FIN 377 - Investments

Group AI Assignment 3

AI-Driven Portfolio Optimization

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This AI assignment must be done as a group, and all group members (unless there are unusual circumstances) will receive the same grade. The assignment must be uploaded to the D2L folder by the due date listed on the course schedule. Use the following title: “FIN 377 AI Ass. 3, Group X”. Upload ONLY ONE assignment per group. All prompts (including the names of the AI models used) and (unedited) completions should be included in an appendix.

AI Assignment 3: AI-Driven Portfolio Optimization

Assignment Overview

In this assignment, you will develop a GenAI-driven model for portfolio optimization to create optimal portfolios based on historical stock data and various risk preferences. You will apply your model to a set of 10 stocks to generate optimized portfolios. This assignment will give you hands-on experience with applying AI and machine learning techniques to a real-world finance problem.

Data Collection and Preprocessing (Using S&P CapIQ)

1. Select 10 stocks from the S&P 500 index. Aim for a diverse set of companies across different sectors.
2. Obtain historical daily price data for the selected stocks over the past 5 years.
3. Calculate daily returns for each stock based on the adjusted close prices.

Feature Engineering (Using AI)

1. For each stock, calculate relevant financial metrics and ratios that could be predictive of future returns, such as:
    a. Momentum (past 1-month, 3-month, 6-month returns)
    b. Volatility (rolling 30-day standard deviation of returns)
    c. Moving average convergence divergence (MACD)
    d. Relative strength index (RSI)

Model Development

1. Define the portfolio optimization problem you aim to solve, whether it's maximizing Sharpe ratio, minimizing volatility for a given target return, etc.
2. Use a GenAI model to implement your portfolio optimization.
3. Evaluate your model's performance on the test set using relevant metrics (Sharpe ratio, returns, volatility, etc.)

Analysis and Insights

1. Interpret the results from a financial perspective. What insights can you glean about risk-return tradeoffs?
2. Discuss the strengths and weaknesses of your AI optimization approach and areas for improvement.
3. Consider the real-world applicability and scalability of your model.