model the static implementation view of a system.

4.3 Screen Shots




Stock Market Prediction
127.0.0.1:8000/ticker/
Sign in
Stocks
Guest
Welcome
Guest
Home
Predict
Ticker Info
All Tickers
Show All
Ticker Symbol
Ticker Name
A
Agilent Technologies Inc. Common Stock
AA
Alcoa Corporation Common Stock
AAC
Ares Acquisition Corporation Class A Ordinary Shares
AACG
ATA Creativity Global American Depositary Shares
AACIW
Armada Acquisition Corp. I Warrant
AADI
Aadi Bioscience Inc. Common Stock
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Arlington Asset Investment Corp 6.000% Senior Notes Due 2026
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American Airlines Group Inc. Common Stock
AAMC
Altisource Asset Management Corp Com
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Atlantic American Corporation Common Stock
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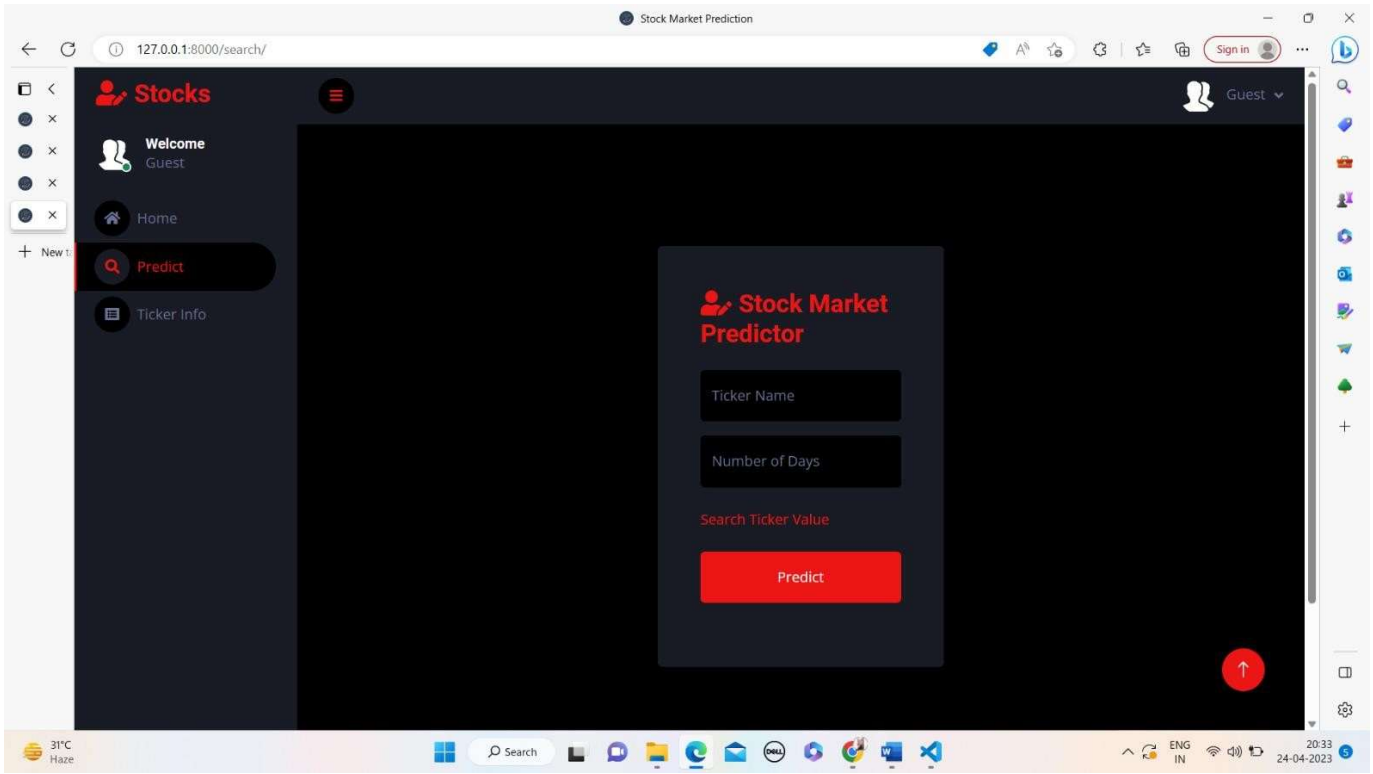
Stock Market Prediction
127.0.0.1:8000/search/
Sign in
Stocks
Guest
Welcome
Guest
Home
Predict
Ticker Info
Stock Market Predictor
Ticker Name
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Predict
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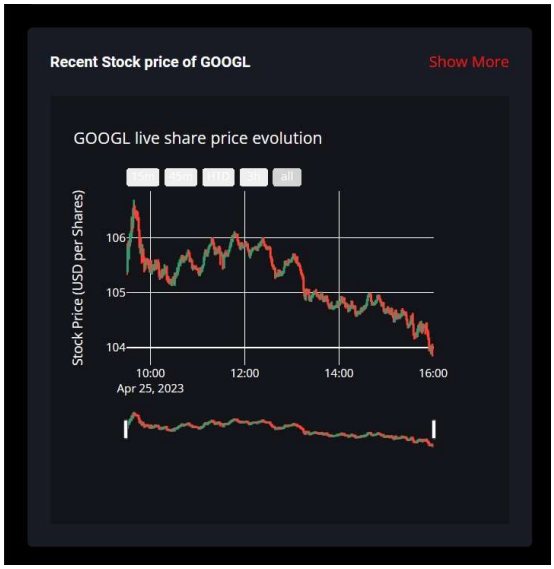
Haze
Search
ENG
IN
20:33
24-04-2023

