

ECE 143 – Group 18

Analysis of Power Consumption of a city in Morocco

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Motivation and Objective

- Technology has been evolving rapidly, and **power consumption** becomes a focus of research
- Students are encouraged to apply their technical learning from courses to solve some real world problems
- Analysis provides a valid proof how potential factors are associated with the power consumption.

Methodology

- Related to power consumption of three different distribution networks of Tetouan city
- To ensure the accuracy of data, analyze and check to remove/correct missing data and erroneous data
- Used Numpy and Matplotlib to create visualizations of data.
- Analyze the data features and build a predictor for real-world applications.

Dataset

Description: This dataset is related to power consumption of three different distribution networks of Tetouan city which is located in north Morocco.

Features: 6

Instances: 52417

Dataset Characteristics: Multivariate, Time-Series

Feature Type: Real Integer

Subject Area: Social Science

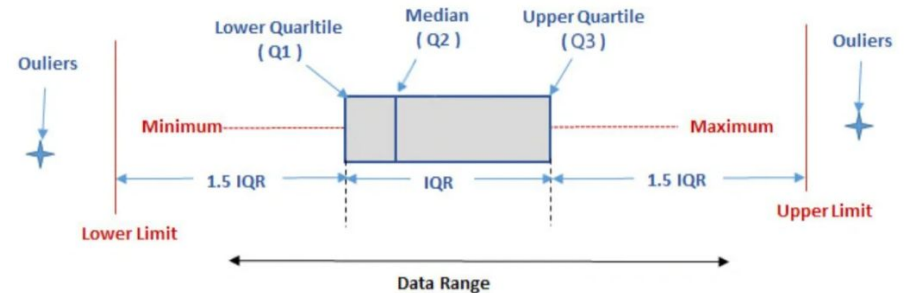
Data Extraction

Missing value handling:

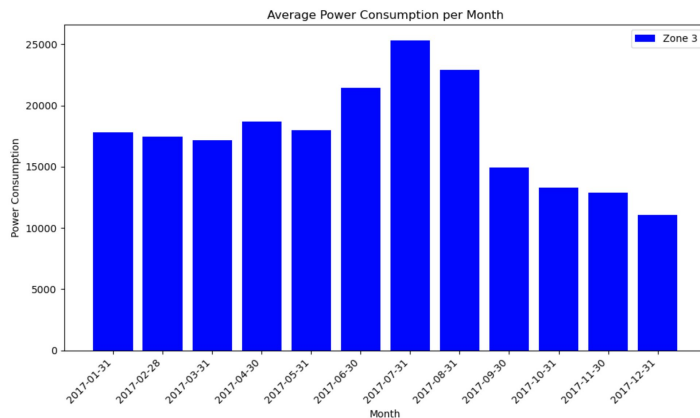
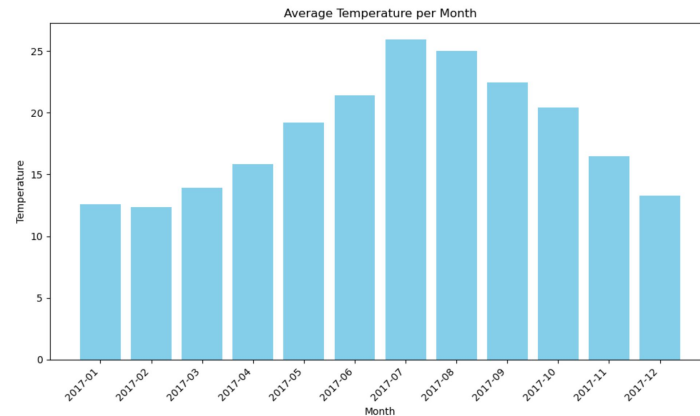
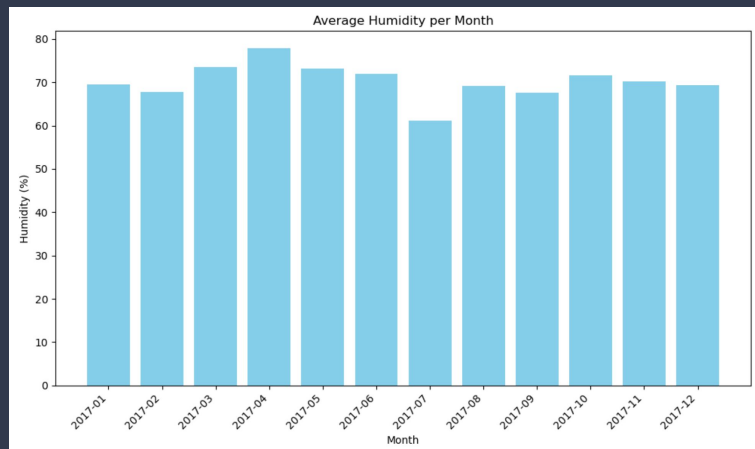
Replace the missing values in each column with the mean of that column.

