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Review

Multiobjective evolutionary finance-based scheduling: Individual projects within a portfolio

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ABSTRACT

Under cash-constrained conditions, the fulfillment of cash demands of the ongoing projects within a contractor's portfolio constitutes a set of conflicting objectives. As the profit values of the individual projects are maximized should their cash demands be fulfilled, the profit values of the individual projects constitute a set of multiple conflicting objectives. A Strength Pareto Evolutionary Algorithm (SPEA) employing a logic-preserving crossover and mutation operators is developed to devise Pareto-optimal finance-based schedules of multiple projects. The Pareto-optimal solutions allow the decision makers select the best solution based on their own preference. The developed SPEA reproduced the same results of an existing GAs-based multi objective technique in the literature. The proposed approach has been developed and implemented on multiple projects of different sizes. The results proved the effectiveness of the SPEA to solve finance-based scheduling problems of multiple projects considering the conflict in their profit realization.

Contents

1. Introduction

The procurement of adequate cash to execute construction operations is very crucial for contractors to run profitable and sustainable business. Contractors often supplement clients' payments with additional fund procured from external sources including banks. Typically, the procurement of additional cash incurs financing costs. Contractors often operate under cash-constrained condition which is being imposed by the delay of clients' payments while retaining portions thereof, and the credit limits set by bankers on cash that can be withdrawn. Thus, contractors pro actively manage this situation by devising project schedules based on cash availability. The concept and technique of finance-based scheduling achieves the sought integration between the functions of scheduling and financing by incorporating financing costs into the project total cost as well as scheduling under cash constraints.

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