

Quant Club Task

IIT KHARAGPUR

TASK 1: Analysis Task (Present In the PDF)
(All the Graphs are present in Notebook)

TASK 2: WordleBot ([Wordle task - Colaboratory](#))

TASK 3: Reading Task

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Analysis Task

Analyzing the relationship between stock prices and trading volume using correlation analysis

Without Removing outliers ([withoutliers.csv](#))

Daily Data Notebook

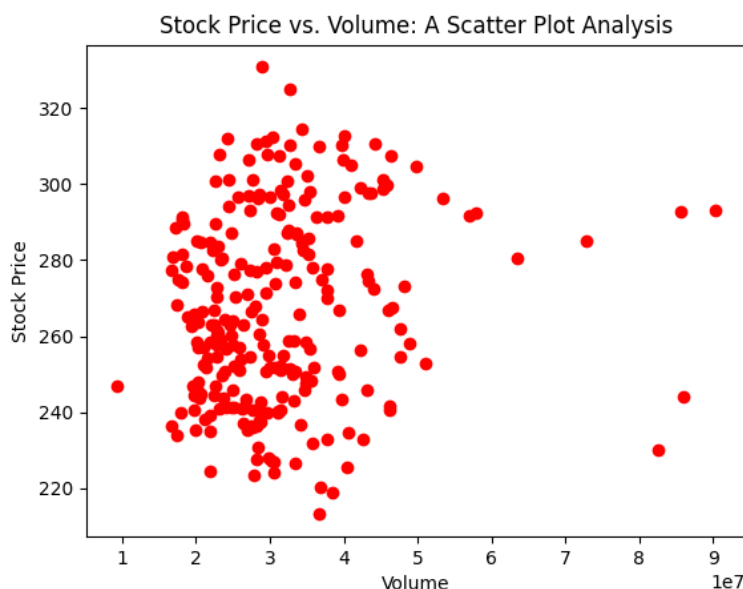
Correlation Coefficient

The correlation coefficient is a statistical measure that indicates the degree to which two variables are related to each other. It is a numerical value that ranges from -1 to 1, where -1 represents a perfect negative correlation, 0 represents no correlation, and 1 represents a perfect positive correlation.

From the Data :-

Correlation coefficient = 0.14781846713930535

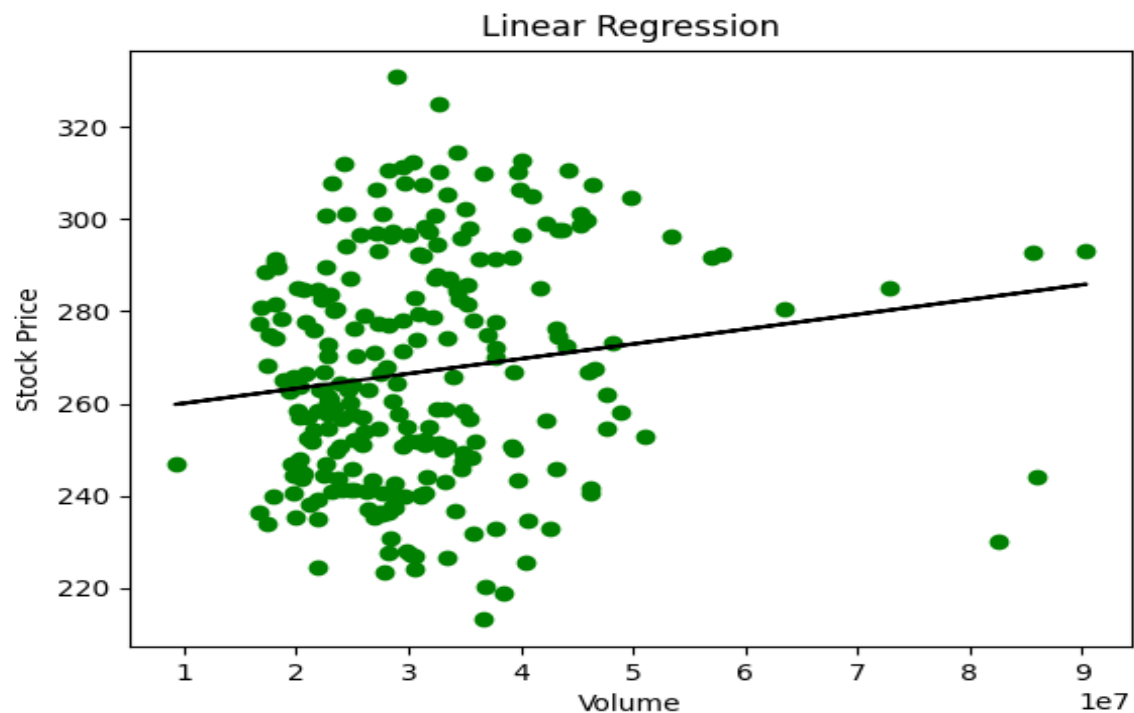
A correlation coefficient value of 0.1478 suggests a weak positive correlation between the two variables being analyzed. The value is positive, indicating that as one variable increases, the other variable tends to increase as well, but the relationship is not very strong.



Regression Analysis

I performed regression analysis manually() and using the linear regression function.

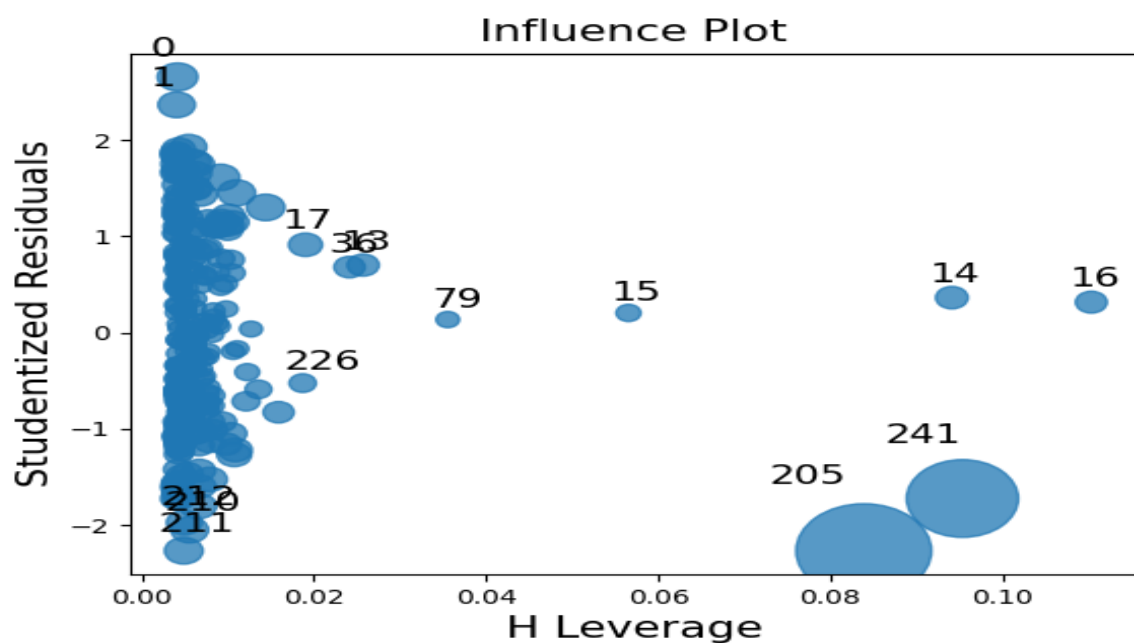
$$y_pred = 3.211609e-07 x + 2.568475e+02$$



Influential Data Point

An influential data point is an observation that has a large effect on the results of a statistical analysis. In regression analysis, influential data points can cause the regression line to be pulled towards them, even if they are not representative of the rest of the data. This can lead to inaccurate results.

