An alternate method to determine ʎ°-measure values prior to applying Choquet integral in a multi-attribute decision making environment

ABSTRACT

Determining 2^n values of fuzzy measure prior to applying Choquet integral normally turns into a complex undertaking, especially when the decision problem entails a large number of evaluation attributes, n. Many patterns of fuzzy measure have thus been suggested to deal with this complexity. ʎ°-measure is one such pattern. However, the original ʎ°- measure identification method was found to be unsuccessful in providing clear-cut indications on the relationships held by the attributes. A revised version of the method was then introduced to tackle this issue, but unfortunately it requires a large amount of initial data from the respondents compared to the original method. This paper therefore proposes an alternate version of ʎ°-measure identification method that synchronously compensates the shortcomings associated with each existing method. The proposed method uses interpretive structural modelling (ISM) to uncover the actual relationships held by the attributes. The outputs of ISM (i.e. digraph, driving power and dependence power) are then utilised to determine the inputs required to identify the complete set of ʎ°-measure values. A supplier selection problem was used to demonstrate the feasibility of the method. Also, the usability of the method was compared over the existing ones.