ABSTRACT

Investment decision-making involves optimizing portfolio performance by simultaneously considering various objectives, such as risk and return. This study proposes an integrative approach for portfolio optimization using Support Vector Regression (SVR) in return prediction and multi-objective optimization techniques. SVR is chosen for its ability to capture non-linear relationships in historical data, resulting in more accurate return estimates. Historical stock price data is used to predict asset returns, which are then integrated into the portfolio optimization process with the goal of maximizing return and minimizing risk. The results of the study show that the SVR model is able to predict returns with a low error rate, with a Mean Absolute Error (MAE) of 0.0281 and Mean Squared Error (MSE) of 0.0480, providing a solid foundation for portfolio optimization. The optimized portfolio produced has an expected return of 0.051212, risk of 0.000001, and a Sharpe ratio that significantly increases to 43464.271948, compared to the non-optimized portfolio with an expected return of 0.004115 and risk of 0.002781. The integration of SVR-based predictions with multi-objective optimization proves effective in improving portfolio efficiency and performance. These findings make a significant contribution to financial engineering by offering a systematic method to help investors make more informed and optimal investment decisions.

Keywords*: Investment Decisions, Portfolio Optimization, Portfolio Multiobjective, Return Prediction, Support Vector Regression*