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Forecasting daily Platts price of auto diesel using time series and neural network approaches

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Predicting price fluctuations of petroleum products are challenging as it is irregular, non-linear and complex. However, accurate predictions are vital to minimize the economic loss. The objective of this research work is to identify the most appropriate model out of time series and deep learning neural network models to forecast daily Platts price per barrel of auto Diesel. The daily Platts prices from January 2010 to March 2021 were collected from the Ceylon Petroleum Corporation. Initially, price movements were observed using descriptive statistics. Then, to capture the volatility in daily Platts prices, the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model was applied. Since the daily data used for modelling contains drastic changes, for instance, in 2014, the Long Short-Term Memory (LSTM) neural network was constructed next as it is more suitable to detect long-term dependencies and unexpected changes in sequential data than the standard recurrent neural network. The ADAM (Adaptive Moment Estimation) optimization algorithm was used to train the neural network. Finally, the prediction accuracies of both models were evaluated using Root Mean Squared Error (RMSE), and Mean Absolute Error (MAE). It was revealed that daily Platts prices oscillate significantly between $144.37 and $20.75. The GARCH (1,1) model was identified as the best time series model whereas LSTM network convergence was attained after 40 epochs with batch size of 60. Based on RMSE and MAE for GARCH (1,1) (0.026 ,0.012) and the LSTM (0.012, 0.007), it was concluded that LSTM neural network was superior to GARCH model in forecasting daily Platts price per barrel of auto diesel and reliable in capturing unexpected price movements in future than time series models.

Keywords: Auto diesel, Forecasting, GARCH, Neural network

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