Outlier processing:

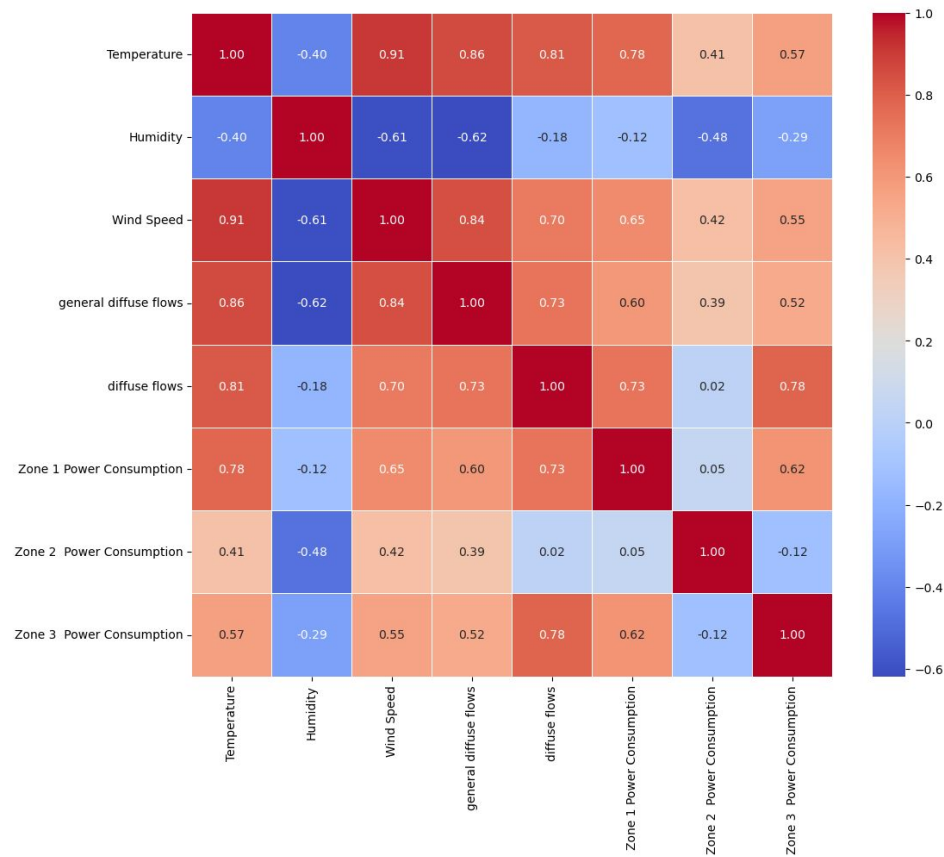
Delete data higher than $Q3 + 1.5 \times IQR$ (Interquartile Range) and lower than $Q1 - 1.5 \times IQR$, where $Q3$ and $Q1$ represent the First and Third Quartile of the column data. $IQR = Q3 - Q1$.



