Comparison of a Case Study of Uncertainty Propagation using Possibility-Probability Transformation

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Abstract

Uncertainty parameters in risk assessment can be modeled by different ways viz. probability distribution, possibility distribution, belief measure, depending upon the nature and availability of
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the data. Different transformations exist for converting expression of one form of uncertainty to another form. They differ from one another substantially, ranging from simple ratio scaling to more sophisticated transformation based upon various principles. These transformations should satisfy certain consistency principles. Several researchers viz., Zadeh, Klir, Dubois & Prade have given such type of consistency laws. The weakest consistency rule that any probability-possibility transformation should satisfy is \( \text{pro}(A) \leq \text{pos}(A) \) i.e., probability of any event is less than or equal to possibility of that event. The strongest among such transformation law \( \text{Pro}(A) > 0 \; \text{Pos}(A) = 1 \). Though possibility and probability capture different types of uncertainty, still transformations are used because it is essential in solving many practical problems. In this paper, we reviewed the consistency principles as given by the above authors. Then we have made a comparative case study of uncertainty propagation by three different methods using probability-possibility transformation satisfying consistency conditions.

References


Index Terms

Computer Science
Fuzzy Systems
Keywords

Uncertainty
Risk Assessment
Hybrid method
Probability-possibility transformation