Power Management Analytics

Insight into the Usage of the Electrical Sub-metering Devices

Agenda

- The background of this project
- What is this analytics for ?
- How will the data be processed?
- Description of the data
- Issues about the data
- Statistics of the data
- Recommendations for the existing data

The background of this project

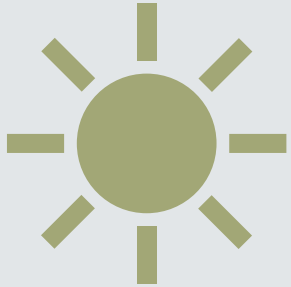
A large regional residential developer is designing a large 'Smart Home' apartment housing development.

The developer is planning to adopt the use of electrical sub-metering devices for power management in Smart Homes.

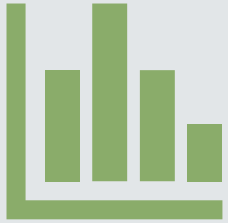
The developer asked our team to analyze the historical data set of the energy usage measured by submeters.

What is this analytics for ?

Do sub-meters provide homeowners the “useful” usage analytics?



Can we predict future energy consumption from the existing data?



Can we improve the future data collection?

How will the data be processed?

Data Source	Pull out the data set from the open sauce mySQL.
Dataframe	Extract data into R Language datafram.
Clean and Convert the data	Clean the data and covert the datatypes to needed types.
Statistics	Get the statistics of the data.

Description of the data

- Gathered in a house located in Sceaux (7km of Paris, France).
- 1,569,894 observations, 5 Attributes
- 1.1.2007 ~ 12.30.2009 (36 months)
- sub_metering_1: kitchen (dishwasher, oven, microwave)
- sub_metering_2: laundry room (washing-machine, tumble-drier, refrigerator, light)
- sub_metering_3: electric water-heater and air-conditioner

	Date	Time	Sub_metering_1 (watt-hour)	Sub_metering_2 (watt-hour)	Sub_metering_3 (watt-hour)
1	2007-01-01	00:00:00	0	0	0
2	2007-01-01	00:01:00	0	0	0
.....	.....	.....	.....	.....	.....
1569894	2009-12-31	23:59:00	0	0	19

Issues about the data

- The dataset contains some missing values in the measurements (nearly 1,25% of the rows).

Statistics of the data

- Highest average energy consumption: submeter 3 (Electric water-heater and air-conditioner)
- Highest maximum energy consumption: submeter 1 (Kitchen)
- The minimum energy consumption of the three submeters are all 0.
- The Median of submeter 1 and submeter 2 are 0: over 50% of the time, there is no energy consumed measured by these two submeters

	Sub_metering_1	Sub_metering_2	Sub_metering_3
Min.	0	0	0
1st Qu.	0	0	0
Median	0	0	1.000
Mean	1.159	1.343	6.216
3rd Qu	0	1.000	17.000
Max.	82.000	78.000	31.000

Recommendations for the existing data

- I would add an attribute represent the energy consumed which is not measured in sub-meter 1, 2, 3
- In the original data, washing-machine, tumble-drier, refrigerator and light were grouped together. I would recommend to put refrigerator in submeter 1, which contained the appliances in the kitchen. I also recommend to put the energy consumed of lights in a separate group.
- In the original data, electric water-heater and air-conditioner were grouped together. I would recommend put these two in separate submeters.

Thank you!

Presented by Wanyun Ho
howanyun@gmail.com