**GOVERNMENT COLLEGE OF ENGINEERING-BAGUR**

**PROJECT TITLE: STOCK PRICE PREDICTION**

**TEAM MEMBERS:**

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**PROBLEM STATEMENT:**

**STOCK PRICE PREDICTION**

The stock price prediction problem statement is to develop a model or algorithm that can forecast the future price of a particular stock based on historical data and various relevant factors. This problem involves using machine learning or statistical techniques to make predictions about whether a stock’s price will raise, fall or remain stable over a given period. The goal is to provide investors and traders with valuable insights for making informed decisions in the financial markets.

**DATASET:**

Dataset is taken from :

<https://www.kaggle.com/datasets/subbhashit/stock-price-predictions>

**COLUMNS USED:**

  The Open column tells the price at which a stock started trading when the market opened on a particular day. The Close column refers to the price of an individual stock when the stock exchange closed the market for the day. The High column depicts the highest price at which a stock traded during a period. The Low column tells the lowest price of the period. Volume is the total amount of trading activity during a period of time.



**LIBRARIES USED:**

**#import numpy as np**

**#import pandas as pd**

**#import matplotlib.pyplot as plt**

**#import seaborn as sb**

**#from sklearn.model\_selection import train\_test\_split**

**#from sklearn.preprocessing import StandardScaler**

**#from sklearn.linear\_model import #LogisticRegression**

**#from sklearn.svm import SVC**

**#from xgboost import XGBClassifier**

**#from sklearn import metrics**

**#import warnings**

**warnings.filterwarnings('ignore')**

**Stock price prediction using LSTM:**

1. Imports
2. Read the dataset
3. Analyze the closing prices from dataframe
4. Sort the dataset on date time and filter “Date” and “Close” columns
5. Normalize the new filtered dataset
6. Build and train the LSTM model
7. Take a sample of a dataset to make stock price predictions using the LSTM model

**HOW TO TRAIN AND TEST:**

**1.Data Collection:**

Gather historical stock price data. You can use APIs like Alpha Vantage, Yahoo Finance, or import data from CSV files. For this example, we'll use the pandas library to work with data.

**2.Data Preprocessing:**

Clean and preprocess the data. This includes handling missing values, normalizing or scaling the data, and creating features that the model can use for prediction.

**3.Splitting Data:**

Split your data into a training set and a testing set. The training set is used to train the model, while the testing set is used to evaluate its performance.

**4.Choosing a Model:**

Select a machine learning or deep learning model for stock price prediction. Common choices include linear regression, decision trees, support vector machines, or more complex models like recurrent neural networks (RNNs) or long short-term memory networks (LSTMs).

**5.Feature Engineering:**

Create relevant features from your data, such as moving averages, technical indicators, or sentiment scores from news articles, which can help improve the model's accuracy.

**6.Training the Model:**

Fit the chosen model on the training data. You'll need to decide on the model's hyperparameters (e.g., learning rate, number of layers in a neural network) and use a training algorithm to optimize the model's weights.

**7.Testing the Model:**

Use the testing dataset to evaluate the model's performance. Common metrics for regression problems like stock price prediction include Mean Absolute Error (MAE), Mean Squared Error (MSE), and Root Mean Squared Error (RMSE).

**8.Visualization:**

Visualize the predicted vs. actual stock prices to understand how well the model is performing.

**METRICS USED FOR ACCURACY:**

Accuracy is not typically used as the primary metric for evaluating the performance of stock price prediction models. This is because stock price movements are often noisy and subject to various external factors, making it challenging to achieve high accuracy in predicting exact price values. Instead, the following metrics are more commonly used to evaluate the performance of stock price prediction models:

**1.Mean Absolute Error (MAE):**

MAE measures the average absolute difference between the predicted and actual stock prices. It gives you an idea of how far off, on average, your predictions are from the actual prices.

**2. Mean Squared Error (MSE):**

MSE measures the average squared difference between the predicted and actual stock prices. It penalizes larger errors more heavily than MAE and is sensitive to outliers.

**3. Root Mean Squared Error (RMSE):**

RMSE is the square root of MSE and provides a measure of the standard deviation of the errors. It is in the same unit as the stock price and is easier to interpret.

**4. Mean Absolute Percentage Error (MAPE):**

MAPE calculates the percentage difference between predicted and actual stock prices, providing a relative measure of error. It is useful for understanding the accuracy of predictions in percentage terms.

**5. Directional Accuracy (DA):**

DA measures whether the model correctly predicts the direction of price movements (e.g., whether it predicts "up" when the price actually goes up). It's a binary metric and doesn't consider the magnitude of the price change.

**6. Sharpe Ratio and Risk-Adjusted Metrics:**

In addition to the above metrics, investors and analysts often use risk-adjusted metrics like the Sharpe Ratio to evaluate the performance of trading strategies based on stock price predictions. These metrics take into account both returns and risk.

**7.Profit and Loss Analysis:**

In practical applications, the ultimate goal is often to make profitable trades. Therefore, profit and loss analysis is crucial, considering transaction costs, slippage, and other trading-related factors.