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A Fuzzy-Rough Feature Selection Based on Binary Shuffled Frog Leaping Algorithm

Authors : Javad Rahimipour Anaraki, Saeed Samet, Mahdi Eftekhari, Chang Wook Ahn

Abstract : Feature selection and attribute reduction are crucial problems, and widely used techniques in the field of machine learning, data mining and pattern recognition to overcome the well-known phenomenon of the Curse of Dimensionality. This paper presents a feature selection method that efficiently carries out attribute reduction, thereby selecting the most informative features of a dataset. It consists of two components: 1) a measure for feature subset evaluation, and 2) a search strategy. For the evaluation measure, we have employed the fuzzy-rough dependency degree (FRFDD) of the lower approximation-based fuzzy-rough feature selection (L-FRFS) due to its effectiveness in feature selection. As for the search strategy, a modified version of a binary shuffled frog leaping algorithm is proposed (B-SFLA). The proposed feature selection method is obtained by hybridizing the B-SFLA with the FRDD. Nine classifiers have been employed to compare the proposed approach with several existing methods over twenty two datasets, including nine high dimensional and large ones, from the UCI repository. The experimental results demonstrate that the B-SFLA approach significantly outperforms other metaheuristic methods in terms of the number of selected features and the classification accuracy.

Keywords : binary shuffled frog leaping algorithm, feature selection, fuzzy-rough set, minimal reduct
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