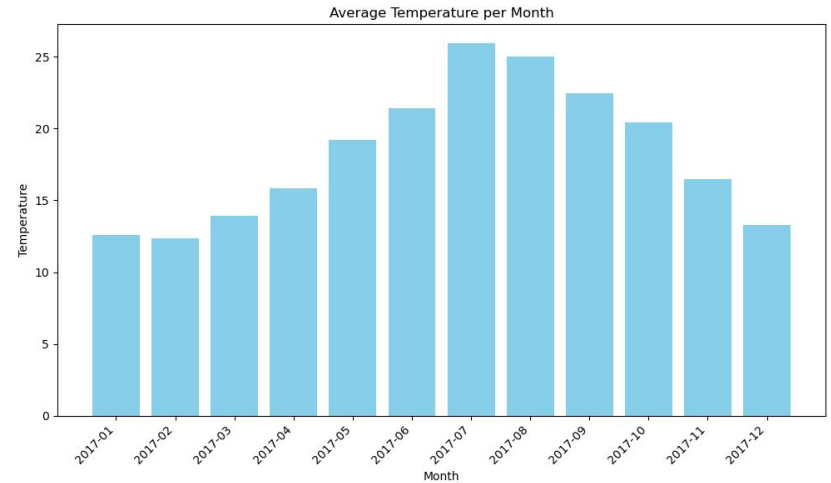
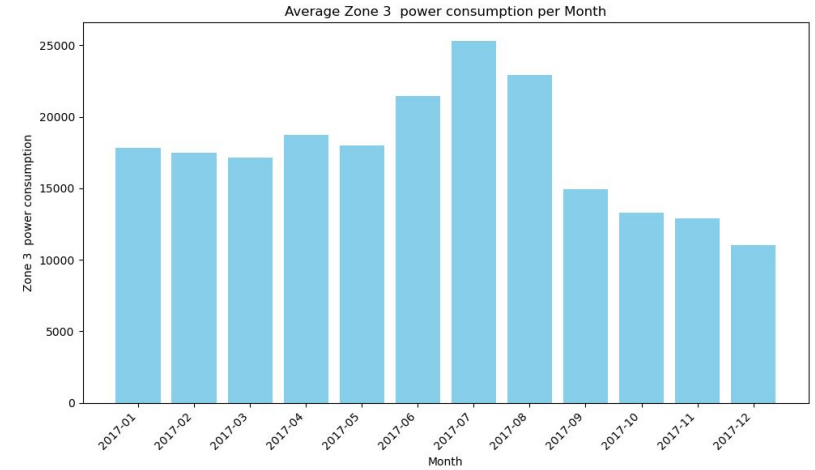
Data Visualization



