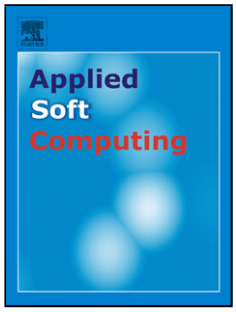

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A new approach for multiple attribute group decision making with interval-valued intuitionistic fuzzy information

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Abstract

This paper proposes a novel method for multiple attribute group decision making (MAGDM) with interval-valued intuitionistic fuzzy information. The interval-valued intuitionistic fuzzy numbers of each expert preference matrix are first mapped into two dimensions. Thus, the values of each membership degree and non-membership degree are considered as points in the two-dimensional representation. Moreover, the distance between the points represents the variance among the different experts preferences. The preference points of the same character are considered as a point set. We employ the plant growth simulation algorithm (PGSA) to calculate the optimal rally points of every point set, the sum of whose Euclidean distances to other given points is minimal, and these optimal rally points reflect the preferences of the entire expert group. These points are used to establish an expert preference aggregation matrix. Suitable points from the matrix are chosen to constitute an ideal point matrix, a projection method is employed to calculate the sum of its Euclidean distance to the expert preference aggregation matrix, and the score of each alternative is evaluated. Finally, the overall ranking of alternatives is obtained. In addition, this study develops a process to evaluate the pros and cons of different aggregation methods. Two typical examples are presented to illustrate the feasibility and effectiveness of the proposed approach.

Keywords: `Multiple attribute group decision making`, Interval-valued intuitionistic fuzzy information, Plant growth simulation algorithm (PGSA), Optimal rally point, Aggregation

1. Introduction

. Multi-attribute group decision making (MAGDM) is a classical decision-making construct applied in various areas such as emergency management, economics, society, etc. [1–5]. F. Herrera [6] classified the decision making process into three parts: translate experts preferences, aggregate experts opinions (i.e., establish the collective matrix) and select the best alternative (the aggregation of expert opinion is the core step among these three steps). The experts preference was described using distinct numbers in the early multi-criteria

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