SHORT-TERM LOAD FORECASTING USING LEAST SQUARE SUPPORT VECTOR MACHINE (LS-SVM)

by

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ABSTRACT

In the electrical industry, accurate forecast of electricity load has been highlighted as most of the important issues. This paper proposes a model for short-term load forecasting using least-square support vector machines. The collected data are from Dayton, Ohio, United State. This collected data are analyzed and suitable features are selected for the model. Last 24 hour load demands are used to the features of load forecasting in combination with days of the week and hours of the day. The suitable data set is used for the model training, and then forecasting of day ahead hourly load demands is performed. The experimental results, obtained from a real-life benchmarks, showing that the proposed model is effective and accurate.

Keywords: short-term load forecasting; least square support vector machines; time series; regression;

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

One of the features of the power generation is that it is not easily stored. Therefore, the production of electricity should be enough to meet the load demand over time. If power generators failed to operate or loads exceeding the maximum electricity production, the electricity production company had no choice but to import expensive electricity from other sources or use their own electrical generators which operate inefficiently. So the operation, maintenance, and efficient planning should be done by relying on load forecasts whereas it is an important part of this process.

Electricity load forecasting is categorized as one of the following categories: short-term, mid-term and long-term depending on the consideration period. Short-term load forecasting (STLF) deals with the prediction of the one-hour load up to a week ahead. Mid-term load forecasting is associated with periods of a few days to a few weeks and long-term load forecast is made for a period of one to several years. Different models are used to forecast the load of each class to meet the specific objectives of application. STLF is required for scheduling and control of power system operation and also act as a source of power analysis functions such as contingency analysis and load flow. Due to its importance, assorted methods have been applied: linear regression, exponential smoothing, ARMA model [1] and data mining models. Data mining techniques such as artificial neural networks [2], fuzzy logic [3] and support vector machines [4] has been widely used for load forecasting. Normally, a person must have some prior knowledge about the system behavior under study, and the input and output of the system. It cannot show a short load forecast changes where it has features with the specific. Meanwhile, it is difficult to determine the number of units is implied, so the final value will be influenced by the initial data