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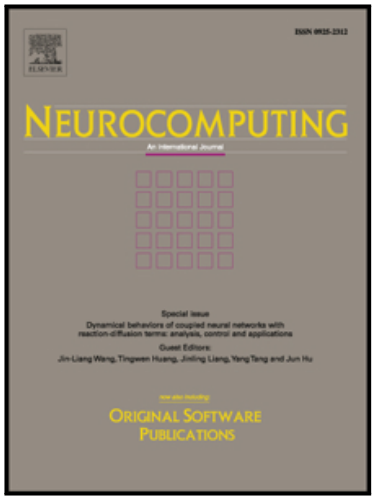

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Mixed kernel based extreme learning machine for electric load forecasting

Yanhua Chen[a,b,*], Marius Kloft[b], Yi Yang[c], Caihong Li[c], Lian Li[c]

[a]*School of Information Engineering, Zhengzhou University, Zhengzhou 450000, P.R. China*
[b]*Department of Computer Science Humboldt University of Berlin 10099 Berlin, Germany*
[c]*School of Information Science and Engineering, Lanzhou University, Lanzhou 730000, PR China*

Abstract

Short term electric load forecasting, as an important tool in the electricity market, plays a critical role in the management of electric systems. Proposing an accuracy and optimization method is not only a challenging task but also an indispensable part of the energy system. More and more accurate forecasting methods are needed by different people in different areas. This paper proposes a novel short-term electric load forecasting method EMD-Mixed-ELM which based on empirical mode decomposition (EMD) and extreme learning machine (ELM). EMD-Mixed-ELM first uses the empirical mode decomposition to decompose the load series for capturing the complicated features of the electric load and de-noising the data. Considering that the performance of extreme learning machine (ELM) is greatly influenced by the choice of kernel, the mixed kernel method is proposed for ELM. The mixed kernel combines the RBF kernel and the UKF kernel. The forecasting results of the EMD-Mixed-ELM are proved to be better than all the other three methods (RBF-ELM, UKF-ELM and Mixed-ELM) and other existing methods (MFES, ESPLSSVM and Combined method). To verify the forecasting ability of the EMD-Mixed-ELM, half-hourly electric load data from the state of New South Wales, Victoria and Queensland in Australia are used in this paper as a case study. The experimental results clearly indicate that for this three datasets, the forecasting accuracy of the proposed method is superior to other methods.

Keywords: Electric load forecasting, Extreme learning machine, RBF kernel, UKF kernel, Empirical mode decomposition

*Corresponding author
Email address: chenyh2011@lzu.edu.cn (Yanhua Chen)