Data Visualization

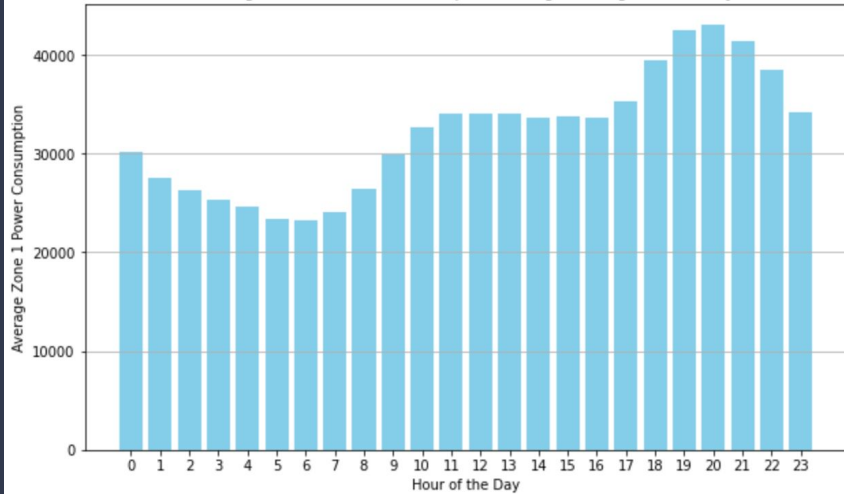


Data Visualization

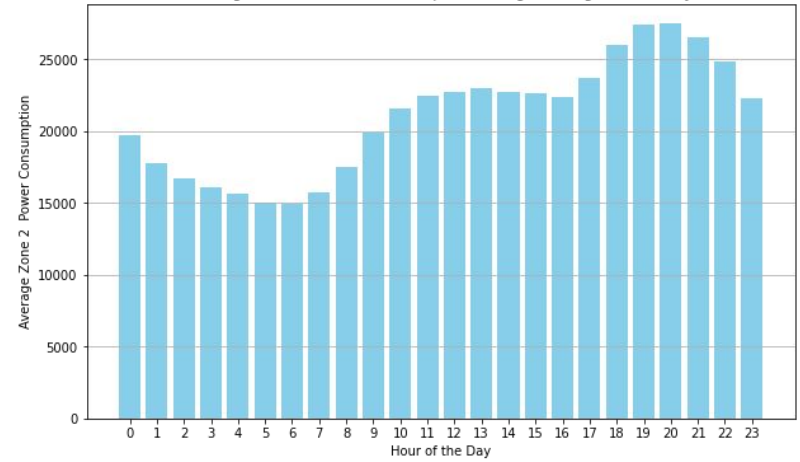


Data Visualization

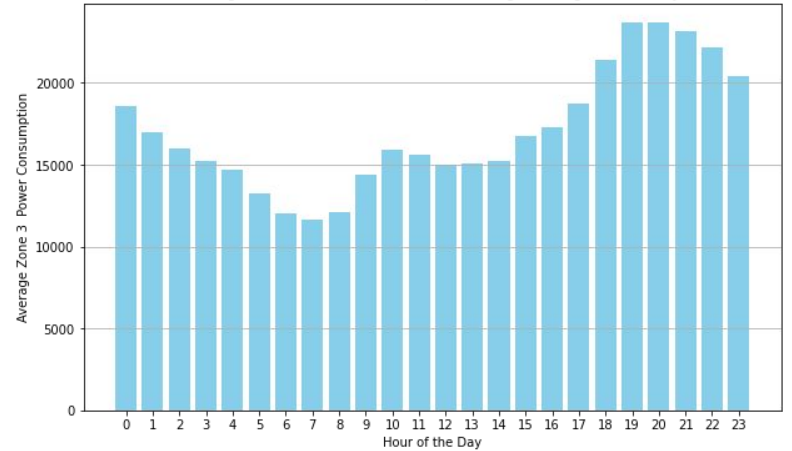
Average Zone 1 Power Consumption Change Throughout the Day



