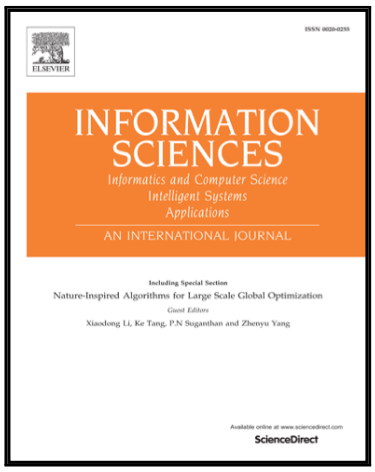

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Hesitant fuzzy preference envelopment analysis and alternative improvement

Wei Zhou[*ab], **Jin Chen**[b], **Zeshui Xu**[a], **Sun Meng**[b]

a. Business School, Sichuan University, Chengdu 610064, P.R. China;

b. Business School, Yunnan University of Finance and Economics, Kunming 650221, P.R. China

Abstract

In the hesitant fuzzy decision-making process, an important issue is to aggregate the hesitant fuzzy information and select the optimal alternatives. How to deal with other non-optimal alternatives? This question has not been clearly answered. To address this issue, this paper proposes the hesitant fuzzy envelopment analysis (HFEA) model based on the defined score per unit. Furthermore, we develop the deviation-oriented hesitant fuzzy envelopment analysis (DHFEA) model and the score-oriented hesitant fuzzy envelopment analysis (SHFEA) model in terms of score and deviation values. Then, their dual forms are derived so that the DHFEA and SHFEA models can be transformed into the linear programming. Based on the calculated results, the non-optimal alternatives can be improved accordingly. Moreover, with respect to the attributes' differences, this paper constructs the hesitant fuzzy preference envelopment analysis (HFPEA) model by integrating the attributes' preferences. Similarly, its dual form, linear transformation, and alternative improvement method are investigated respectively. Thus, based on the HFEA and HFPEA models, we can rank all the alternatives and improve the non-optimal ones according to the envelopment values and the obtained parameters. Meanwhile, the decision maker's subjective preferences for the attributes can be considered in the decision-making process. Finally, an illustrative example of bidding evaluation is provided to show the feasibility of the proposed decision-making approaches.

Keywords: Hesitant fuzzy envelopment analysis; dual form; efficiency value; preference relationship; alternative improvement.

[*] Corresponding author.