

Probabilistic linguistic multi-attribute decision making approach based upon novel GSM operators

ABSTRACT

Probabilistic linguistic terms set (PLTS), a new tool for expressing uncertain decision information, is composed of all possible linguistic terms (LTs) and their related probabilities. It also increases the corresponding probability of LTs in hesitant fuzzy linguistic term set (HFLTS). On the other hand, aggregation operator is an important information fusion tool, the Maclaurin symmetric mean (MSM) operator can provide more flexibility and robustness in information fusion and make it more suitable for solving MADM problems with independent attributes. This current study adopts the merits of PLTS and MSM operator, and then a novel probabilistic linguistic decision-making approach are targeted. Firstly, the operations of two PLTSs are redefined based upon Archimedean t-norm (ATN) and Archimedean t-conorm (ATC); Secondly, the probabilistic linguistic generalized MSM operator (PLGMSM) is proposed based on ATN and ATC, some properties of PLGMSM are investigated, then some special PLGMSM operators have been studied in detail when the parameters take different values and the generator of ATN takes different functions. Thirdly, the weighted probabilistic linguistic generalized MSM operator (WPLGMSM) is studied along with some properties of PLGMSM, some special WPLGMSM operators have been also investigated in detail when the parameters take different values and the generator of ATN takes different functions. Finally, on the basis of our proposed aggregation operators, the aggregated-based decision-making approach is designed and an example is supplied to manifest the effectiveness of the proposed approach. Furthermore, some comparison analyses with extant decision approaches are carried out to illustrate the validity and feasibility of the proposed approach.