UNIVERSITI TEKNOLOGI MARA

FUZZY CLASSIFICATION BASED ON COMBINATIVE ALGORITHMS WITH FUZZY SIMILARITY MEASURE

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ABSTRACT

The performance of a single-model (classifier) can be determined on the basis of the classification accuracy. However, it is difficult to determine which single-model is the best classification technique in a specific application domain since a single learning algorithm may not uniformly outperform other algorithms over various datasets. Furthermore, most classification algorithms, using either fuzzy or non-fuzzy approaches, produce results in the form of crisp or categorical classification outcomes. Moreover, in certain applications, the classification outcomes that represent class labels may involve categorisations which are fuzzy in nature. Therefore, this study aims to develop a new technique to handle the classification task based on combinative algorithms by adopting multiple-model concepts and Fuzzy Ordered Weighted Averaging (FOWA) operator. A fuzzy similarity measure for Generalized Trapezoidal Fuzzy Number (GTFN) based on distance and geometric shape characteristics, namely geometric distance, centre of gravity points, area, perimeter and height is proposed. The proposed fuzzy similarity measure is integrated in the proposed Fuzzy Classification technique based on Combinative Algorithms which is termed as FCCA. The performance of the proposed FCCA has been analysed and compared with the best single-models and the existing multiple-model technique using Domestic Water Consumption (DWC) dataset. The findings show that the proposed FCCA method consistently outperforms all selected single-models and performs better prediction performance than a statistical multiple-model approach, known as the Pool Method. These results indicate that the proposed FCCA technique has the potential to assist decision-making, especially in situations where it is difficult to decide which model is better for a specific classification problem and when it is difficult to decide selected unconfirmed cases.

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