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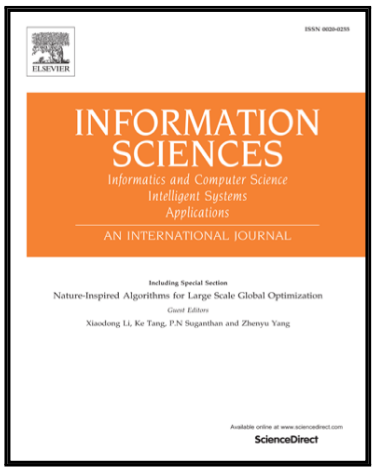

Multiattribute Decision Making Based on Interval-Valued Intuitionistic Fuzzy Values and Particle Swarm Optimization Techniques

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Multiattribute Decision Making Based on Interval-Valued Intuitionistic Fuzzy Values and Particle Swarm Optimization Techniques

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Abstract

In this paper, we propose a new multiattribute decision making (MADM) method based on the interval-valued intuitionistic fuzzy weighted geometric average (IIFWGA) operator, the accuracy function of interval-valued intuitionistic fuzzy values (IVIFVs) and particle swarm optimization (PSO) techniques, where the weights of attributes and the evaluating values of alternatives with respect to attributes are represented by IVIFVs. First, the proposed method uses an accuracy function to transform the decision matrix given by the decision maker and represented by IVIFVs into a transformed decision matrix represented by real values in $[-1, 1]$. Then, it produces the optimal weights of the attributes based on the obtained transformed decision matrix and PSO techniques. It determines the weighted evaluating IVIFV of each alternative based on the IIFWGA operator, the obtained optimal weights of the attributes and the decision matrix given by the decision maker represented by IVIFVs. Finally, it calculates the transformed value of the weighted evaluating IVIFV of each alternative based on the accuracy function to get the preference order of the alternatives. The main contribution of this paper is that we propose a new MADM method based on the IIFWGA operator of IVIFVs, the accuracy function of IVIFVs and PSO techniques, which can overcome the drawbacks of the existing MADM methods for MADM in interval-valued intuitionistic fuzzy (IVIF) environments.

***Keywords*:** Accuracy function, IIFWGA operator; Interval-valued intuitionistic fuzzy sets; Interval-valued intuitionistic fuzzy values; Multiattribute decision making; Particle swarm optimization.

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