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Empirical Mode Decomposition Based Denoising Method with Support Vector Regression for Time Series Prediction: A Case Study for Electricity Load Forecasting

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Abstract

Electricity load demand estimation has a remarkable impact on the economic policies of power industry and business cycles. Forecasting the movements of load demand provides to know the tendency of the future and can lead to a clear decision in strategic planning or investments. Besides the ability to know the fluctuations of the future, values contributes to the management of daily/weekly and long term operations. This study aims to predict the electricity load demand using a hybrid method that incorporates Empirical Mode Decomposition (EMD) and Support Vector Regression (SVR) algorithms. The proposed EMD-SVR method integrates the EMD method to SVR algorithm by using EMD as a denoising step on the training data. Unlike the previous studies, the proposed algorithm is not dependent to a specific Intrinsic Mode Function (IMF) for denoising and model learning. Experimental results are conducted on 3 electricity load datasets from different countries and the proposed method is compared with SVR algorithm using different feature vectors as well. It is shown that the proposed algorithm outperforms the SVR and non-feature used denoised-SVR algorithm on electricity load forecasting.

Keywords: electric load forecasting; prediction; support vector regression; empirical mode decomposition; time series

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