In order to quantify the potential for saving based on the electricity market pricing plans, we need data about the home house electricity consumption. Additionally, the environmental data provided by the weather sensors can be used to predict the aggregate consumption for homes.

Researchers from UMASS Amherst computer science department made publicly available numerous data sets in the paper ”Cutting the Electricity Bill in Smart Homes with Energy Storage”. Professor Irwin is one of its authors. So he provided us the required data sets. The data sets include three homes’ electricity consuming value during the period between April and July in 2012.

Take the data observed from home A for example. Home A is located around Amherst. The data sets collected the energy consumption of home A for 68 days. For each day, dataset came from 26 indexed different sources, including grid, HRV, washing machine, bedroom lights and so on. We filtered only the average real and apparent powers every second from grid supply which represents the aggregate consumption per second for the whole home house. Every day has 86 thousands and 4 hundreds seconds but the amount of the filtered data is less than this amount. In addition, the timestamp for each data is unix time which means that how many seconds have passed since January 1st 1970 however we found that the timestamps are not correct. So we used MATLAB to process the filtered data by inserting data into those lost seconds as same as the last reasonable value and shifting all data to correct starting place for every day according to the timestamps. Finally, we calculated interval power (power per hour), day power and month power.

And then we collected the outdoor temperature and outdoor humidity for every day from the website www.wunderground .com which contains the history weather data collected from the sensor that is located in UMASS Amherst computer science building. Also we labeled weekday as “0” and weekend or holiday as “1” that can be convenient for future process as data input.

The following figure is part of the final results after the processes mentioned above:

