DSC 530 DATA EXPLORATION – STOCK INDEX DATA

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Stock Index Data Analysis Data Exploration

The data exploration project experiment on S&P 500 and Dow 30 index is to analyze the market data and help investors with true insights.

Statistical/Hypothetical Question

- How do the returns of the Dow 30 compare to the S&P 500 over the 5-year period? Calculate and compare the annualized returns of the Dow 30 and S&P 500 over the 5-year period to see which index offered better performance.
- How do the trends in the moving averages (e.g., 50-day and 200-day moving averages) of the Dow 30 compare with those of the S&P 500 over the same period?
- What is the market volatility comparison between the Dow 30 and S&P 500? based on investors risk taking and accepted volatility investor can choose best suited one for them.
- Do we have any significant correlations between the movements of the Dow 30 and S&P 500 indexes? Is there a strong correlation between the closing prices of the Dow 30 and S&P 500? How does this correlation change when considering their moving averages?

Outcome of the EDA

- Outlier detection: we performed potential outlier detection for the stock market index data, here we used histograms for each of related variables, there seems to be fewer instances of extreme low and high values, but then based on the nature of stock market we can conclude those are not outliers , and in real scenario those are market volatility in response to varies market conditions.
- Feature Creation: As part of EDA process, created new valuable features/data elements to the dataset, in real world it is not always possible to get all the required data for the project. We need to Analyse, transform/create new data elements from the available raw data.in this

project we have created 50_day_MA_sp500, 50_day_MA_dow30, 200_day_MA_sp500, 200_day_MA_dow30, Daily_Returns_sp500 & Daily_Returns_dow30.

- Moving Averages Trends: we have performed a study examining the trends in 50-day and 200-day moving averages for both indices, exploring their implications on market sentiment and investor behavior. Here the standard deviation measurements indicated that the closing prices fluctuated more widely than the moving averages, suggesting higher short-term volatility compared to the long-term trend stability.
- Market Volatility: we have performed a comparison of market volatility between the two indices &P 500 and Dow 30 was conducted, providing insights into risk profiles suitable for different investor types. The standard deviation of closing prices versus moving averages was used to gauge market volatility.
- Correlation Analysis: we did Investigation on correlation between the movements of the Dow 30 and S&P 500, specifically looking at closing prices and how these correlations may vary with their moving averages. Here Scatter plots and Pearson correlation coefficients were used to explore the relationship between trading volumes and closing prices for each index. This analysis aimed to determine if higher trading volumes were associated with significant changes in closing prices, indicating potential correlations or causations between these variables. There is a statistically significant relationship between trading volume and closing prices for the S&P 500, the actual impact of volume on closing prices appears to be minimal based on this analysis

What are items were missed during the analysis

Here the analysis was performed based on historical data, but in the real scenario we need to consider additional market impacting variables. The following are some additional variables could have been considered for the analysis.

- Interest Rates: Changes in interest rates can affect the cost of borrowing, consumer spending, and investment levels.
- Inflation Rates: Inflation impacts purchasing power and can influence central bank policies, affecting stock prices.
- Gross Domestic Product (GDP): Economic growth indicators such as GDP growth rate reflect the overall health of the economy and can influence market sentiment.
- Unemployment Rates: High unemployment can signal economic distress, while low rates may indicate economic strength, impacting consumer spending and corporate profits.
- Election Results: Political changes can affect market regulation, economic policies, and investor confidence.
- Trade Policies and Tariffs: Trade agreements or disputes can impact industry sectors differently, affecting international trade and company earnings.
- Geopolitical Tensions: Conflicts, wars, or tensions between countries can create market volatility and uncertainty.
- Investor Sentiment: General market mood can drive market movements independent of fundamental indicators.
- Market Trends and Momentum: Trends, whether based on technical analysis or market momentum, can influence investor behavior and stock prices.

Were there any variables you felt could have helped in the analysis?

Yes, analyzing stock market trend includes time series analysis, and it is not always possible as the market conditions depends on many other variables listed above, in order to support this project, we should have one supporting variable called ‘market greedy index‘ ranging from 1 to 10, this should be the feature created based on above missing variables to support the analytical project.so that the we can improve the accuracy of the prediction model.

Were there any assumptions you felt were incorrect?

Yes, this project assumed that all available information was already reflected in the market price, and we were using only the historical data for understanding the data and identifying the relationship. This assumption might not account for all external influences on market volatility and index movements, we need to consider all other market influencing variables too.

What challenges did you face, what did you not fully understand?

The analysis acknowledged potential oversights, such as not fully incorporating macroeconomic factors or sector-specific performances, which could have provided more comprehensive insights into the indices' movements, I need to find a way to include all the market influencing factors and conduct the data exploration and proceed for further analytical process.

References

Yahoo finance , For obtaining the histoical data . URL

Zacks investment research , For obtaining knowledge about stocks and its performance. URL