

Resolution of Resource Contentions in the Critical Chain Project Management based on Simulated Annealing

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Abstract

The aim of this research is to resolve resource contentions in the critical chain project management method. The method is an effective tool for project management, in which we apply max-plus algebra. To level resource contention, we have used complete enumeration methods by which an exact solution is obtained. In a numerical simulation, the maximum computation time was longer than 10 hours if the number of jobs is twenty, which is quite long. This research thus aims to obtain a solution within a short computation time, in which resource contentions are leveled, using an approximate method. A simulated annealing-based method, which is one of common metaheuristic methods, is developed. This is because simulated annealing is known as an approach to obtain exact solutions easily. Amongst several parameters in simulated annealing, we focus on the temperature parameter. Compared with the exact and approximate solutions, a good approximate ratio was obtained within a short computation time if the temperature parameter is set to 0.1 for ten and fifteen tasks, and 1.0 for twenty tasks. If the temperature parameter is set to a higher value, a good approximate ratio was obtained but the computation time was very long.

Keywords

Critical Chain Project Management, Max-plus algebra, Metaheuristics, Resources contention, Simulated Annealing

Biography

Hajime Yokoyama is a student of the master's course in the Graduate school of Science and Engineering, Hosei University. His research interests include Max-plus algebra and Critical Chain Project Management.

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