

Technical Assignment

Introduction:

Gram Power smart meters collect snapshots of electricity consumption of household data which consists of various parameters like voltage, current, power etc. In this assignment, you will get data(snapshots) of 4 household meters for random days. The assignment is designed to mimic the problem statements that data analysts at Gram Power face.

Concept:

Generally, households follow some patterns of electricity consumption. For example, one house may be switching an appliance (may be a heater) at 08:00 am to 08:30 am most of the days for the month, or maybe one switches water pump from 06:00 am to 07:00 am. Also, keep in mind, it is not that you are observing the same pattern within a particular time range always but if you look at the various parameters you can predict if it was the same appliance at a different time. If you perform granular analysis, maybe you could observe that certain hours has the highest consumption throughout the month or similar analytics like that.

Algorithmic Assignment:

The task at hand is to design algorithms to determine the :

1. The **different appliances(tag##)** whose similar instantaneous power/load** consumption pattern is observed in many days.
(##You just need to tag appliance in which a common pattern is observed or they exhibit with any name like 'Appliance 1')
2. The **time intervals** (*basically time ranges like 08:00 to 08:30*) in which the instantaneous power/load* consumption pattern is observed of those appliances.

Try to think it from a pattern matching approach instead of simple statistics.

The data is a time series data, so you could use various strategy to related to analyse time-series like



resampling(up/down),correlation etc. for a better picture of the problem.

The data provided along with the assignment (600002-10days.csv) is of a domestic urban household for 10 consecutive days . At Least predict/detect three appliances (Air Conditioner, Water Heater, Water Pump).

** The amount of power in a circuit at any instant of time is called the instantaneous power and it is defined in the dataset as 'active_power' and its unit is in 'Watt (W)'.

For more information , you can visit

<http://www.electronics-tutorials.ws/accircuits/power-in-ac-circuits.htm>

Visualisation Assignment :

It is needed to plot following graphs on the visualisation side:

1. An interactive graph of a household instantaneous load **day** wise.

There should be a dropdown(or similar) in which the user should be able to select the

Household and month of which graph of instantaneous load should be shown day wise.

2. An interactive graph of a household instantaneous load **hour** wise.

There should be a dropdown(or similar) in which the user should be able to select the

Household and month of which graph of instantaneous load should be shown day wise.

Algorithms can be written in whatever language you are comfortable with, just make sure you are able to connect it with visualization part.

Feel free to use any library for graphs . We use Jupyter and Plotly to map graphs

Deliverables:

The core deliverable is to come up with the following :

1. Code which implements above algos and visualizing graphs.



2. A document which explains the algorithm in details and the steps to run the code in the system.

**Any extra insights you can generate from data will be appreciated. (

Implementation Guidelines:

Please follow the below guidelines while working on this assignment.

1. We like clean, structured code that uses a consistent style of commenting, and variable naming conventions
2. Use a version control system, preferably GitHub for your development
3. Comment your code sufficiently such that another engineer can easily understand what's going on.
4. It is better to visualize first so that you have more understanding of patterns.