Leverage plot

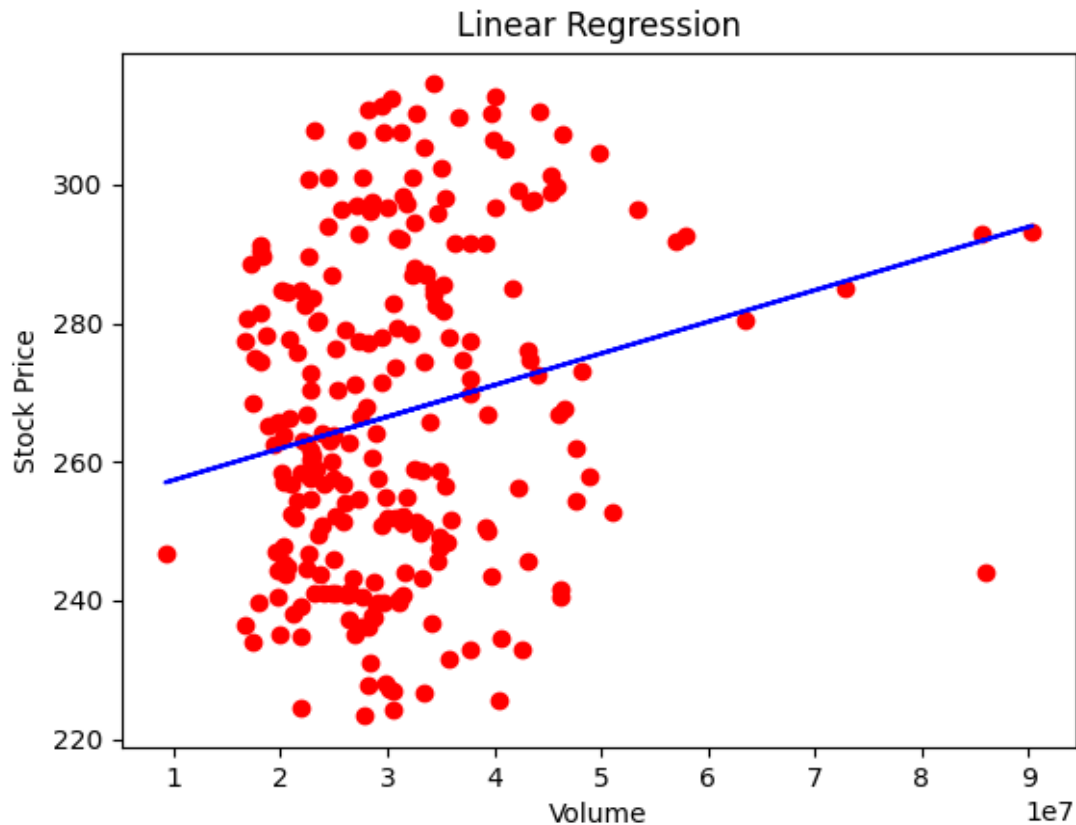


Removing outliers ([RemovedOutliers.csv](#))

Method Used - Standardized residual method

New Correlation coefficient - 0.21368662347751452

$$y_{\text{predict}} = 4.56156933e-07x + 252.82169341$$



Prediction

Data - [PredictedPrice.csv](#)

