Power Consumption Forecasting

OT Project

Vishal Ramesh Patil

191030052

Final Year B-Tech Electrical Engineering

Google Colab Project File Link

Github Repository Link

1. AIM

To build a model for Power Consumption Forecasting using ML Algorithm of Random Forest Regression. We Predict kW 48 hours ahead of current time. In this data reading of meter is bi-hourly. We have to get houly reading in predictions. For optimization, our prediction should not be deviated more than ±5kWh.

2. DATA USED

The data consists of Serial No., kWh rating, kW rating, kVARh rating, kVAR rating, and time stamp of the energy used.

I. **Input Parameters -** kWh Rating, kVARh rating, kVAR Rating, Time Stamp.
II. **Output Parameters -** kW Rating.

The dataset has around 10972 Rows(Records) of data and 6 columns viz. Serial No., kWh rating, kW rating, kVARh rating, kVAR rating, and time stamp of the energy used.

3. METHODOLOGY

I built this model using Python, Pandas Library, and Numpy Library.

Pandas: Pandas is a python library that is used to analyze big data and make conclusions based on statistical theories. Pandas can clean messy data sets, and make them readable and relevant. Pandas can help us find the correlation between two or more columns, average value, max value, and min value.

NumPy: NumPy is a python library used for working with arrays. It also has functions for working in domain of linear algebra, Fourier transform, and matrices. In python, we have lists that serve the purpose of arrays but they are a slow process. NumPy aims to provide an array object that is upto 50x faster than traditional python lists.

Tensorflow: TensorFlow helps to implement best practices for data automation, model tracking, performance monitoring, and model retraining. Using production-level tools to automate and track model training over the lifetime of a product, service, or business process is critical to success.

