Exact Optimal Solution of a Critical Chain Project Management Problem

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Abstract

A solution method is developed for obtaining an exact optimal solution for a Critical Chain Project Management scheduling problem. Critical Chain Project Management aims to adhere to a target due date as well as to shorten the makespan. The problem is both simple and practical, yet continues to interest scholars and practitioners given the potential for improved scheduling. The traditional approach for solving this problem is based on a compromising policy called "good enough". Since existing methodology can be reduced to a combinatorial problem, an optimal solution must exist for a project. Hence, our approach is to obtain the exact optimal solution based on minimizing the estimated makespan. Given reduced task processing times, precedence relations, and assigned tasks per each resource, we obtain the processing sequence for each resource. The problem is formulated as a mixed-integer linear-programming. An optimal solution can therefore be found using a general-purpose solver. Application to a scheduling problem is demonstrated to highlight the viability and performance of this approach.

Keywords

Critical-chain project management, good enough, combinatorial optimization, mixed-integer linear-programming, resource constrained project scheduling.

Biography

Hiroyuki Goto is a professor in the department of Industrial & System Engineering, Hosei University, Japan. He received his B.S. and M.S. degrees from The University of Tokyo in 1995 and 1997. He received his D.E. degree from Tokyo Metropolitan Institute of Technology in 2004. His research interests include operations research, geographic information science, and high-performance computing. He is currently a research scholar at the University of California at Santa Barbara.

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