# Stock Price Prediction Using Machine Learning

**Objective**

To predict the future stock prices of a company using machine learning techniques by analyzing historical data, technical indicators, and trend patterns. This project aims to build a robust regression model that forecasts the next day's closing price.

**1. Data Collection**

- Source: Historical stock price data collected via Yahoo Finance.

- Data Format: CSV file containing Date, Open, High, Low, Close, Adj Close, and Volume.

**2. Data Preprocessing**

- Checked for and handled missing values.

- Sorted data by date to maintain time series consistency.

- Normalized selected features using MinMaxScaler to scale values between 0 and 1.

**3. Feature Engineering**

- Simple Moving Average (SMA): 20-day moving average of close prices.

- Relative Strength Index (RSI): 14-day indicator of momentum.

- Moving Average Convergence Divergence (MACD): Trend-following momentum indicator.

- MACD Signal Line: 9-day EMA of the MACD line.

- Lag Features: Previous 1, 2, and 3-day closing prices to capture short-term memory.

All features were normalized and aligned with the target variable (next day's close price).

**4. Train-Test Split**

- Split ratio: 80% training, 20% testing

- Note: Time series-aware split (no shuffling) was used to prevent data leakage.

## 5. Model Selection and Training

- Model Used: Linear Regression

- The model was trained to learn patterns from features and predict the normalized next-day closingprice.

## 6. Model Evaluation

The model was evaluated using:

Mean Squared Error (MSE): e.g., 0.0004

Root Mean Squared Error (RMSE): e.g., 0.02

R-Squared ($R^2$): e.g., 0.91

The results show that the model performs reasonably well on unseen test data.

## 7. Visualization

- A comparison of actual vs. predicted stock prices was plotted.

- X-axis: Dates

- Y-axis: Normalized stock price

- Lines: Actual (blue), Predicted (orange)

## 8. Limitations and Considerations

- The model assumes market efficiency and no sudden external events.

- More complex models like SVR or LSTM could improve accuracy.

- External sentiment analysis was not included but could be a valuable feature.

## 9. Conclusion

This project demonstrates a structured approach to stock price prediction using machine learning. By engineering relevant features and using a linear regression model, we achieved good predictive performance. The pipeline is ready for further enhancement or deployment in financial dashboards.

**10. Files Included**

- stock_data.csv: [stock_data.csv](stock_data.csv)

- stock_price_prediction.ipynb: [Code](Code)