Article

Interactive software for classification and ranking procedures based on multi-criteria decision-making algorithms

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Abstract
Interactive software that helps the decision maker to choose the optimal ranking for complex systems has been prepared according to multiple preference criteria. The code algorithm is based on famous mathematical methods well known in multi-criteria decision making, such as VIKOR, TOPSIS, and the weighted sum method (WSUM). This code is used at the AECS to assess and classify the performance of employees or for inter-departmental comparison according to their scientific and technical output performance. It can also be used in wider fields outside the AECS according to preference criteria carefully selected by the decision-maker. Beneficiaries might include Syrian private and state universities or academics. Criteria elements can, for example, be drafted along international standards of copyrighted internal reports, published papers, journal impact factor, journal citations, H-index and registered patents. Two real examples are explained in this paper to prove the validity and consistency of this computer code.

Keywords ranking and classification methods; multi-criteria optimization; multi-criteria decision-making; multi-objective optimization; multi-criteria decision aid.

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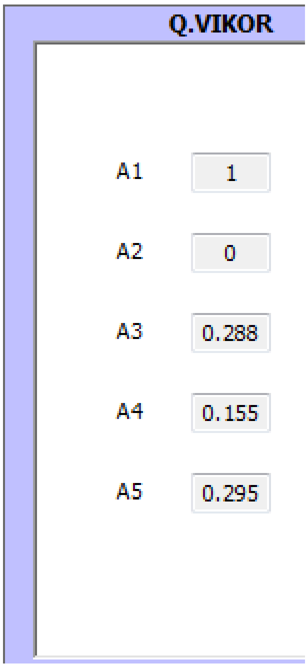
1 Introduction

Multi-criteria decision making (MCDM), multi-objective decision making (MODM), multi-criteria optimization (MCO), multi-objective optimization (MOO),multi-criteria decision aid (MCDA) or multi-criteria decision analysis(MCDA) are considered as the process of determining the best feasible solution according to established criteria which represent different effects. However, these criteria are usually conflicted and there may be contradictory with each other criterion which that implies to no feasible solution satisfying all criteria simultaneously at the time. Thus, the concept of Pareto optimality was introduced for a vector optimization problem. Pareto optimal solutions have the characteristic that, if one criterion is to be improved, at least one other criterion has to be made worse. In such cases, a system analyst can aid the decision making process by making a comprehensive analysis and by listing the important properties of the Pareto optimal non-inferior solutions.

The results driven by the method is listed in Table 8.

Table 8 Results driven by the code to method VIKOR.



7 Conclusions

Easy interactive computer software has been proposed. The code algorithm is mainly based on famous mathematical methods well-known in multi-criteria decision making such as: VIKOR, TOPSIS, and the weighted sum method (WSUM). Two real examples are shown to prove the validity and accuracy of this code. The code is implemented and programmed by the c-sharp under dot-net; it is easy to use and easy to be developed. Examples input data file, testing examples, and the setup file of this software are appended in a rar file with this paper.

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