New Classification Models through Evolutionary Algorithms

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ABSTRACT

This Doctoral Thesis presents new computational models on data classification which address new open problems and challenges in data classification by means of evolutionary algorithms. Specifically, we pursue to improve the performance, scalability, interpretability and accuracy of classification models on challenging data. The performance and scalability of evolutionary-based classification models were improved through parallel computation on GPUs, which demonstrated to achieve high efficiency on speeding up classification algorithms. The conflicting problem of the interpretability and accuracy of the classification models was addressed through a highly interpretable classification algorithm which produced very comprehensible classifiers by means of classification rules. Performance on challenging data such as the imbalanced classification was improved by means of a data gravitation classification algorithm which demonstrated to achieve better classification performance both on balanced and imbalanced data. All the methods proposed in this Thesis were evaluated in a proper experimental framework, by using a large number of data sets with diverse dimensionality and by comparing their performance against other state-of-the-art and recently published methods of proved quality. The experimental results obtained have been verified by applying non-parametric statistical tests which support the better performance of the methods proposed.


