UNIVERSITEIT GENT

FACULTEIT ECONOMIE EN BEDRIJFSKUNDE

TWEEKERKENSTRAAT 2
B-9000 GENT
Tel. : 32 - (0)9 – 264.34.61
Fax. : 32 - (0)9 – 264.35.92

WORKING PAPER

A Genetic Algorithm for the Multi-Mode Resource-Constrained Project Scheduling Problem

Vincent Van Peteghem [1]
Mario Vanhoucke [2]

January 2008

2008/494

[1] Faculty of Economics and Business Administration, Ghent University, Gent, Belgium
Vincent.VanPeteghem@UGent.be
[2] Faculty of Economics and Business Administration, Ghent University, Gent, Belgium
Operations & Technology Management Centre, Vlerick Leuven Gent Management School, Gent, Belgium
Mario.Vanhoucke@UGent.be

D/2008/7012/03

A Genetic Algorithm for the Preemptive and Non-preemptive Multi-Mode Resource-constrained Project Scheduling Problem

Vincent Van Peteghem[1] and Mario Vanhoucke[1,2]

[1]Faculty of Economics and Business Administration, Ghent University, Tweekerkenstraat 2, 9000 Gent (Belgium), vincent.vanpeteghem@ugent.be
[2]Operations and Technology Management Centre, Vlerick Leuven Gent Management School, Reep 1, 9000 Gent (Belgium), mario.vanhoucke@ugent.be

Abstract

In this paper we present a genetic algorithm for the multi-mode resource-constrained project scheduling problem (MRCPSP), in which multiple execution modes are available for each of the activities of the project. We also introduce the preemptive extension of the problem which allows activity splitting (P-MRCPSP). To solve the problem, we apply a bi-population genetic algorithm, which makes use of two separate populations and extend the serial schedule generation scheme by introducing a mode improvement procedure. We evaluate the impact of preemption on the quality of the schedule and present detailed comparative computational results for the MRCPSP, which reveal that our procedure is among the most competitive algorithms.