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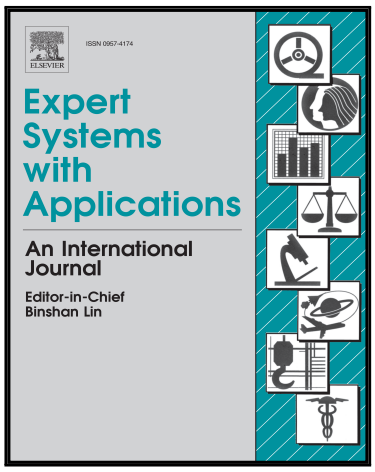

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A Fast Incremental Extreme Learning Machine Algorithm for Data Streams Classification☆

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Abstract

Data streams classification is an important approach to get useful knowledge from massive and dynamic data. Because of concept drift, traditional data mining techniques cannot be directly applied in data streams environment. Extreme learning machine (ELM) is a single hidden layer feedforward neural network (SLFN), comparing with the traditional neural network (e.g. BP network), ELM has a faster speed, so it is very suitable for real-time data processing. In order to deal with the challenge in data streams classification, a new approach based on extreme learning machine is proposed in this paper. The approach utilizes ELMs as base classifiers and adaptively decides the number of the neurons in hidden layer, in addition, activation functions are also randomly selected from a series of functions to improve the performance of the approach. Finally, the algorithm trains a series of classifiers and the decision results for unlabeled data are made by weighted voting strategy. When the concept in data streams keeps stable, every classifier is incrementally updated by using new data; if concept drift is detected, the classifiers with weak performance will be cleared away. In the experiment, we used 7 artificial datasets and 9 real datasets from UCI repository to evaluate the performance of the proposed approach. The testing results showed, comparing with the conventional classification methods for data

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