Average Zone 2 Power Consumption Change Throughout the Day

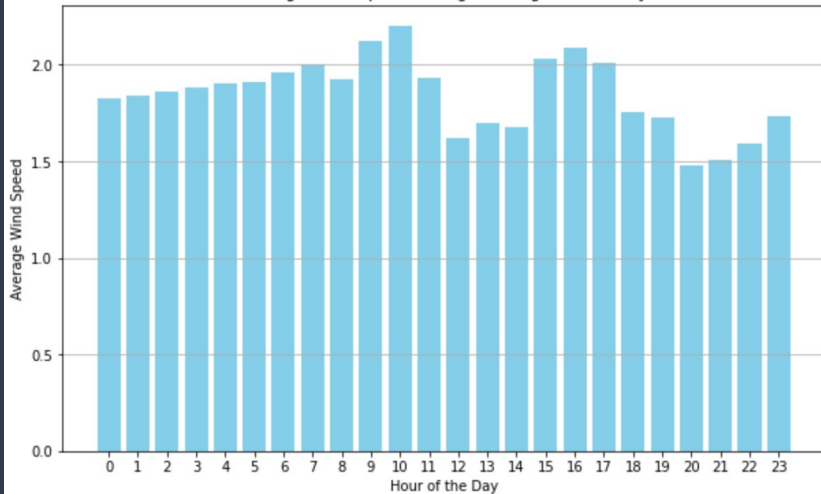


Average Zone 3 Power Consumption Change Throughout the Day

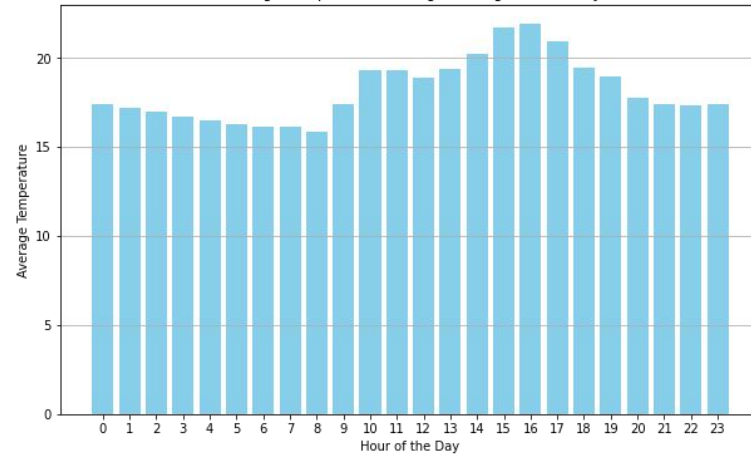


Data Visualization

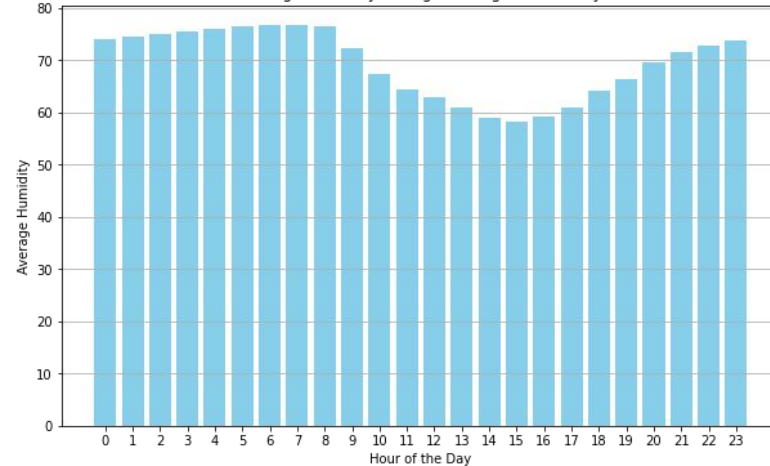
Average Wind Speed Change Throughout the Day



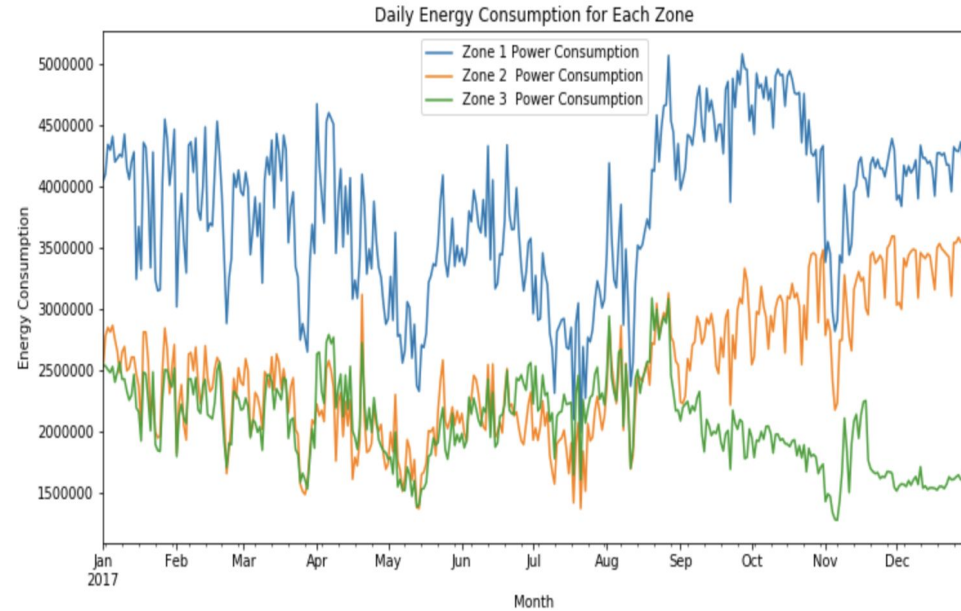
Average Temperature Change Throughout the Day



