Problem Statement 3

Energy Audit for Households

Industries and big buildings are usually energy efficient as energy audits are regularly conducted and measures are taken to reduce the energy wastage. However, it is not true at the household levels. Most households wouldn't go down the energy audit route (for various reasons) to assess the energy efficiency and energy usage of their homes. Hence it is proposed that ML based models are built which can be used to build energy consumption profiles and identify probably areas where the energy is getting wasted for a household.

To learn more about energy audit please read through:

- https://en.wikipedia.org/wiki/Energy_audit
- https://www.energuide.be/en/questions-answers/what-is-an-energy-audit/3/

Problem Description

It is estimated that around 35% of the energy supplied to the households is wasted. The typical sources for wastage include:

- Inefficient insulation for cooling or heating
- Faulty gadgets or appliances
- Not using energy efficient models of appliances like refrigerators, AC
- Vampire appliances or electronics (consume power even when switched off or in standby mode)
- Use of incandescent or spot lights

While many households might not even be aware of this wastage, but at the global level, this wastage adds up to a significant percentage of the energy generated.

Industries and big buildings conduct regular energy audits to identify and fix energy inefficiencies and wastage. It is imperative that such measures are also made available for the households. Current methods of auditing will not be feasible for households as energy auditors are few in numbers and their charges are quite high.

Especially in developing countries where sufficient energy is not generated, it is quintessential that the energy already generate is not wasted.

Hence there is a need for an inexpensive or free solution that could be used by typical households to identify areas of energy wastage and measures to stop those.

Expectation

It is expected that the solution includes the following components:

1. Typical energy consumption profiles built using simulated data generated from tools like EnergyPlus or from real data sets if available
2. Predictive models which can predict the consumption for a household considering the usage fluctuations based on weather conditions, seasonal attributes (like festival season)
3. Based on consumption profile that a household fits into, its predicted consumption and real usage data or bills, identify the areas where energy is being wasted
4. A mobile app or web application that the users can use to enter the actual usage data or bills and get back the suggested areas of energy wastage

Evaluation Criteria

The evaluation parameters are listed on the hackathon landing page.

Tools & Technology

1. Suggested tools and technologies both IBM and open source.
2. IBM Cloud, IBM Watson Studio and IBM Watson Knowledge Catalog
3. H2O.ai, Knime, Scikit Learn, Tensorflow

Resources & References

- *https://energyplus.net/*
- https://console.bluemix.net/catalog/

Frequently asked questions

Q: What are the programming languages?
A: Python
Q: What are mobile platforms allowed?
A: Any
Q: Where to get free access to IBM Cloud?
A: Sign up on - https://www.ibm.com/cloud/
Q: Is there any documentation available to use IBM Cloud?
A: Yes, each service comes with elaborate documentation with step by step illustration to use the services available on IBM cloud, follow the VIEW DOCS, link available on each service.
Q: Is the knowledge of ML/DL is required?
A: Yes

Q: Is there any dataset provided?
A: No, there is no dataset made available with this problem statement. You can get data available in public domain or use tools like EnergyPlus.

Post your technical queries here.