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Weighted fuzzy interpolated reasoning based on ranking values of polygonal fuzzy sets and new scale and move transformation techniques

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Abstract

In this paper, we propose a new transformation-based weighted fuzzy interpolative reasoning (FIR) method based on ranking values of polygonal fuzzy sets (PFSs) and the proposed new scale and move transformation techniques. The proposed weighted FIR method gets more reasonable FIR results than the ones of the existing methods, where the weight of each antecedent variable and the weight of each fuzzy rule are generated automatically. Moreover, the proposed new scale and move transformation techniques can deal with FIR using singleton fuzzy sets and PFSs. We also apply the proposed weighted FIR method to predict the diarrheal disease rates in remote villages. The proposed weighted FIR method provides us with a very useful way for weighted FIR in sparse fuzzy rule-based systems.

Keywords: Fuzzy interpolative reasoning; Interpolated fuzzy rules; Polygonal fuzzy sets; Ranking values; Scale and move transformation techniques.

1. Introduction

In a fuzzy rule-based system, a complete fuzzy rule base is essential to obtain reasonable fuzzy reasoning results. However, the conventional fuzzy reasoning methods may produce unreasonable fuzzy reasoning results when the fuzzy rule base is

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