Mining Sensor Data for Power Saving Management

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PROBLEM DESCRIPTION AND RESEARCH QUESTION

- Improve the understanding of energy-consuming practices, appliance usage patterns, energy needs and their predictability
- Analyse the needs and flexibility of the use of energy in households, and to bring these insights to bear on efforts to design and develop systems that are more intelligent w.r.t. energy management and energy efficiency
- Study and design methods that promote behaviour changes informed by e.g. behavioural psychology
- Investigate and implement new algorithms for sensing, learning and modelling of user activity for intelligent energy management
- Contribute towards a smart grid that has real-time information on what happens at the consumers' end using smart meters [5]
- Contribute towards the targets of the EU's growth strategy for the next decade (Europe 2020): increase the energy efficiency and decrease the greenhouse gas emissions by 20% without loss of economic strength or quality of life

PROCEDURE AND METHOD

The research is carried out in a household environment from where we collect empirical data about energy consumption, people's location, and activity.

The evaluation will measure the practical energy saving potential provided by the system, for example in preventing stand-by losses of appliances.

We will test time series models, possibly combined with drift detection methods to predict the power consumption of different home appliances.

We intend to use mathematical models of pattern recognition, behavioural psychology concepts and machine learning techniques that had been proved promissing, e.g in [1,4,6] in identifying trends in energy data and user actitivity recognition.

RELATED WORK

Good results using time series to predict appliance power consumption were achieved e.g. in [1] which inspired us to investigate similar methods. We intend to improve these methods and then use behavioural psychology concepts [3] to induce behavioural changes that can save energy.

PREMILINARY RESULTS

We pre-processed the data and created visualization scripts to generate single and multiple device plots. Similarlly to [2], the graphs show the time and frequency of use of the devices. The visualizations give us first exploratory insights and will help us throughtout the research.

NEXT STEPS

The first next step is to find the most suitable methods to predict the power consumption of different types of home appliances e.g. fridges, computers, TVs, etc.

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