Nonlinear Non-Weight Method For Multi-Criteria Decision Making

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Multi-criteria decision making (MCDM) is a prominent field of operations research, playing a critical role in our daily lives, ranging from politics and business to environment and healthcare. Discrete decision making problems are solved using multi-attribute decision making (MADM) methods. Though there are many effective MADM methods, the weighted-sum model is the underlying model for most methods. Therefore, these methods cannot produce the rankings that are unrenderable by linear functions. In addition, these methods prove challenging to use and are very time consuming.

Researchers at Purdue University have developed a new method for multiple-criteria evaluation problems that does not require domain experts to assign weights for decision criteria as is usually demanded by the weighted-sum model. Comparison matrices (for decision alternatives) are multiplied by a standard vector, resulting in a positive eigenvector of the matrix that is used as the ranking vector for decision alternatives. This new method is much less time consuming and simple to use compared to previous methods.

Advantages:
- Facilitates the assignment of required decision criteria weights
- Includes the rankings that cannot be revealed by linear equations
- Reduces the overall difficulty and time consumed

Potential Applications:
- Operations Management
- Decision Making

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