Investment Portfolio Analysis project:

**Objectives:**

* Perform an in-depth analysis of an investment portfolio consisting of 10 stocks.
* Calculate the returns, risk, and correlations of the individual stocks and the overall portfolio.
* Determine the efficient frontier and identify the minimum variance and optimal risky portfolios.
* Provide insights and recommendations for optimizing the investment portfolio.

**Research Methodology:**

* Data Collection: You extracted stock price data for 10 Indian stocks over the period from July 2021 to July 2024 using the getSymbols() function from the quantmod library.
* Data Preprocessing: You cleaned and prepared the data, handling missing values using na.locf() and converting the data to the required formats (timeSeries, data.frame).

**Portfolio Analysis:**

* Calculated the discrete returns for the individual stocks and the overall portfolio using the Return.calculate() and Return.portfolio() functions.
* Computed the covariance matrix and standard deviation of the portfolio returns.
* Utilized the portfolioFrontier() function from the fPortfolio package to determine the efficient frontier and identify the minimum variance and optimal risky portfolios.

Visualization: You used the plot() function to visualize the efficient frontier.

**Key Findings:**

* The mean return of the 10-stock portfolio was X.X%, with a standard deviation of X.X%.
* The efficient frontier plot showed the trade-off between risk and return for different portfolio allocations.
* The minimum variance portfolio had weights of [W1, W2, ..., W10] and achieved a return of X.X% with a standard deviation of X.X%.
* The optimal risky portfolio had weights of [W1, W2, ..., W10] and achieved a return of X.X% with a standard deviation of X.X%.

**Recommendations:**

* Consider rebalancing the portfolio to align with the optimal risky portfolio weights to maximize the risk-adjusted return.
* Monitor the portfolio performance and individual stock contributions regularly and make adjustments as necessary.
* Diversify the portfolio further by adding investments in other asset classes (e.g., bonds, real estate) to reduce overall risk.
* Continuously research and evaluate new investment opportunities that fit the portfolio's risk-return profile.