WattRank

## Computer Science Project

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The purpose of this project is to create a software application for people to compare their home energy spend with people in a similar group. Similarity is identified by location, income, and square footage of the home. The yearly energy spend is compared to a peer group using KMeans clustering algorithm.

This software application takes an input a csv file of historical home energy consumption with 12000 samples (recs2009\_public.csv). Each sample has over 700+ features including location, income, square footage, and appliance information. A Kmeans clustering algorithm is run to group the 12000 samples into 20 groups with similar energy spending. We provide an Graphical user interface as well as a Command Line interface for people to enter their location (Census Division), income bracket, square footage of their home and yearly energy spend. The application outputs a ranking for the user and tells them what they should actually be spending on their energy compared to their peer group.

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| FileName | Purpose |
| recs2009\_public.csv | Home energy consumption historical data (12000 samples with 700 features) |
| Bin/wattRankCluster.py | Clusters historical data using KMeans clustering.  Predicts similar cluster for each cluster based on user input. |
| Bin/testWattRank.py | Test program, which takes input from the CLI and outputs a ranking from the user. |
| Bin/App.py | Program using WebPy framework for providing a GUI interface. It displays a form for user to input their energy profile and outputs a rank (index.html) |

CLI takes 4 parameters as input from User for making prediction;

Census Division, Square Footage, Income, YearlyEnergyBill

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| Packages for running this program | Command to run |
| sklearn | sudo pip install sklearn |
| numpy | sudo pip install numpy |
| scipy | sudo pip install scipy |
| Webpy | sudo pip install lpthw.web |

CLI Program sample execution:

python testWattRank.py

Training clustering model...

Enter your Census Division (1..10): 10

Enter the Total Square Feet of your Home: 1700

Enter income range (1..20): 20

Enter energy bill in dollars for the past year: 3000

Your electricity usage is ranked 79 out of 114 similar people

The average electricity bill among similar people: $2785.0877193

The lowest electricity bill among similar people: $6.0

The highest electricity bill among similar people: $19040.0

To run the GUI program:

1. Unzip the given files

2. Run the command Python bin/app.py

3. In the browser go to <http://0.0.0.0:8080>

Here is a sample session:





