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PROJECT – 1

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PROJECT TITLE – **“stock-market”**

Abstract

This project conducts a business and financial analysis of four major technology stocks: Apple (AAPL), Google (GOOG), Microsoft (MSFT), and Netflix (NFLX), using historical price data. The objective is to identify trends, compare performance, and understand the relationships between these stocks. The methodology involves time-series analysis of adjusted closing prices, the calculation of 20-day and 50-day simple moving averages to identify trend momentum, and a volatility analysis based on the standard deviation of daily returns. Furthermore, a correlation analysis was performed to examine how these stock prices move in relation to one another. The findings show distinct volatility patterns and a high positive correlation among AAPL, GOOG, and MSFT, suggesting they are influenced by similar market forces. This analysis provides valuable insights for investment strategy and business forecasting.

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1. Introduction

1.1. Background

In the domain of business and finance, analyzing stock market data is crucial for understanding company performance, market dynamics, and investment opportunities. The technology sector, in particular, is a significant driver of the global economy. Companies like Apple, Google, Microsoft, and Netflix are market leaders whose stock performance is closely watched by investors and analysts.

1.2. Problem Statement

For a business analyst, the ability to dissect historical stock data to extract meaningful patterns is a key skill. The challenge is to move beyond simply observing price changes and apply quantitative methods to assess trends, risk (volatility), and inter-relationships between different assets. This project aims to systematically analyze and compare these four tech giants to provide a clear, data-driven performance overview.

2. Objectives

The primary objectives of this analysis are:

- **Trend Identification:** To visualize and identify trends and patterns in the stock price movements of AAPL, GOOG, MSFT, and NFLX.
- **Moving Average Calculation:** To compute and analyze 20-day and 50-day simple moving averages to smooth out price data and identify trend directions.
- **Volatility Measurement:** To calculate and compare the volatility of each stock to assess its relative risk.
- **Correlation Analysis:** To conduct a correlation analysis to understand the relationships between the price movements of the different stocks.

3. Methodology

3.1. Dataset Description

The dataset contains historical daily stock price information for several companies. This analysis focuses on the data for tickers AAPL, GOOG, MSFT, and NFLX.

Key Columns:

- **Ticker:** The stock symbol (e.g., 'AAPL').
- **Date:** The date of the trading day.
- **Adj Close:** The closing price adjusted for dividends and stock splits. This is used for accurate historical performance analysis.
- **Volume:** The number of shares traded on that day.

3.2. Data Preprocessing

The Date column was converted from a string to a datetime object to enable proper time-series plotting and analysis.

3.3. Trend Analysis

The adjusted closing prices for all four stocks were plotted over time on a single chart to visually compare their historical performance and identify major trends.

3.4. Moving Averages

Simple Moving Averages (SMAs) are a technical analysis tool used to identify trend direction. We calculated:

- **20-day SMA:** A short-term trend indicator.
- **50-day SMA:** A medium-term trend indicator. These were plotted alongside the adjusted closing price to visualize trends and potential buy/sell signals (e.g., when the short-term average crosses the long-term average).

3.5. Volatility Analysis

Volatility measures the degree of variation in a stock's price over time and is a common measure of risk. It was calculated as the standard deviation of the daily percentage returns. A rolling 20-day volatility was also plotted to see how risk levels changed over time.

3.6. Correlation Analysis

Correlation measures the statistical relationship between two variables. A correlation matrix of the daily returns for the four stocks was calculated. The results were visualized using a heatmap, where values range from -1 (perfect negative correlation) to +1 (perfect positive correlation).

4. Results and Discussion

4.1. Stock Price Trends

The time-series plot of adjusted closing prices shows the growth trajectory of each company. This visualization allows for a direct comparison of their performance over the given period.

4.2. Moving Averages Insights

The plot of moving averages for each stock helped in identifying the prevailing trend. When the 20-day SMA is above the 50-day SMA, it typically indicates a bullish (upward) trend, and the reverse indicates a bearish (downward) trend.

4.3. Volatility Comparison

The volatility analysis revealed which stocks were more stable and which experienced larger price swings. This is a critical factor for risk assessment. For instance, a historically more volatile stock might be considered a riskier investment.

4.4. Stock Price Correlation

The correlation heatmap showed a strong positive correlation (values close to +1) between Apple, Google, and Microsoft. This suggests that their stock prices tend to move in the same direction, likely influenced by broader market or tech sector trends. Netflix showed a slightly lower, but still positive, correlation with the other three.

5. Conclusion and Future Work

5.1. Conclusion

This analysis successfully provided a multi-faceted comparison of four key technology stocks. Through trend, moving average, volatility, and correlation analysis, we uncovered key characteristics of each stock's behavior. The strong correlation between the major tech players highlights the interconnectedness of the sector. These insights are valuable for business analysts in making data-informed decisions regarding market assessment and competitive analysis.

5.2. Future Work

- **Fundamental Analysis:** Incorporate financial metrics from company reports (e.g., P/E ratio, earnings per share) into the analysis.
- **Sentiment Analysis:** Integrate sentiment data from news articles or social media to see how public perception affects stock prices.
- **Predictive Modeling:** Use machine learning models like ARIMA or LSTM to forecast future stock prices based on historical data.

DATA SET - <https://drive.google.com/file/d/1i7Too9BOI6-A2QdfPsgGi2CzID09fVLE/view?usp=sharing>

TABLEAU DASHBOARD LINK

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