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Schedule generation scheme for solving multi-mode resource availability cost problem by modified particle swarm optimization.

Summary: The resource availability cost problem (RACP) (Möhring, Operations Research, 32:89-120, 1984) is commonly encountered in project scheduling. RACP aims to minimize the resource availability cost of a project by a given project deadline. In this study, RACP is extended from a single mode to a multi-mode called multi-mode RACP (MMRACP), which is more complicated than RACP but more convenient in practice. To solve MMRACP efficiently, forward activity list (FAL), a schedule generation scheme, is proposed. Heuristic algorithms are designed according to the characteristics of FAL to repair infeasible solutions and to improve the fitness of the solution. Modified particle swarm optimization (MPSO), which combines the advantages of particle swarm optimization and scatter search, is proposed to make the search for the best solution efficient. Computational experiments involving 180 instances are performed to validate the performance of the proposed algorithm. The results reveal that MPSO using FAL is a very effective method to solve MMRACP.

Keywords: project scheduling; multi-mode resource availability cost problem; schedule generation; forward activity List; modified particle swarm optimization
doi:10.1007/s10951-014-0374-0