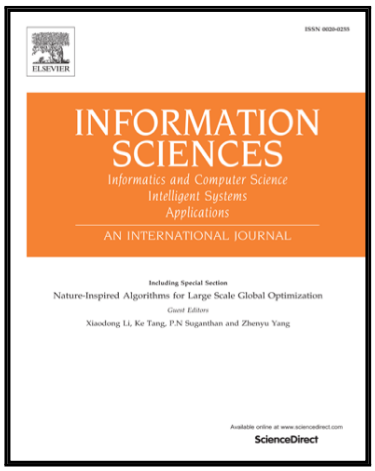

A group decision-making method considering both the group consensus and multiplicative consistency of interval-valued intuitionistic fuzzy preference relations

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A group decision-making method considering both the group consensus and multiplicative consistency of interval-valued intuitionistic fuzzy preference relations

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Abstract: This paper investigates a group decision-making (GDM) method that considers group consensus and multiplicative consistency of interval-valued intuitionistic fuzzy (IVIF) preference relations (IVIFPRs). First, the mean and variance of IVIF values (IVIFVs) are defined and a ranking method for IVIFVs is proposed considering the risk attitude of the expert. Then, the group consensus is presented by the individual similarity between experts. An iteration algorithm is designed to improve the group consensus. A statistical comparative analysis validates this algorithm. Subsequently, a new multiplicative consistency of IVIFPR is defined based on the multiplicative consistency of interval fuzzy preference relation. Two single-objective programming models are established to extract the most optimistic and pessimistic interval priority weight vectors from an IVIFPR, respectively. In particular, if the feasible domains of these two models are empty, two adjusted programs are constructed to replace the originals. Combining the most optimistic and pessimistic interval priority weights, the IVIF priority weights are generated. Further, expert weights are derived from Markov model and used to derive the collective IVIFPR for generating the IVIF priority weights. Therefore, a new method is proposed to solve the GDM with IVIFPRs. Finally, two cases are analyzed to verify the effectiveness of the proposed method.

Keywords: Interval-valued intuitionistic fuzzy preference relation, Group decision making, Multiplicative consistency, Group consensus

1. Introduction

The preference relation was first introduced in the analytic hierarchy process (AHP) [21]. Owing to the flexible structure and innate ability of humans to make relative comparisons, preference relations have been widely applied to decision-making problems. Several different types of preference relations

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