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Generating decision rules for flexible capacity expansion problem through gene expression programming. (English) [Zbl 1458.90648]

Summary: This paper proposes a novel approach for generating decision rules to exercise flexibility in capacity expansion. The proposed approach differs from other decision rule generation methods by integrating gene expression programming. This approach allows parameters to be automatically selected from a database and optimally combined to form decision rules, allowing both the structure and parameters of the decision rules to evolve. The generated decision rules support capacity expansion activities by clearly providing guidance to adjust the expansion level and timing according to the changing environment. The proposed approach was applied to a waste-to-energy system, to flexibly expand capacity under uncertainty. The empirical results demonstrate that the decision rules generated by our proposed approach improved system performance in terms of expected net present value, relative to decision rules generated by a method based on differential evolution algorithm. A sensitivity analysis was also conducted to investigate the effectiveness of the proposed approach under changes to the major assumptions, and results indicated that the generated decision rule can guide capacity expansion under different situations.

MSC:
90C59 Approximation methods and heuristics in mathematical programming
90C15 Stochastic programming

Keywords:
flexibility; decision rules; gene expression programming; capacity expansion

Full Text: DOI

References:
programming, Control Eng. Practice, 6, 11, 1341-1352 (1998)


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