Green Funded Hack-a-thon - Technical Report
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Introduction

Green Funded Hack-a-thon is aimed to create a dashboard that allows member users to visualize and serves as a tool for authorized personals in UNCG power consumptions across 81 electricity meters on UNCG's campus. The application is designed to be user friendly that users will easily understand and predict future energy consumption. It has four parts of the dashboard based on the given instructions that import datasets, cleaning and building datasets, dashboard layout, and user interface for predicting consumptions.

Architecture

In this dashboard, it only uses Python as a programming language and modules for creating it. It also requires access to the network to launch our dashboard. Since we use plotly as a graphic and web lay out, we have to import the following.

* !pip install dash
* !pip install dash-components
* !pip install dash-html.

Design Considerations

Before creating the design, we should be able to import our data and do some cleaning. Since we have 81 csv files for each meter, it was considerably easier to create a loop and concat those table in one mega file. Building and cleaning dataset (importing csv into pandas):

* Import all .csv file to append them in a list
* Main goal is to use the meter_name_and_lable
* By simply removing the suffix to use filename as a label for the buildings.

We also make sure that the out date column to convert it to datetime datatype before considering cleaning up.

Creating Layout for dashboard plotly

We are considering at least four graphs to create interactive dash to meet its criteria:

1. Main graph that shows the average consumption across campus.
2. Second graph will create an user interactive via mouse drag filtering
3. Third graph the similar idea including predicted values
4. Graph with a prediction with best fit line to imply the average value between lines

It requires additional components for us to be able to meet the complete criteria. That includes a dropdown menu to show all the names of meters located.

A graph that plots the overall average energy usage of each building which is average out each actual value of a given name. By using a dropdown button, it can show a group of buildings, and other location, but for efficiency purposes, it only includes the building graph that corresponds to:

* Groupby name of the building
* Graph energy consumption:
    - x: average actual value for energy consumption
    - y: name of the building in energy_con_df dataset

Next graph will summarize average energy consumption(kwh) over a specific time.

* Main goal is that to improve a graph by time range using simple dragging along
* reset energy_con_df data frame
* It isn't user interactive yet but in a future improvement to add a drop down menu for different meter name
* Button is added to simply observe the time range:
    - All: Overall layout for average yearly consumption plot.
    - 4 hrs: Four hours of average power usage in a single day.
    - 12 hrs: Twelve hours average of power usage a single day.
    - Day : A single day average power usage of selected month.
    - week : A single week average power usage of selected month.
    - month: A single month average power usage of selected year.

The average high and low energy consumption and predicted reading (kwh) over specific time graph has the following:

* This graph will also give us the average high and low usage for each actual and predicted usage.
* Main goal is to be able to create this graph for each campus location and add more optional best fit lines.
* It isn't user interactive yet but in a future improvement to add a drop down menu for different meter name
* Button is added to simply observe the time range:
    - None: Overall layout for average yearly consumption and predicted reading plot.
    - Low: Four hours of average power usage and predicted reading in a single day.
    - High: hrs: Twelve hours average of power usage and predicted reading a single day.
    - Both : A single day average power usage and predicted reading of selected month.

App layout and launching on local host

* For this task, it is only 20% completed but planned to add more features and alignments for web components.

Conclusion

It was able to implement the primary features that are required . it included several features, all of which will be beneficial to the users. It is planned to add those features and be able completely functions.