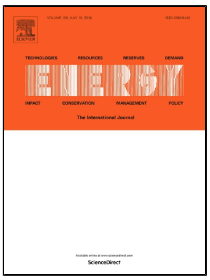
Accepted Manuscript



Short term electricity load forecasting using a hybrid model

Jinliang Zhang, Yi-Ming Wei, Dezhi Li, Zhongfu Tan, Jianhua Zhou

PII:	S0360-5442(18)31065-X
DOI:	10.1016/j.energy.2018.06.012
Reference:	EGY 13054
To appear in:	*Energy*
Received Date:	31 December 2017
Accepted Date:	03 June 2018

Please cite this article as: Jinliang Zhang, Yi-Ming Wei, Dezhi Li, Zhongfu Tan, Jianhua Zhou, Short term electricity load forecasting using a hybrid model, *Energy* (2018), doi: 10.1016/j.energy.2018.06.012

Short term electricity load forecasting using a hybrid model

Jinliang Zhang[a*], Yi-Ming Wei[b], Dezhi Li[c], Zhongfu Tan[a], Jianhua Zhou[d]

[a] School of Economics and Management, North China Electric Power University, Beijing 102206, China

[b] Center for Energy and Environmental Policy Research, Beijing Institute of Technology, Beijing 100181, China

[c] China electric power research institute, Beijing 100192,China

[d] Shanghai Electric Power Company, Shanghai 200122, China

ABSTRACT

Short term electricity load forecasting is one of the most important issue for all market participants. Short term electricity load is affected by natural and social factors, which makes load forecasting more difficult. To improve the forecasting accuracy, a new hybrid model based on improved empirical mode decomposition (IEMD), autoregressive integrated moving average (ARIMA) and wavelet neural network (WNN) optimized by fruit fly optimization algorithm (FOA) is proposed and compared with some other models. Simulation results illustrate that the proposed model performs well in electricity load forecasting than other comparison models.

Keywords*:* electricity load forecasting; IEMD; ARIMA; WNN; FOA

1. Introduction

Accurate short term electricity load forecasting has a significant role in power system, which is useful for making optimal decisions to ensure the secure, reliable and economic operation of the power system [1]. Besides, power grid planning, investment and transaction are also based on accurate electricity load forecasting. However, due to many factors affecting electricity load, it turns out to be a challenging work. In recent years, researchers have proposed many models to forecast electricity load. In general, these models can be classified into three major categories: time series models, artificial intelligence models and hybrid models.

Time series models have been used for electricity load forecasting, such as linear regression [2], seasonal autoregressive [3], ARIMA [4], threshold autoregressive [5], kalman filtering [6], seasonal autoregressive integrate moving average (SARIMA) [7], etc. As mentioned above, electricity load is affected by many other factors, using only time series model does not produce a good result [8]. Thus, artificial intelligence models have been presented to forecast electricity load, such as expert systems [9], support vector machines [10], fuzzy logic [11], artificial neural networks [12], echo state networks [13], support vector regression [14]. Although artificial intelligence model can consider other influence factors, it still has its own shortcoming such as local minimum and over training. Thus, hybrid model integrating different models will be a good choice for improving the forecasting accuracy. The reason can be mainly attributed to two aspects: First, the model combined with suitable models can capture the different features of electricity load. Second, the model combined with other models can overcome its own defects. Therefore, the hybrid model may be superior to the single model. In general, the hybrid model for electricity load forecasting can be classified into two main categories.

*Corresponding author. Tel.:+86 010 51963749; fax: +86 010 80796904.
Email address: zhangjinliang1213@163.com (JL.Zhang).