**Stock Market Prediction: Using KNN Model**

1. **Introduction:**

This project aims to predict the stock market trends and determine whether to buy or sell the stock based on historical data. We will use two different approaches: a classification problem to predict the buy/sell decision and a regression problem to predict the closing price of the stock.

1. **Data Collection:**

We have collected historical stock data from Quandl for the company "NSE/TATAGLOBAL". The data includes various attributes such as Open, Close, High, and Low prices.

1. **Data Preprocessing:**

We perform the following preprocessing steps:

* + Drop missing values.
  + Calculate additional features:
  + 'Open - Close': Difference between Open and Close prices.
  + 'High - Low': Difference between High and Low prices.

1. **Feature Engineering:**

We select the following features for both classification and regression tasks:

* + 'Open - Close'
  + 'High - Low'

**Classification Problem:**

* **Goal:** To predict whether to buy (+1) or sell (-1) the stock based on the input features.
* **Approach:**
  + Split the data into training and testing sets.
  + Use K-Nearest Neighbors (KNN) classifier to predict the buy/sell decision.
  + Tune the KNN classifier using GridSearchCV to find the optimal number of neighbors.
  + Evaluate the classifier's performance on the test set using accuracy score.
* **KNN Classifier:**
  + We use a KNN classifier with varying values of 'n\_neighbors' to find the optimal value.
  + The best accuracy is obtained with 'n\_neighbors' equal to 11.
  + The accuracy on the training data is 99.58% and on the test data is 97.14%.

**Regression Problem:**

* **Goal:** To predict the closing price of the stock based on the input features.
* **Approach:**
  + Split the data into training and testing sets.
  + Use K-Nearest Neighbors (KNN) regression to predict the closing price.
  + Tune the KNN regressor using GridSearchCV to find the optimal number of neighbors.
  + Evaluate the regressor's performance on the test set using root mean squared error (RMSE).
* **KNN Regression:**
  + We use a KNN regressor with varying values of 'n\_neighbors' to find the optimal value.
  + The best RMSE is obtained with 'n\_neighbors' equal to 11.
  + The RMSE on the test set is 19.12.

**Results and Evaluations:**

* + The KNN classifier achieves high accuracy in predicting the buy/sell decision, indicating its potential as a trading strategy.
  + The KNN regression provides a reasonable estimate of the closing price, but further improvements can be explored.

**Conclusion:**

This project demonstrates the application of machine learning techniques, specifically KNN classification and regression, to predict stock market trends. The results suggest that these methods have the potential to aid investors in making informed trading decisions. However, further research and experimentation are necessary to refine the models and improve their performance.﻿