AN ARTIFICIAL NEURAL NETWORK IN SHORT TERM LOAD FORECASTING

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ABSTRACT

Load forecasting plays an important role in electric power system operations and planning purposes. Improving the accuracy of the load forecast can optimize the operation of the electrical system and save significant amount of money. Therefore, this study investigates the effectiveness of an artificial neural network (ANN) approach to short term load forecasting (STLF) in power systems. Two approaches of ANN algorithms i.e. the Back-Propagation Network (BPN) and Modular Neural Network (MNN) were investigated. Accuracy of the networks depend on some associated factors which usually affect ANN structure and training parameters such as learning rate *(η)*, momentum constant *(α)*, number of hidden node *(s)* and number of iteration. Hourly loads (24 hour per day) of current day were used as the inputs with the type of day of weekdays (Monday to Friday), Saturday and Sunday. The 24-hour loads for the next day were chosen as the outputs. Both networks were trained and tested on actual load data and weather conditions for the next day's load forecast by using software package Professional II/PLUS and NeuralWorks. The capability of both networks based STLF has been found to be very encouraging.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

In the new deregulated environment, each utility tries to reduce the uncertainty and produce optimal estimation in the daily operation of a power system operations and planning [1,2]. Generally, this task is accomplished through load forecast, especially for the short term. It is evident that load forecasting is one of a crucial activity in electricity supply [3,4].

Ultimately, as the electricity markets mature and margins shrink, the costs of load imbalances due to load forecast inaccuracy will have significant impacts on the cost of operations and the cost of electric production [5]. Large savings can be achieved if accurate load forecast are used to support these activities and in accordance with the planning needs [6,7]. With an accurate forecast also, improved revenues can be achieved and alleviate the dependencies found in generation dispatch, unit commitment, demand side management, short-term maintenance scheduling [2,5,7,8]. Furthermore, it can ensures that the necessary amount of power generation gets scheduled to meet maximum customer demand and thus, making the best possible use of generating capacity [9].

Load forecasting can basically be broken into three categories [1], which are Short-Term Load Forecasting (STLF), Medium-Term Load Forecasting (MTLF) and Long-Term Load Forecasting (LTLF) [1,9]. The STLF are basically used for planning the level mix of generating that will be used to support actual demand. The MTLF are used in preparing operating plans, financial planning as well as tariff setting, and the