

A Three-Phase Method for Group Decision Making With Interval-Valued Intuitionistic Fuzzy Preference Relations

Shuping Wan, Feng Wang, Jiuying Dong

Abstract— This paper develops a new method for solving group decision making (GDM) problems with interval-valued intuitionistic fuzzy preference relations (IVIFPRs). First, an additive consistency of an IVIFPR is defined by the additive consistency of intuitionistic fuzzy preference relation (IFPR). Based on the additive consistency definition of IVIFPR, two linear programming models are established to extract the most optimistic and pessimistic consistent IFPRs from an IVIFPR, respectively. Especially, if the feasible regions of these two models are empty, two adjusted programming models are constructed. Afterwards, a risk attitudinal-based consistent IFPR is determined considering decision maker's (DM's) risk attitude. To derive the intuitionistic fuzzy priority weights from the risk attitudinal-based consistent IFPR, a multiobjective programming model is established and transformed into a linear goal program to resolve. Subsequently, combining DMs' subjective and objective importance degrees, the comprehensive importance degrees of DMs are generated. Using comprehensive importance degrees as order inducing variables, a new comprehensive importance interval-valued intuitionistic fuzzy induced ordered weighted averaging (CI-IVIF-IOWA) operator is defined to aggregate the individual IVIFPRs into a collective one. Thereby, a three-phase method is proposed for GDM with IVIFPRs. An example of network system selection is examined to illustrate the practicability and effectiveness of the proposed method.

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