Software Tools and Methods to support Sensor-based Data Inspection for Optimizing Smart Energy Solutions

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In the near future fossil fuels will be limited and new energy solutions should be found. The society, governments and energy experts all point to that renewable energy, like wind and solar, will substitute the fossil energy sources. With renewable energy there will be fluctuations in the output of energy due to peak consumption. There will be a need for flexible customers, which can schedule production and energy intensive processes.

Companies at Vejle Nord, Denmark, have constructed an Energy Guild, which purpose it is to make the area around Vejle sustainable.

Data analysis of energy data is one of the key topics for this project. Some known analysis methods will be applied to the data from the energy guild, to obtain more knowledge. The plan is to use outlier detection to clean energy data, and to find peaks in the energy consumption. By finding the peaks it is the plan to find patterns in the energy consumption. The pattern could be used to find peaks that are related to some processes that could be scheduled due to the price of electricity.

Causal relations in energy data are also one of the key topics in this project. The plan is to find causal relations between sensor inputs and peaks in energy data. This means data analysis of multidimensional data to find relations in the data. The first example is the cold store; when new goods arrive there will be used more energy for the first hours for freezing, than by holding the temperature constant. Another example could be charging of electrical fork lifts, where the charging primary will be when the workers go home, but the charging could be cheaper in the night hours than the afternoon hours.

The last part of the project will be concerning inspection of sensor based data. It will cover some of the issues with understanding large data sets, and exploring data through different visualization techniques.

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