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Applied Mathematics and Computation

Volume 162, Issue 1, 4 March 2005, Pages 243-256

Extensions of TOPSIS for multi-objective large-scale nonlinear programming problems

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https://doi.org/10.1016/j.amc.2003.12.087

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Abstract

In this paper, we focus on multi-objective large-scale nonlinear programming (MOLSNLP) problems with block angular structure. We extend technique for order preference by similarity ideal solution (TOPSIS) approach to solve (MOLSNLP) problems. Compromise (TOPSIS) control minimizes the measure of distance, providing that the closest solution should have the shortest distance from the positive ideal solution (PIS) as well as the longest distance from the negative ideal solution (NIS). As the measure of â€œclosenessâ€ L_P-metric is used. Thus, we reduce a q-dimensional objective space to a two-dimensional space by a first-order compromise procedure. The concept of membership function of fuzzy set theory is used to represent the satisfaction level for both criteria. Also, we get a single objective large-scale nonlinear programming (LSNLP) problem using the maxâ€“min operator for the second-order compromise operation. Finally, a numerical illustrative example is given to clarify the main results developed in

the paper.

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Keywords

Large-scale systems; Multi-objective decision making; Fuzzy set theory; Compromise (satisfactory solution); Positive ideal solution; Negative ideal solution

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