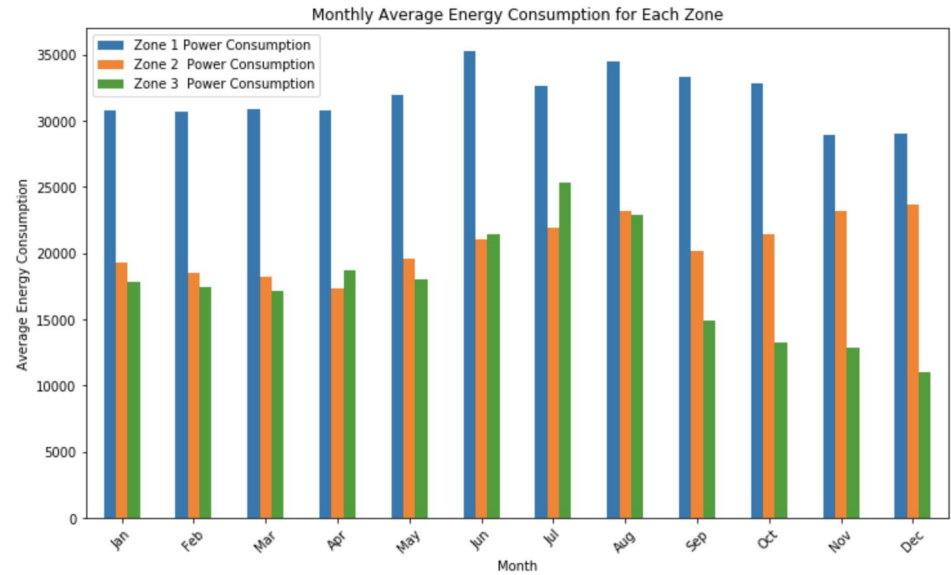
Average Humidity Change Throughout the Day



