Abstract:

This study examines the relationship between energy consumption and temperature levels for load curve prediction. The objective is to establish energy-efficient practices due to the rising cost of electricity generation. The study focuses on a commercial spot, and weather conditions in Lagos State, where temperature data is obtained from NASA Data Access Viewer, and energy consumption data is collected from IOT sensors. Regression and correlation and ML analyses are employed to determine the relationship and statistical significance of the variables.

The findings of the study are summarized as follows:

* Temperature (T2M) is a significant predictor of system\_kW, the measure of energy consumption, with higher temperatures leading to higher system\_kW.
* For every one-degree Celsius increase in temperature, there is a 4.0760 unit increase in system\_kW according to the SARIMAX model.
* The correlation analysis confirms a strong positive correlation between temperature and energy consumption.
* The results of the OLS regression model reveal that temperature (T2M) and hour are significant predictors of system\_kW, with a coefficient of 3.607 and a coefficient of -0.0290, respectively.
* The SARIMAX model indicates that there is a positive relationship between temperature (T2M) and energy consumption (system\_kW) with a coefficient of 4.0760. The model's residuals do not have any significant autocorrelation at lag 1, indicating that the model is well-fitted. The MAE and RMSE of the model on the training set are 2.5647 and 4.3608, respectively.

The study emphasizes the importance of understanding the relationship between energy consumption and temperature levels for load curve prediction and provides insights into energy-efficient practices. Further analysis is needed to validate the performance of the SARIMAX model.