

## ABSTRACT

Stock price forecasting is one of the essential strategies in capital market analysis used to anticipate price movements and support data-driven investment decision-making. This study evaluates the performance of the Support Vector Regression (SVR) model in predicting the stock price of PT Mitra Adiperkasa Tbk (MAP) by applying hyperparameter optimization approaches using Genetic Algorithm (GA) and Grid Search (GS). The data used consists of 1,211 observations from January 2020 to December 2024. SVR was chosen due to its ability to handle non-linear relationships patterns through the Radial Basis Function (RBF) kernel, along with its flexibility in controlling model complexity through three main hyperparameters:  $C$ ,  $\epsilon$ , and  $\gamma$ . The model's sensitivity to hyperparameter settings necessitates optimization to achieve optimal predictive results. GA is an evolutionary algorithm that mimics the process of natural selection with the advantage of being able to explore solutions globally and avoid local optimum traps. As a comparison, this study also implements GS, a systematic search method that evaluates each parameter combination within a predefined space using a cross-validation scheme to obtain the best configuration. The results show that the SVR-GA model yields a hyperparameter combination of  $C = 313,5399$ ,  $\epsilon = 0,3378$ , and  $\gamma = 0.00002$ , while SVR-GS produces different values  $C = 1000$ ,  $\epsilon = 0.01$ , and  $\gamma = 0.0001$ . The default SVR model uses the configuration from the Scikit-learn library,  $C = 1$ ,  $\epsilon = 0.1$ , and  $\gamma = \text{'scale'}$ , which is used before the optimization process is performed. Performance evaluation using the Mean Absolute Percentage Error (MAPE) indicates that SVR-GA achieves the highest accuracy with a MAPE of 1.9969%, lower than SVR-GS at 2.0424%. This comparison reflects GA's better ability to explore the search space effectively, although both methods improve prediction accuracy compared to non-optimized SVR, which has a MAPE of 8,5681%.

**Keywords:** Stock price forecasting, Support Vector Regression, Mitra Adiperkasa, Genetic Algorithm, Grid Search, Mean Absolute Percentage Error.