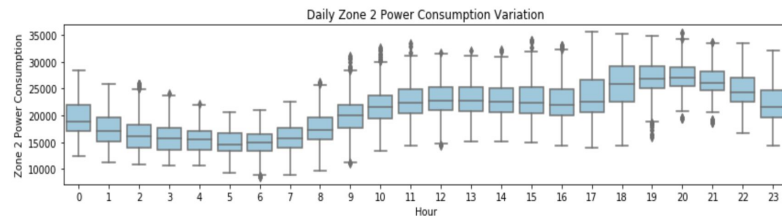
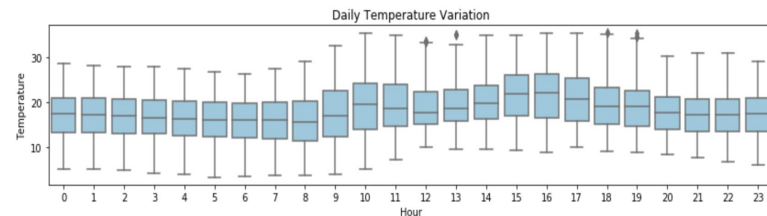
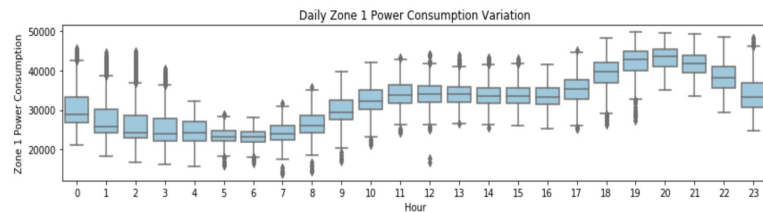
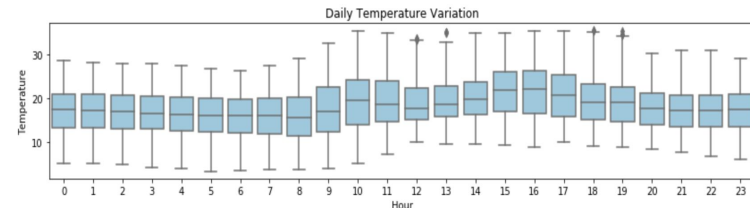
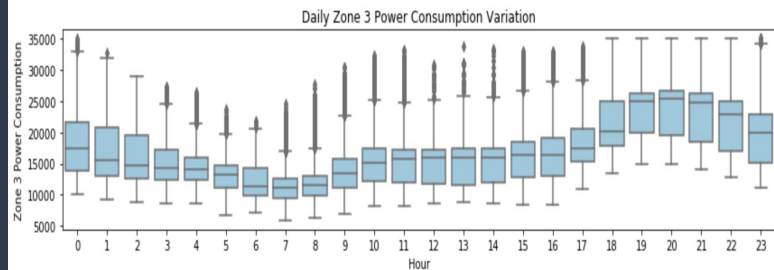
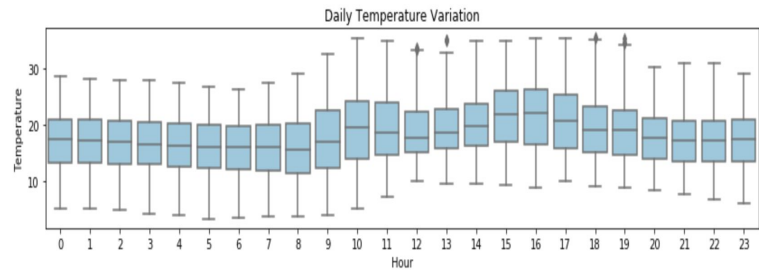
Analysis



