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Stochastic Resource-Constrained Project Scheduling:

State-of-the-Art and New Results

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Abstract:

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Recently the stochastic resource-constrained project scheduling problem (SRCPSP)
has received considerable attention. In the SRCPSP a set of precedence-related activities with stochastic processing times and deterministic resource demands have to be
scheduled subject to scarce resources such that the expected makespan is minimized.
The literature addresses predominantly the single project SRCPSP while there is little
work on the multi-project RCPSP.
In this talk we first consider the single project SRCPSP. We provide an overview on
exact and heuristic solution approaches and then propose a new heuristic which uses
the concept of estimation of distribution algorithm (EDA). EDA employs a probability
model in order to generate activity lists which are then mapped into a schedule with a
resource-based scheduling policy. We report on computational results applying EDA
on a widely used benchmark instance set. In particular we investigate on the performance of the algorithm with respect to problem size, variance of the processing times
and well-known problem parameters from the project scheduling library PSPLIB.
Furthermore, we compare EDA with the state-of-the-art heuristics proposed for the
SRCPCP. In the second part of the talk we consider the multi-project SRCPSP where
the sum of the project durations is minimized. We introduce a novel set of test instances for this problem and perform a computational study. In the latter we employ
a genetic algorithm with two different scheduling policies (resource- and activity-based) and study the performance of the latter with respect to the mean and the variance of the objective function. Our results indicate that resource-based policies dominate activity-based policies and that the goals of minimizing the mean and the variance of the objective function are not conflicting.