Smart Grids

The Center for Applied Intelligent Systems Research http://islab.hh.se/ at Halmstad University, Sweden, is a research environment built around idea of close collaboration between academia and industry, focusing on three scientific areas: Signal Analysis, Mechatronics and Machine Learning.

We have recently started working together with local power distributor, using data mining and machine learning to analyze energy usage patterns and discover weak spots in the network. We combine both data-driven and knowledge-driven methods for predicting critical failures and understanding the needs for routine maintenance, as well as detecting deviations in usage and operations in order to support high quality, sustainable services for the future.

We create new algorithms for combining different types of information. The smart meters and other intelligent sensors distributed on the power grid generate a lot of data, but not all of it can be stored or transmitted easily. Thus, we focus on streams of data that has to be combined with other kind of knowledge.

We use many different techniques from Machine Learning, both supervised like Random Forests or Support Vector Machines, as well as unsupervised like Spectral Clustering. The most important and interesting aspects, however, is usually figuring out what new sources of information can we use and in what way, discovering interesting relations in the available data, evaluating their usefulness, and finally exploiting resulting models.