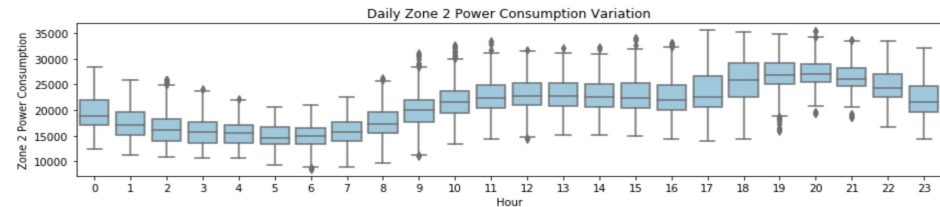
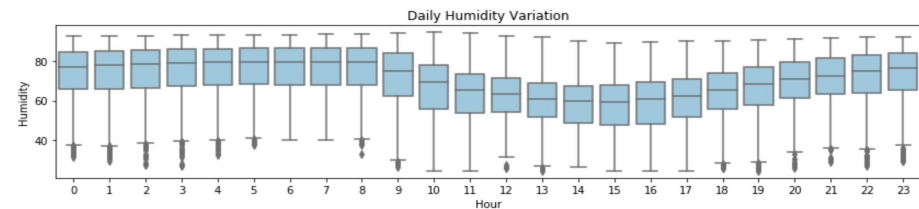
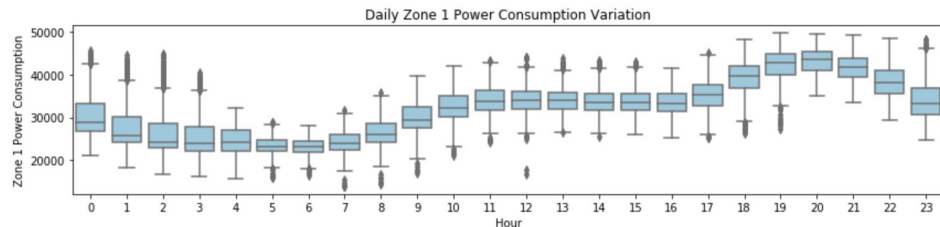
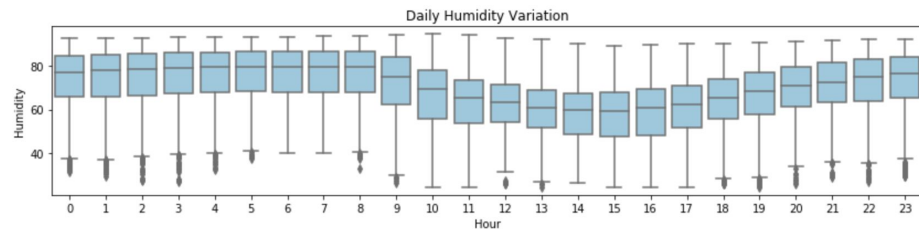
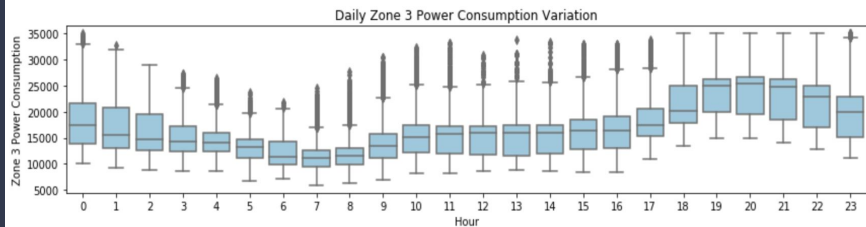
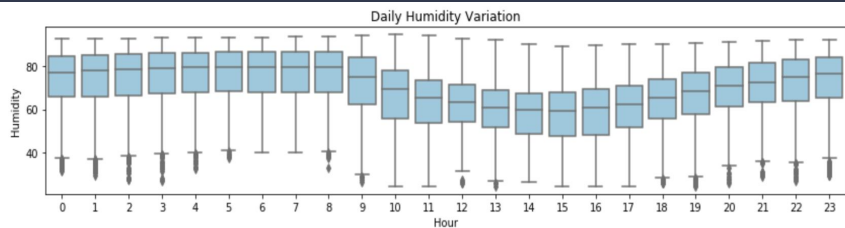
Analysis



Analysis



Analysis



Conclusion

- From slides 7, 8, 13 we came to the conclusion that there is a high correlation between temperature and power zones
- From slides 6,9 we came to the conclusion that there is a high correlation between time (day and month) and power zones
- Our visual plots also support the metrics we see from the correlation matrix
- From these analysis we can use the features of temperature and time to build a predictor
- While these features are relevant to this dataset, additional features can further improve a predictive model in other locations around the world

Predictive Model Plan

- General Plan:
 - Randomize and split the dataset to create training data
 - Model will be based on features: temperature, hour of the day
 - Use a regression model to generate power consumption prediction
 - Final predictor model would be able to predict power consumption given: month and hour of day
- Improvements:
 - After creating a predictor, we would check accuracy with the actual average from the dataset
 - Determine the margin of error
 - Determine if addition of other features would improve accuracy of prediction

Thank You!