

Apple Stock EDA Insights

1. Box Plot of Closing Price and Volume Traded:

- Closing Price Box Plot:

This box plot highlights the spread and outliers in the stock's closing price over the observed period. The relatively tight interquartile range (IQR) suggests moderate variability, with some extreme values (outliers) that could be spikes in the stock price, often due to market reactions or significant events.

- Volume Traded Box Plot:

The volume box plot shows the distribution of the number of shares traded. The presence of outliers suggests that there were days with unusually high or low trading volumes, which could indicate market activity spikes during significant events (e.g., product launches or financial announcements).

2. Joint Plot of Closing Price and Volume:

- The joint plot illustrates the relationship between trading volume and closing price. While no clear linear relationship is evident, the density of points at particular volume levels shows that certain volume ranges are associated with stock prices. Higher volumes might be loosely connected with specific price levels, but the lack of a strong pattern could indicate that volume alone isn't a sole predictor of price.

3. Density Plot of Volume Traded:

- This plot shows the probability distribution of the number of shares traded. The shape of the density curve, with a long tail on the higher end, suggests that while most days see a moderate trading volume, there are occasional spikes where the volume is much higher. These high-volume days could align with earnings reports or major company announcements.

4. Density Plot of Closing Price:

- The density plot of the closing price shows how frequently certain stock price ranges occur. A bell-shaped curve indicates that most of the prices hover around a specific range, with some variability. The smooth curve suggests that there are fewer extreme deviations, meaning the stock price has been relatively stable with gradual shifts over time.

5. Random Forest Model Results:

- Mean Absolute Error (MAE):

With an MAE of 0.0736, the model has a very small average error when predicting the stock's closing price. This suggests that on average, the model's predictions deviate from the actual values by only 0.07 units, which is highly accurate.

- R² Score:

The R² score of 0.99998 indicates that almost all the variance in the data is explained by the model. This means that the model fits the data exceptionally well and can make highly accurate predictions.

- Prediction Accuracy:

The accuracy of 99.68% shows the model's reliability in predicting Apple stock's closing price. The combination of the features used (like volume, open, high, low prices) and the Random Forest algorithm has resulted in a highly accurate predictive model.

General Insights from the Analysis:

- Stock Behavior:

The Apple stock shows typical fluctuations in its closing price, with moderate volatility and occasional spikes. The trading volume has a wider range, with many days seeing high trading activity, often driven by market news.

- Feature Impact:

Although volume and stock price are somewhat related, there isn't a clear one-to-one correlation. This is reflected in the scatter plots, and it emphasizes that stock price is influenced by multiple factors beyond just trading volume, which your Random Forest model captures well by using various input features.

- Model Performance:

The Random Forest model's impressive performance suggests that it's capturing the underlying patterns in the stock data well. The inclusion of multiple stock attributes (like open, high, low prices) and the careful treatment of outliers contributed to the model's high accuracy.