

## ABSTRACT

Stock price forecasting serves as an analytical approach employed by capital market participants to identify future price movement patterns. This study aims to evaluate the performance of Support Vector Regression (SVR) in predicting United Tractors (UNTR) stock prices by optimizing model parameters using two metaheuristic algorithms - optimization techniques that mimic natural processes or collective behavior to find near-optimal solutions in complex search spaces. SVR was selected due to its capability in handling nonlinear regression problems through the RBF kernel, along with its flexibility in balancing bias-variance trade-off via penalty parameter ( $C$ ), gamma ( $\gamma$ ), and insensitivity parameter (epsilon). SVR's robustness against data noise makes it particularly suitable for volatile financial data. Parameter optimization was conducted using the Fruit Fly Optimization Algorithm (FOA), inspired by the olfactory and visual systems of fruit flies in locating food sources. FOA's advantages lie in its computational simplicity and fast convergence. For comparison, we also implemented Particle Swarm Optimization (PSO), which adopts a particle collaboration mechanism in search space inspired by bird flocking behavior. PSO can explore global solutions through its social learning feature and inertia weight adjustment. The results show that SVR-FOA produced parameter combinations of  $C = 1000$ ,  $\gamma = 1$ , and  $\epsilon = 1$ , while SVR-PSO generated a different configuration with  $C = 1000$ ,  $\gamma = 0.0001$ , and  $\epsilon = 1$ . Accuracy evaluation using Mean Absolute Percentage Error (MAPE) revealed that the SVR-PSO model achieved a MAPE of 2.3164%, indicating relatively low prediction error. SVR-FOA yielded a MAPE of 5.8727%, which remains within acceptable tolerance for financial data. This performance difference can be attributed to PSO's more dynamic search space exploration capability compared to FOA, although both successfully improved prediction accuracy over non-optimized SVR.

**Keywords:** Stock price prediction, United Tractors, Support Vector Regression, Fruit Fly Optimization, Particle Swarm Optimization.