A systematic design of interval type-2 fuzzy logic system using extreme learning machine for electricity load demand forecasting.

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Resumen: This paper presents a novel design of interval type-2 fuzzy logic systems (IT2FLS) by utilizing the theory of extreme learning machine (ELM) for electricity load demand forecasting. ELM has become a popular learning algorithm for single hidden layer feed-forward neural networks (SLFN). From the functional equivalence between the SLFN and fuzzy inference system, a hybrid of fuzzy-ELM has gained attention of the researchers. This paper extends the concept of fuzzy-ELM to an IT2FLS based on ELM (IT2FELM). In the proposed design the

antecedent membership function parameters of the IT2FLS are generated randomly, whereas the consequent part parameters are determined analytically by the Moore–Penrose pseudo inverse. The ELM strategy ensures fast learning of the IT2FLS as well as optimality of the parameters. Effectiveness of the proposed design of IT2FLS is demonstrated with the application of forecasting nonlinear and chaotic data sets. Nonlinear data of electricity load from the Australian National Electricity Market for the Victoria region and from the Ontario Electricity Market are considered here. The proposed model is also applied to forecast Mackey-glass chaotic time series data. Comparative analysis of the proposed model is conducted with some traditional models such as neural networks (NN) and adaptive neuro fuzzy inference system (ANFIS). In order to verify the structure of the proposed design of IT2FLS an alternate design of IT2FLS based on Kalman filter (KF) is also utilized for the comparison purposes. [ABSTRACT FROM AUTHOR]

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