

SUBJECT OF THESIS 2021 2022

Thesis title : TOWARDS AN EFFICIENT CONSIDERATION OF DIFFERENT OBJECTIVE FUNCTIONS IN CONSTRAINTS PROGRAMMING SCHEDULING MODELS.

Thesis director (s) : Doctoral school: I-MEP2

Beginning of thesis : Funding envisaged - Context - Possible partners :

Keywords: *Operational Research, Combinatorial Optimization, Scheduling, Constraints Programming.*

Brief Description:

A scheduling problem consists of organizing tasks over time, taking into account time constraints (deadlines, precedence constraints) and resource availability constraints. When solving a scheduling problem, one can choose between two main types of strategies: Finding a feasible or optimal solution.

The optimization approach assumes that the candidate solutions can be ordered according to one or more numerical evaluation criteria, called objective functions. Thus, we will seek to minimize or maximize such criteria. In practice, decision-makers frequently use different objective functions such as the flow-time, the weighted flow-time, or the maximum of regular functions (e.g. tardiness). Furthermore, the real objective of a scheduling problem is often a complex combination of several objective functions, and in many cases even a multi-criteria function. The work carried out in this thesis aims to complete and enrich the possibilities offered to decision-makers to define the objectives function of their scheduling problem.

The subject of this thesis is to develop new techniques in constraint programming to better schedule a disjunctive resource according to objective functions less studied, but frequent in practice: the flow-time; the weighted flow-time; maximum regular functions. That is important, as the resolution may become ineffective in optimizing these functions. Constraint programming is naturally more efficient for satisfying constraints (finding a solution) than for optimization (finding the best solution). The main objective is therefore to develop new dedicated techniques for these objective functions to optimize them efficiently based on the results in scheduling theory literature.

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