

A comparative approach of ant colony system and mathematical programming for task scheduling in a mineral analysis laboratory

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Abstract

This paper considers the problem of scheduling a given set of samples in a mineral laboratory, located in Barranquilla Colombia. Taking into account the natural complexity of the process and the large amount of variables involved, this problem is considered as NP-hard in strong sense. Therefore, it is possible to find an optimal solution in a reasonable computational time only for small instances, which in general, does not reflect the industrial reality. For that reason, it is proposed the use of metaheuristics as an alternative approach in this problem with the aim to determine, with a low computational effort, the best assignation of the analysis in order to minimize the makespan and weighted total tardiness simultaneously. These optimization objectives will allow this laboratory to improve their productivity and the customer service, respectively. A Ant Colony Optimization algorithm (ACO) is proposed. Computational experiments are carried out comparing the proposed approach versus exact methods. Results show the efficiency of our ACO algorithm.

Keywords

Ant colony optimization, Multi-objective optimization, Scheduling