A Genetic-Fuzzy Algorithm to Discover Fuzzy Classification Rules for Mixed Attributes Datasets

Abstract

Genetic Algorithms, being global search method, have been extensively applied for discovery of automated classification rules. Fuzzy Logic was integrated with genetic algorithms for discovery of Fuzzy Classification Rules (FCRs) which are more interpretable and cope better with pervasive uncertainty and vagueness in real world decision making situations. At one hand,
most of the Genetic Algorithm approaches have been implemented for datasets with categorical attributes only, at the other Genetic-Fuzzy approaches have the limitation to deal only with continuous attributes. This paper proposes genetic-fuzzy approach for discovery of fuzzy decision rules from datasets containing both categorical as well as continuous attributes. The continuous attributes are normalized and fuzzified in pre-processing step. A novel match procedure is devised to take care of mixed attributes during the fitness computations of individual rules. A direct match is carried out for categorical attributes whereas a Mumdani style min-max method is employed for matching continuous attributes with the instances in the training dataset. The proposed approach is tested on various datasets containing purely continuous or purely categorical or a mix of both types of attributes. Appropriate encoding scheme, fitness function and genetic operators with the necessary constrained are designed. The results are compared with three other machine learning techniques and results are comparable in terms of predictive accuracy. Moreover, the rule sets discovered with the suggested approach are compact and more comprehensible.

Reference

- Li Ji-Dong, Xue-Jie Zhang and Yun-Shan Chen: “Applying Expert Experience to

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