Short-Term Load Forecasting Using Artificial Neural Network

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ABSTRACT

This thesis presents a neural network based approach for short-term load forecasting that uses the most correlated weather data for training and testing the neural network of weather data determines the input parameters of the neural networks. Inputs to the ANN are past loads and the output of the ANN is the load forecast for a given day. The network with one or two hidden layers is tested with various combinations of neurons, and the results are compared in term of forecasting error. Historical load data and temperature observations for the year 2006 - 2010 obtained from the Australian Energy Market Operator (AEMO) & Bereau of Meteordology (BOM) for Sydney/NSW. The inputs used were the hourly load demand for the full day (24 hours), the weather, humidity and holiday for the state.-The network trained over 4 year's data. A mean average percent error (MAPE) of 1.99% was achieved when the trained network was tested on one year data.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Accurate models for electric power load forecasting are essential to the operation and planning of a utility company. Load forecasting helps an electric utility to make important decisions including decisions on purchasing and generating electric power, load switching, and infrastructure development [1].

In achieving this goal, the knowledge of future power system load is the first prerequisite;[2] therefore short-term forecasts which are usually from one hour to one week, medium forecasts which are usually from a week to a year, and long-term forecasts which are longer than a year. For short-term load forecasting several factors should be considered, such as time factors, weather data, and possible customers' classes [1] [2].

Short-term load forecasting (STLF) refers to forecasts of electricity demand (or load), on an hourly basis, from one to several days ahead. The short-term load forecasting (one to twenty four hours) is of importance in the daily operations of a power utility. It is required for unit commitment, energy transfer scheduling and load dispatch. With the emergence of load management strategies, the short term load forecasting has played a greater role in utility operations. The development of an accurate, fast and robust short-term load forecasting methodology is of importance to both the electric utility and its customers.

Many algorithms have been proposed in the last few decades for performing accurate load forecasting. The most commonly used techniques include statistically based techniques like time series, and regression techniques, and