

Minimizing Total Completion Time in Flowshops with Bounded Processing Times

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Abstract

We consider the two-machine flowshop scheduling problem where jobs have random processing times which are bounded within certain intervals. The objective function is to minimize total completion time of all jobs. The decision of finding a solution for the problem has to be made based on the lower and upper bounds on job processing times since this is the only information available. The problem is NP-hard since the special case when the lower and upper bounds are equal, i.e., the deterministic case, is known to be NP-hard. Therefore, a reasonable approach is to come up with well performing heuristics. We propose eleven heuristics which utilize the lower and upper bounds on job processing times. The proposed heuristics are compared through randomly generated data. The computational analysis has shown that the heuristics using the information on the bounds of job processing times on both machines perform much better than those using the information on one of the two machines. It has also shown that one of the proposed heuristics performs as the best for different distributions with an overall average percentage error of less than one.

Keywords

Scheduling, flowshop, total completion time, random and bounded processing times.