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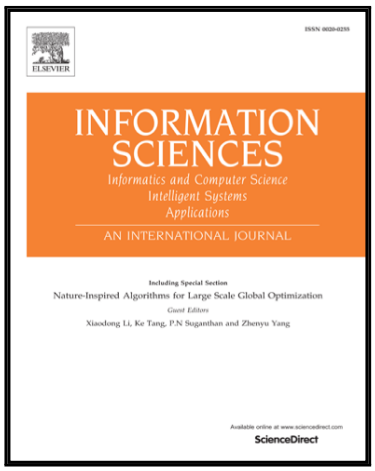

An ordinal consistency-based group decision making process with probabilistic linguistic preference relation

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The revised manuscript (#INS-D-17-2187-R2):

An ordinal consistency-based group decision making process with probabilistic linguistic preference relation

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Abstract:

The probabilistic linguistic preference relation (PLPR) reflects different preference degrees (or weights) of experts over possible linguistic terms and improves the flexibility for experts in expressing linguistic preference information. Ordinal consistency is the minimum condition to guarantee that experts would not give some self-contradictory preferences. The ranking result of alternatives based on ordinal inconsistent preference relations is unreliable. This study investigates the ordinal consistency for PLPRs and the identification and modification of ordinal inconsistent PLPRs. To do so, this paper first defines the ordinal consistency of PLPR and presents the preference graph associated with the PLPR. Then, we present theorems about ordinal consistency of PLPR and define an ordinal consistency index to measure the ordinal consistency level from the perspective of preference graph. Moreover, we put forward an algorithm to check whether a PLPR is ordinal consistent and further identify the inconsistent elements for the inconsistent PLPR. Another algorithm based on three modification principles is further developed to modify the ordinal inconsistent PLPR and obtain the ordinal consistent one. Furthermore, we introduce new aggregation operators and present the whole decision-making procedure based on the ordinal

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