Type of Load Prediction

Submitted to Dr. Dagmar Niebur

and the Senior Design Committee

of the

Electrical and Computer Engineering Department

Drexel University

Team Number: ECE-20

Team Members:

Yuriy Smolyanitskiy   Electrical Engineering
Sheeba Minhas   Electrical Engineering
Ardit Pone   Electrical Engineering
Ermelinda Muskaj   Electrical Engineering

Submitted in partial fulfillment of the requirements for the Senior Design Project

May 11, 2005

Abstract

Secure, reliable and economic operation of the US power grid is essential for our post-industrial, information driven society. The reliability of the power grid depends also on the load and the load type on transmission lines. The objective of our senior design project is to predict the type of load demand of the neighborhood control area.

The data for this problem comes from a real-world power system. The base case is provided by MMWG (Multi Regional Modeling Working Group) of NERC (North American Electric Reliability Council); active and reactive load profiles for three times twenty-four hourly bus loads as well as active and reactive tie-line measurements were provided by PJM.

Our team has delivered three algorithms, which are suited to be embedded into an Energy Management System. The first two algorithms are linear regression and feed-forward neural networks. These algorithms estimate the reactive power flow on the tie-lines connecting two control areas. A comparison of results is presented in our report. The third algorithm, which is independent component analysis, uses higher order statistics to estimate the reactive power demand of an unknown control area.

After analyzing the results, recommendations are given to the regional transmission operators on the type and amount of data to be recorded for the accurate reactive load prediction.