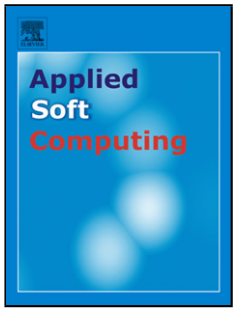

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Consensus via Penalty Functions for Decision Making in Ensembles in Fuzzy Rule-based Classification Systems

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Abstract

The aim of this paper is to propose a consensus method via penalty functions for decision making in ensembles of fuzzy rule-based classification systems (FRBCSs). For that, we first introduce a method based on overlap indices for building confidence and support measures, which are usually used to evaluate the degree of certainty or interest of a certain association rule. Those overlap indices (a generalizations of the Zadeh's consistency index between two fuzzy sets) are built using overlap functions, which are a special kind of non necessarily associative aggregation functions proposed for applications related to the overlap problem and/or when the associativity property is not demanded. Then, we introduce a new FRM for the FRBCS, considering different overlap indices, which generalizes the classical methods. By considering several overlap indices and aggregation functions, we generate fuzzy rule-based ensembles, providing different results. For the decision making related to the selection of the best class, we introduce a consensus method for classification, based on penalty functions. We also present theoretical results related to the developed methods. A detailed example of a generation of fuzzy rule-based ensembles based on the proposed approach, and the decision making by consensus via penalty functions, is presented.

Keywords: fuzzy rule-based classification system, aggregation function, penalty function, overlap function, overlap index, confidence and support measures

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