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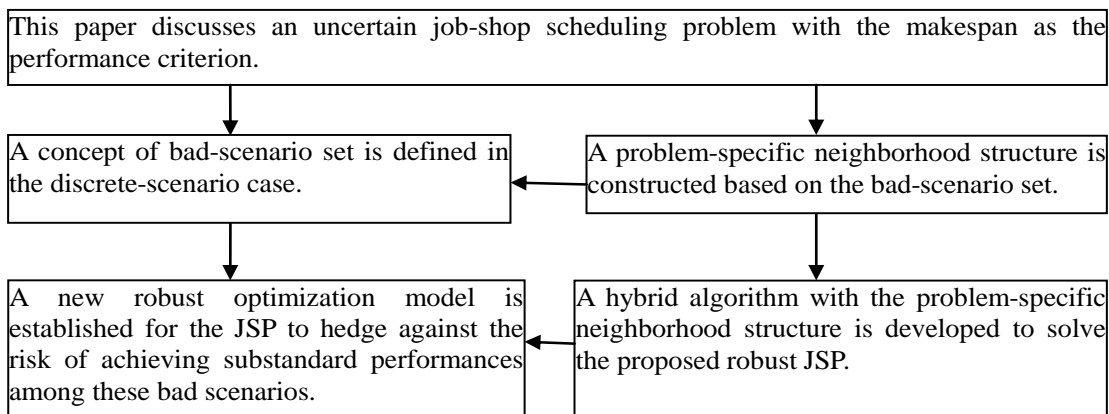
A Hybrid Local-search Algorithm for Robust Job-shop Scheduling under Scenarios

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Graphical abstract

This paper discusses an uncertain job-shop scheduling problem with the makespan as the performance criterion.

A concept of bad-scenario set is defined in the discrete-scenario case.

A problem-specific neighborhood structure is constructed based on the bad-scenario set.

A new robust optimization model is established for the JSP to hedge against the risk of achieving substandard performances among these bad scenarios.

A hybrid algorithm with the problem-specific neighborhood structure is developed to solve the proposed robust JSP.

The Graphical Abstract

Highlights

- We propose a new robust scheduling model for uncertain job shop scheduling to hedge against the risk of performance degradation on a set of bad scenarios.
- A neighborhood structure is constructed by uniting multiple single-scenario neighborhoods to handle the uncertainty described by scenarios.
- A hybrid algorithm with the united-scenario neighborhood structure is developed to solve the proposed robust job shop scheduling problem.
- The hybrid algorithm has the simulated annealing search mechanism with the tabu technique applied in the local search of neighborhood.

Abstract: This paper discusses an uncertain job-shop scheduling problem with the makespan as the performance criterion. Uncertain processing times are described by discrete scenarios. A robust optimization model is established for the job-shop scheduling problem based on a set of bad scenarios to hedge against the risk of achieving substandard performances among these bad scenarios. To solve the established problem, a problem-specific neighborhood structure is constructed by uniting multiple single-scenario neighborhoods.