PROJECT-9

Quantitative Analysis on Stocks Data

Project Description: This project focuses on performing a comprehensive quantitative analysis on stock market data for Microsoft, Google, Netflix, and Apple. Using Python and various analytical techniques, the study explores stock volatility, correlation, risk-return trade-offs, and time-series patterns to derive actionable financial insights.

Data Exploration and Summary: The initial phase involves importing the dataset and conducting exploratory data analysis (EDA):

- Summary statistics for stock prices and returns to understand distribution, central tendencies, and dispersion.

Exploratory Data Visualization: Several visualizations are created to gain insights into the stock data:

- **Line Plots of Stock Prices Over Time:** Visualizes the historical trends of stock prices.
- **Histograms of Daily Returns:** Illustrates the return distribution for each stock.
- **Box Plots of Stock Volatility:** Highlights stock price fluctuations and risk levels.
- **Heatmap of Correlations:** Displays the correlation matrix between the selected stocks to assess relationships.

Volatility and Risk-Return Analysis: The study evaluates the financial risk associated with the selected stocks:

- **Rolling Volatility Calculation:** Uses moving averages to analyze fluctuations over different time frames.
- **Sharpe Ratio Computation:** Assesses risk-adjusted returns for each stock to determine their performance relative to risk.
- **Daily Risk vs. Return Scatter Plot:** Compares risk (volatility) and return across all four stocks to evaluate investment potential.

Time Series Analysis: The project examines trends and seasonality patterns in stock prices:

- **Autocorrelation Analysis:** Identifies repeating patterns and dependencies in stock prices over time.
- **Trend and Seasonal Decomposition:** Extracts underlying trends and cyclical behavior in stock movements.

Comparative Analysis: The final stage involves drawing comparative insights between the selected stocks:

- **Performance Comparison:** Evaluates the overall profitability and risk of each stock.
- **Market Behavior Patterns:** Derives insights into sector-wide trends and macroeconomic influences.

Conclusion: The project provides key insights into stock market behavior, volatility, and risk-return trade-offs. It aids in understanding investment opportunities, risk mitigation strategies, and comparative financial performance among major technology stocks. The analysis can be extended further for portfolio optimization and predictive modeling for future stock performance.