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Multi-Objective Evolutionary Computation Based Feature Selection Applied to Behaviour Assessment of Children

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Abstract : Abstract—Attribute or feature selection is one of the basic strategies to improve the performances of data classification tasks, and, at the same time, to reduce the complexity of classifiers, and it is a particularly fundamental one when the number of attributes is relatively high. Its application to unsupervised classification is restricted to a limited number of experiments in the literature. Evolutionary computation has already proven itself to be a very effective choice to consistently reduce the number of attributes towards a better classification rate and a simpler semantic interpretation of the inferred classifiers. We present a feature selection wrapper model composed by a multi-objective evolutionary algorithm, the clustering method Expectation-Maximization (EM), and the classifier C4.5 for the unsupervised classification of data extracted from a psychological test named BASC-II (Behavior Assessment System for Children - II ed.) with two objectives: Maximizing the likelihood of the clustering model and maximizing the accuracy of the obtained classifier. We present a methodology to integrate feature selection for unsupervised classification, model evaluation, decision making (to choose the most satisfactory model according to a a posteriori process in a multi-objective context), and testing. We compare the performance of the classifier obtained by the multi-objective evolutionary algorithms ENORA and NSGA-II, and the best solution is then validated by the psychologists that collected the data.

Keywords : evolutionary computation, feature selection, classification, clustering
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