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Consensus-reaching methods for hesitant fuzzy multiple criteria group decision making with hesitant fuzzy decision making matrices

Key words: Multiple criteria group decision making; Group consensus; Consensus-reaching process; Hesitant fuzzy decision making matrices; Aggregation operators

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Motivation

- There is little research on the consensus-reaching process for multiple criteria group decision making (MCGDM) problems with hesitant fuzzy information.
- Some researchers such as Zhang et al. (2014; 2015a; 2015b) presented a consensus support model and a decision making model. Their method has some drawbacks as it focuses only on how to measure the consensus of a group and cannot help the group check what are the real factors resulting in the low level of consensus.

Main idea

- To avoid these drawbacks, in this research we develop two methods for HFMCGDM with group consensus, in which all experts use HFDMs to express their preferences.
- We introduce two novel methods to measure, check, and reach the consensus of a group and give two complete algorithms for GDM with HFDMs, which are quite flexible and reasonable, and thus can match the practical GDM situations well.

Method

1. Through a series of effective computing methods, we first should find and pick out the expert who should change his/her preference information to reach a higher consensus.
2. Then we ask the expert who is selected whether he/she agrees to change his/her preference values.
3. If the expert does not agree to change his/her preference values, we will exclude him/her from the group because his/her preference information is different from that of other experts. Then, we calculate a new consensus degree and compare the size between the calculation consensus degree and the expected consensus degree.

Major results

- Our methods allow to achieve consensus solutions before the selection process and can avoid some experts' preference values being too high or too low.
- After modifying the previous preference information by using our consensus measures, the result of the selection process is much more reasonable.

Conclusions

1. We find that our methods are more comprehensive and convincing because we have considered the situation where each expert's preference information may be expressed as several possible values.

2. We have proposed the consensus checking and reaching processes to find the experts who should modify their judgments.

3. Our methods allow to achieve consensus solutions before the selection process and can avoid some experts' preference values being too high or too low. In the future, we will apply our proposed consensus approaches to GDM using R language, linguistic term sets, etc.