

ABSTRACT

In stock investment, stock price forecasting methods are used to reduce risks and increase profits, but the fluctuating nature of stock prices often makes forecasting difficult. This includes Xiaomi Corporation's fluctuating stock prices, hence the need for accurate forecasting methods to guide investors' decisions. In this study, a stock price forecasting model was developed using Prophet algorithm that is optimized with Particle Swarm Optimization (PSO) and is given with additional regressors. This stock price forecasting model is used to predict the adjusted closing price of Xiaomi Corporation's stocks, reflecting the final stock prices on a given day. The PSO algorithm is used to enhance the Prophet's stock price forecasting accuracy by finding the optimal values for each of Prophet's hyperparameters, namely `changepoint_prior_scale`, `seasonality_prior_scale`, and `holidays_prior_scale`. The dataset used covers Xiaomi Corporation's stock prices for a five-year period, spanning from July 7th, 2018, to November 13th, 2023. The dataset is divided into 1.054 data points for the training dataset and 264 data points remaining for the testing dataset. Additional regressors added to the Prophet model include features such as Open, High, Low, Close, and Volume from the dataset, which are expected to enhance the Prophet's forecasting accuracy. The stock price forecasting model developed with the Prophet algorithm and PSO, which includes additional regressors, was trained and tested in four scenarios in this study. The best scores obtained from these scenarios include a Mean Absolute Percentage Error (MAPE) of 0,0000000852237 and Coefficient of Determination (R^2) of 0,9999999999991. These results were achieved when the Prophet's hyperparameters were optimized by PSO with values of `changepoint_prior_scale` at 0,001, `seasonality_prior_scale` at 2,008, and `holidays_prior_scale` at 10, and the Prophet model was provided with additional regressors including Open, High, Low, Close, and Volume features.

Keywords : Additional Regressors, Adjusted Closing Price, Forecasting, Hyperparameter, Particle Swarm Optimization, Prophet, Stock Prices, Xiaomi Corporation