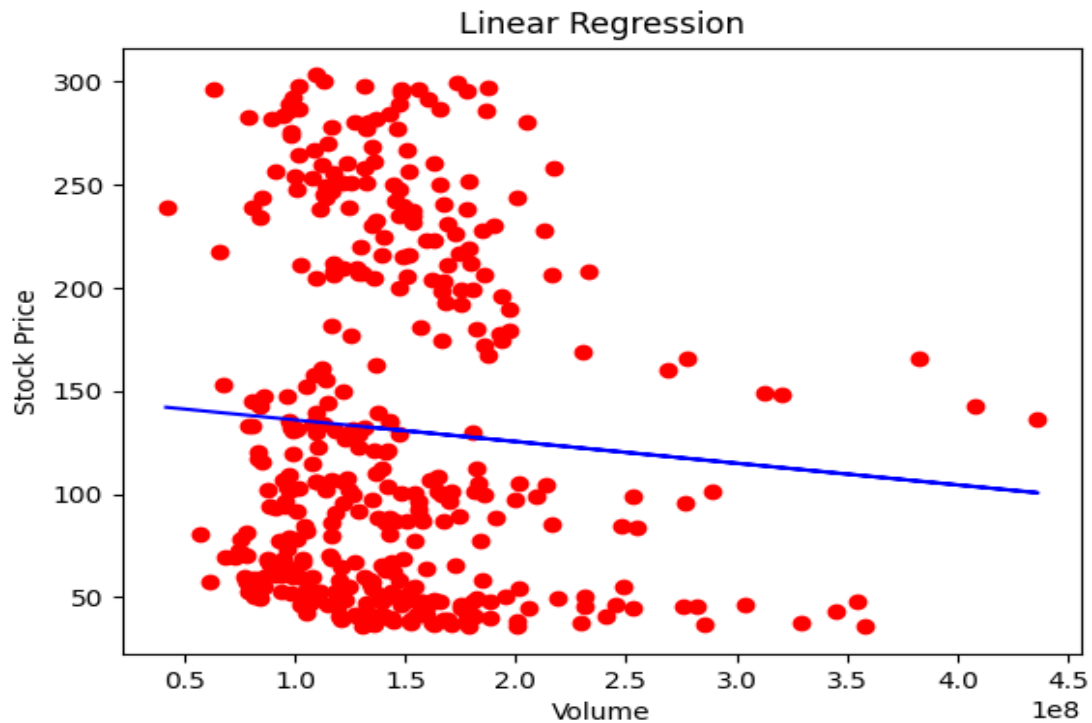
Rmse value = 10.184 (Made the model little bit accurate in the prediction section)

Conclusion

In conclusion, our analysis suggests that there is a positive relationship between stock prices and volume, as higher trading volumes tend to be associated with higher stock prices. However, our simple linear regression model had an RMSE value of 10.184, indicating that the model's predictions have some level of error and are not perfectly accurate. Despite this limitation, our study provides valuable insights into the relationship between stock prices and volume, which can inform investment strategies and decision-making in the financial industry.

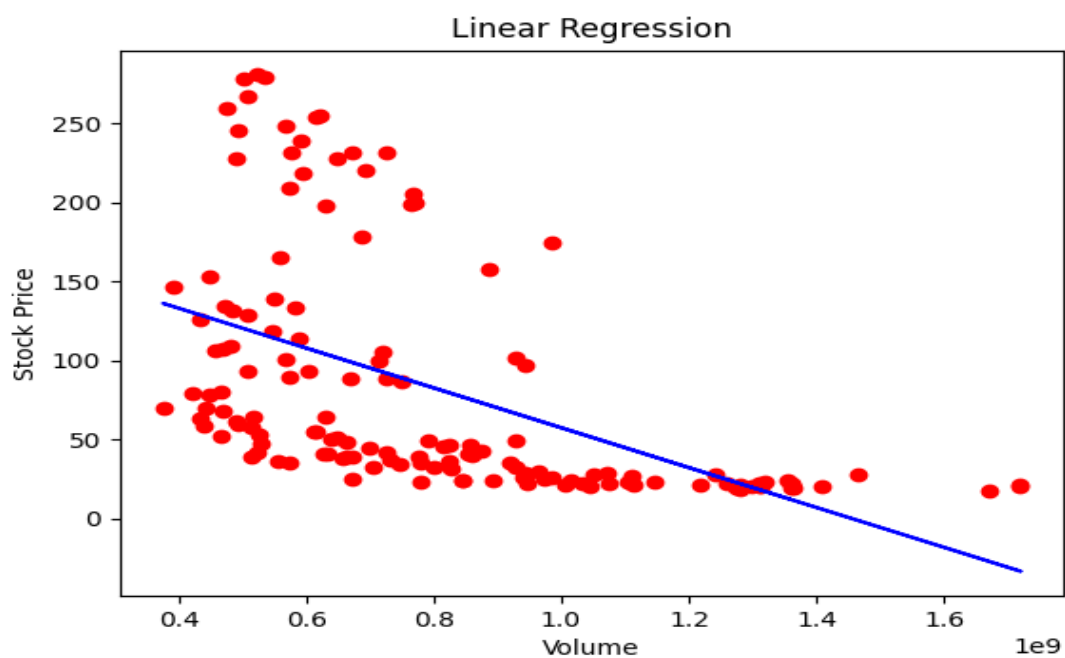
Weekly (After removing Outliers) [Weekly Data Notebook](#)

