

**Beck, J. C.; Wilson, N.**

**Proactive algorithms for job shop scheduling with probabilistic durations.** (English)

Zbl 1182.68023

J. Artif. Intell. Res. (JAIR) 28, 183-232 (2007).

Summary: Most classical scheduling formulations assume a fixed and known duration for each activity. In this paper, we weaken this assumption, requiring instead that each duration can be represented by an independent random variable with a known mean and variance. The best solutions are ones which have a high probability of achieving a good makespan. We first create a theoretical framework, formally showing how Monte Carlo simulation can be combined with deterministic scheduling algorithms to solve this problem. We propose an associated deterministic scheduling problem whose solution is proved, under certain conditions, to be a lower bound for the probabilistic problem. We then propose and investigate a number of techniques for solving such problems based on combinations of Monte Carlo simulation, solutions to the associated deterministic problem, and either constraint programming or tabu search. Our empirical results demonstrate that a combination of the use of the associated deterministic problem and Monte Carlo simulation results in algorithms that scale best both in terms of problem size and uncertainty. Further experiments point to the correlation between the quality of the deterministic solution and the quality of the probabilistic solution as a major factor responsible for this success.

**MSC:**

68M20 Performance evaluation, queueing, and scheduling in the context of computer systems

Cited in **12** Documents

**Keywords:**

Monte Carlo simulation; deterministic scheduling algorithms

**Software:**

TSPTW

**Full Text:** [arXiv](#)