

Team R-chitects

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Financial Portfolio Management Dashboard

R-Shiny Decision Support System

# **Abstract**

We have developed a shiny dashboard that allows the user to track the performance of S&P stocks, observe their forecast predictions and curate a stock portfolio based on the user’s financial goals and risk appetite. This solution was developed to support potential investors in for their portfolio management. The dashboard provides a comprehensive analysis of the stocks and descriptive, predictive and prescriptive analytics.

# **Business Problem**

For a retail investor who does not have the time and ability to carry out sophisticated financial analysis, the portfolio management dashboard is a very effective tool. Our solution addresses two key questions of the potential investor:

1. Which are the stocks that should I invest in?
2. How much should I invest in each of these stocks?

The dashboard generates a portfolio of stocks curated for four different profiles of investors:

1. The risk-averse investor: Minimize risk (selects top ‘x’ stocks with the least risk)
2. The high-return investor: Maximize return (selects top ‘x’ stocks with the most returns)
3. Balanced portfolio investor: Maximizes the sharpe ratio1
4. Specific goals investor: Maximizes sharpe ratio with risk and return constraints

On an average, the optimizer tool would match the S&P annual return of ~10% whereas the average retail investor typically gets a return of 6% on his/her stock investments.

# **Analytics Problem**

The business problem can be formulated into an optimization problem with the objective of maximizing the Return-Risk ratio, with different user defined constraints (such as min expected return, number of stocks to be selected in the portfolio, max risk tolerance, etc.)

Maximize *([Return-(risk free return)/Risk] or [Max Returns] or [Minimum Risk] )* Subject to *([Overall returns] or [Minimum Weights] or [Maximum Weights])*

The success of the solution lies in its ability to generate multiple portfolios which curated to the specific investor’s risk appetite and financial goals.

By their nature, stock markets are inherently unpredictable, our predictions come with the underlying assumption that the returns will have an underlying risk (variance in return) associated with it.

# **Data**

We narrowed down our focus to S&P stocks which are typically more attractive for the retail investors. The stock data is imported from Yahoo Finance (starting from Jan 1st, 2013)

Since the data is already in a clean, structured, and standardized format, we did not apply additional data cleaning methods.

The data granularity is at a daily level – This data is used to generate the technical indicators

# Methodology Selection

We designed the product to support the investor in each step of the decision process:

1. **Explore** (descriptive analytics): Identify the stocks and review their past performance
2. **Forecast** (predictive analytics): Estimate the expected growth of a stock based on current trends
3. **Optimize** (prescriptive analytics): An optimized portfolio curated to the investor’s specifications

Pre-existing libraries such as ‘quantmod’, ‘PortfolioAnalytics’, ‘dplyr’ make ‘R’ the most ideal tool to develop this solution. Moreover, Shiny with R served as an excellent visualization tool.

# Model Building

# GUI Design and Functionality

# Conclusions

# References