4.3 Test Case Report



4.4 Additional details of the Project

Data Selection: The first step is to select data for an organization and split the data into training and testing. we have used 75% for training and 25% for testing purposes. Pre-processing of data: In pre- processing, we are selecting attributes required for the algorithm and the remaining attributes are neglected. The selected attributes are Trade Open, Trade High, Trade Low, Trade Close, Trade Volume. In pre-processing, we are using normalization to get values in a particular range. Predictionusing LSTM: In this system, we are using the LSTM algorithm for predicting stock values. Initially, thetraining data is passed through the system and train the model. Then in the testing phase, the predicted values are compared with the actual values. Evaluation: In the evaluation phase we are calculating the Accuracy, Mean Square Error(MSE) and Root Mean Square Error (RMSE) values for comparison.

Chapter 5

Conclusion

5.1 Summary

we are predicting the closing stock price of any given organization, we have developed an application for predicting close stock price using LSTM algorithm. We have used datasets belonging to Google, Nifty50, TCS, Infosys and Reliance Stocks and achieved above 93% accuracy for these datasets. In the future, we can extend this application for predicting cryptocurrency trading and also, we can add sentiment analysis for better predictions.

5.2 Future Scope

The field of stock price prediction has been constantly evolving with the advancement of machine learning, deep learning, and artificial intelligence. Here are some potential future directions for stock price prediction: Incorporating alternative data sources: In addition to traditional financial data, there is an increasing interest in incorporating alternative data sources such as social media sentiment, news articles, satellite imagery, and web traffic data to improve the accuracy of stock price prediction models. Hybrid models: Hybrid models that combine different techniques such as statistical models, machine learning algorithms, and deep learning models are becoming popular. Such hybrid models can leverage the strengths of each technique to improve the accuracy of predictions. Reinforcement learning: Reinforcement learning is a machine learning technique that involves training an agent to make decisions in a given environment to maximize rewards. There is growing interest in applying reinforcement learning to stock price prediction. Quantum computing: Quantum computing is a rapidly advancing field that has the potential to revolutionize stock price prediction. Quantum algorithms can perform calculations much faster than classical algorithms and may be able to uncover patterns and correlations that are not visible with current techniques. Explainable AI: With the increasing complexity of machine learning models, it is becoming increasingly important to ensure that the models are interpretable and provide explanations for their predictions. Explainable AI techniques are therefore likely to play an important role in the future of stock price prediction. Overall, the future of stock price prediction is likely to be shaped by advances in machine learning, deep learning, artificial intelligence, and alternative data sources.

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