$$y_{\text{predict}} = -1.05074879e-07x + 146.53950993$$



Monthly (After Removing Outliers) [Monthly Data Notebook](#)

$$y_{\text{predict}} = -1.26068971e-07x + 183.40576376$$



Standardized residual method

- The studentized residual method is a statistical technique used to identify outliers in linear regression analysis. A studentized residual is a measure of how far an observed value of the response variable is from the predicted value, expressed in terms of the standard error of the residuals.
- I used this code snippets for finding the standardized residuals

```
stand_resids = model.resid_pearson (statsmodels.api  
module)
```
- Standardized residuals are a useful tool for evaluating the fit and accuracy of a linear regression model and for identifying potential outliers or influential observations in the dataset.

Final Conclusion

The linear regression model has an RMSE value of 10.184. This means that the model is not very accurate in predicting stock prices. One possible reason for this is that the volume data depicts both buying and selling prices. This can introduce noise into the model, making it difficult to accurately predict future price movements.

- **Rising volume with rising prices** - This is a bullish signal, as it indicates that there is more buying pressure than selling pressure. This can be a sign that the stock is in a strong uptrend.
- **Falling volume with falling prices** - This is a bearish signal, as it indicates that there is more selling pressure than buying pressure. This can be a sign that the stock is in a strong downtrend.
- **Rising volume with falling prices** - This is a bearish signal, as it indicates that there is a lot of selling pressure, but the stock is still falling. This can be a sign that the stock is oversold and could be due for a rebound.
- **Falling volume with rising prices** - This is a bullish signal, as it indicates that there is a lot of buying pressure, but the stock is still rising. This can be a sign that the stock is overbought and could be due for a pullback.

To predict stock prices with better accuracy, we need more data, such as news sentiments and a better model.

The relationship between stock price and volume can be affected by a number of other factors, including news events, economic conditions, and company announcements.

Terms

Volatility - Volatility measures the amount of uncertainty or risk related to the size of changes in the value of a financial asset or instrument. It indicates the extent of potential swings in price over a given time period. Higher volatility means greater potential fluctuations in value, implying more possibility of substantial gains or losses.

Liquidity - The liquidity of an asset refers to how easily it can be bought or sold in the market without materially impacting its price. A liquid market allows assets to be traded in large volumes at low costs and with minimal price changes.

- Heavy trading volume and frequent buying and selling activity.
- Low transaction costs such as bid-ask spreads, broker fees, and market impact costs.
- Narrow differences between the prices at which investors are willing to buy (bids) versus sell (asks) the asset.
- Minimal price changes or distortions due to the trading activity itself.

Relation between Volatility , Liquidity and traded volume

Volatility and liquidity are closely linked yet complexly related. In general, high volatility tends to curb liquidity as investors may avoid trading in assets with unpredictable price swings. Likewise, low volatility often boosts liquidity by making assets more attractive and feasible to trade.

However, the relationship between volatility and liquidity is not straightforward. High volatility and liquidity can coexist, especially in large, active markets that facilitate frequent trading with minimal impact. And low volatility is not always matched with high liquidity if trading volume is low.

Trading volume itself influences both volatility and liquidity, in sometimes contradictory ways. A high volume of trades typically enhances liquidity by demonstrating strong investor interest, yet it can also spur volatility through the price impacts of many trades. Conversely, low volume may sap liquidity by making trades more difficult to execute, while reducing volatility from fewer price-influencing trades.

In sum, volatility, liquidity, and trading volume interact in complex and multidimensional ways. They can positively, negatively, or even mutually reinforce each other depending on the context of a specific market and set of conditions. Optimal levels of each also vary for different assets, investors, and investment objectives.