Solving the resource availability cost problem in project scheduling by path relinking and genetic algorithm

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Abstract

This paper considers a project scheduling problem with the objective of minimizing resource availability costs required to execute the activities in a project by a given project deadline. The project contains activities interrelated by finish-start-type precedence relations with a time lag of zero, which require a set of renewable resources. Two metaheuristics, path relinking and genetic algorithm, are developed to tackle this problem in which a schedule is created with a precedence feasible priority list given to the schedule generation scheme. In these procedures, each new generation of solutions are created using the combination of current solutions. Comparative computational results reveal that path relinking is a very effective metaheuristic and dominates genetic algorithm.

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Keywords: Project scheduling; Resource availability cost problem; Heuristics; Path relinking; Genetic algorithm

1. Introduction

We study the resource availability cost problem (RACP) in project scheduling denoted as \( m, 1 | \text{cpm}, \delta_n | \text{rac} \) using the classification of Herroelen et al. [1]. This problem consists of scheduling the activities in a project such that the total cost of acquiring the necessary resources is minimized, assuming that a resource (whether it is used or not) is assigned to the project for the total project duration.