LSTM: Long short-term memory (LSTM) is an artificial neural network used in the fields of artificial intelligence and deep learning. Unlike standard feedforward neural networks, LSTM has feedback connections. Feedback connections, is capable of processing the entire sequence of data, apart from single data points such as images.
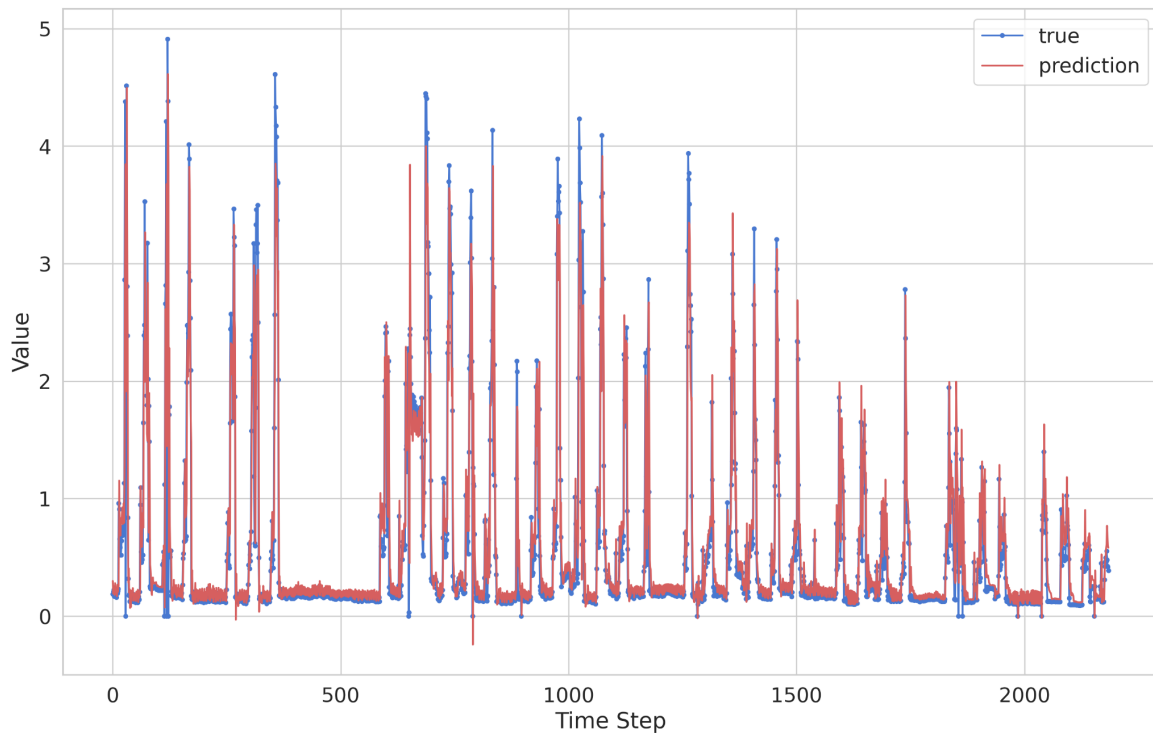
4. OBSERVATIONS
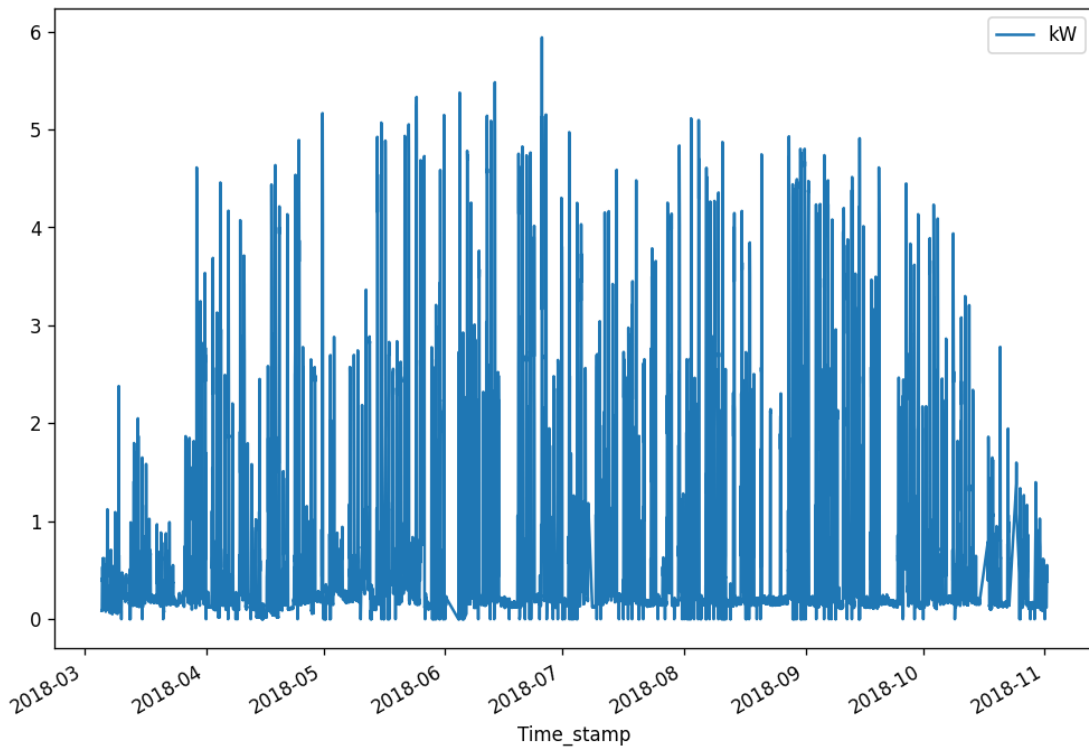
Time_stamp vs kW Rating Plot
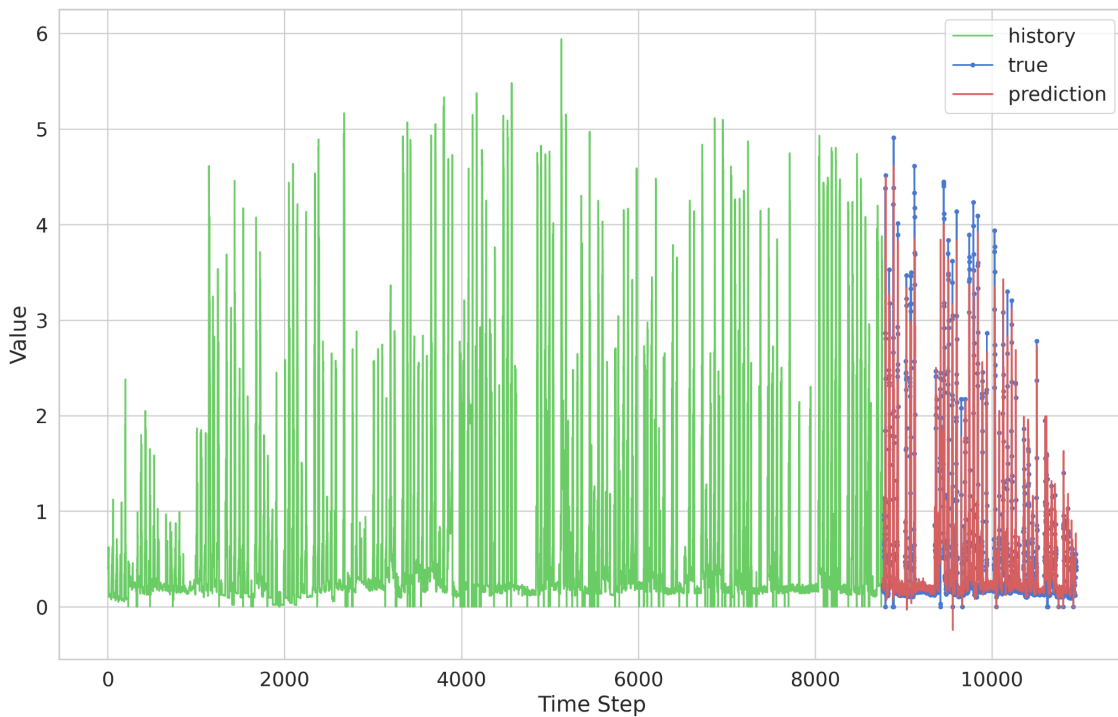
kW vs Time Step Plot for History, True and Prediction Values

kW vs Time Step Plot for True and Prediction Values

5. RESULTS

- Mean Squared Error = 0.375612373771778
- R2 Score = 0.7757783117501613

6. DISCUSSION

- By regression, we have successfully built a Random Forest Regression Model.
- The model has R2_score of 0.7757783117501613.
- This model has a mean squared error of 0.375612373771778.

7. WHAT CAN BE DONE IN THE FUTURE?

For future models, we can work on improving the accuracy and efficiency of the model. We can also make the data more cleaner and accurate for better results.