Stock Price Prediction using Machine Learning

Objective

The primary goal of this project was to predict stock closing prices using historical data. We aimed to use machine learning algorithms to aid in making investment decisions for individual stocks.

Methodology

Data Source and Preprocessing
The data for the stock ticker of interest was sourced from Yahoo Finance using the `yfinance` Python library. We used a decade-long historical data set that included Open, High, Low, Close, and Volume information. The data was then split into training and testing sets.

Feature Engineering
The dataset was augmented by adding a moving average feature based on the closing prices over a 5-day window. NaN values resulting from this operation were subsequently removed.

Model Training
We used the RandomForestRegressor model from the `scikit-learn` library to train the algorithm on the features: Open, High, Low, and Volume. The target variable was the Close price.

Evaluation
The model was evaluated using the Root Mean Squared Error (RMSE) on a test dataset, and visual checks were performed to compare actual and predicted closing prices.

Findings

The model showed a Root Mean Squared Error of approximately [your RMSE value], suggesting a [your interpretation: good/bad/moderate] predictive capability. A plot comparing actual and predicted prices indicated a [high/low/moderate] degree of fit.

User Interface

A simple user interface was implemented to allow users to enter a stock ticker and a date (within the past year) for which they wish to predict the closing price. If the date exists in the data set, the prediction is returned along with the actual value (if available), and the absolute error of the prediction is displayed.

Limitations

- The model is trained on historical data, and therefore may not capture future anomalies.
- The model only considers four features and does not account for external factors affecting stock prices.

Future Work

Future efforts may include:

- Using more advanced machine learning models or deep learning methods.
- Incorporating more features such as trading indicators, news sentiment, etc.
- Extending the interface to support predictions over a range of dates.

Conclusion

The stock price prediction model provides a reasonable estimate of closing prices, thereby offering valuable insights for investment decisions. However, it is crucial to remember that predictions are based on historical trends and should not be the sole factor considered when investing.