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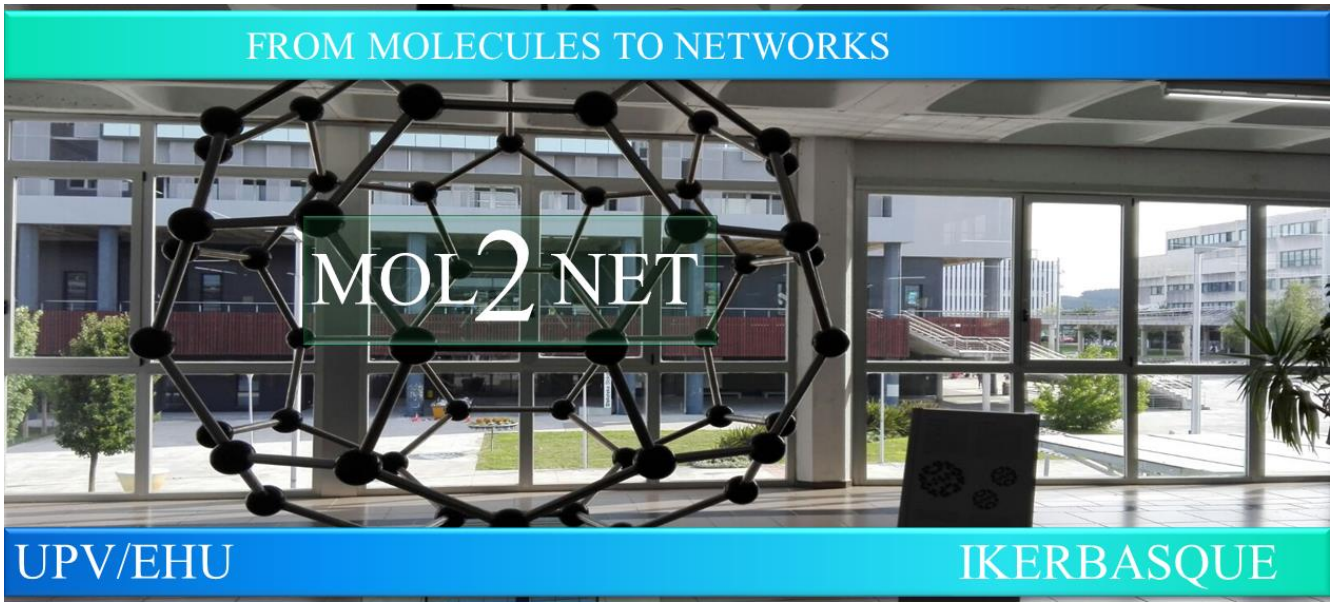

Exact and Metaheuristic methods for the Concrete Delivery Problem

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Graphical Abstract

Abstract.

A compact Mixed Integer Programming (MIP) model has been proposed to solve the problem identified in the literature as the Concrete Delivery Problem (CDP) at a first attempt. Additionally, a GRASP-type metaheuristic is presented.
In the literature, a few works deal with maximum time lag constraints, which are particularly challenging since even small changes in a solution can lead to infeasibilities and the process of constructing a solution often implies backtracking strategies.

A strategy based on a MIP formulation of the problem is proposed, seeking to reduce the number of variables involved in the problem, discretizing variables by vehicle type instead of by vehicle as in the model of Kinable et al., (2014), which was taken as a guideline. It is also proposed take advantage of modifying constraints of flow preservation, dividing them into two clique type constraints, which impact directly on the Cplex (IBM ILOG) solver performance when solving the model.
Moreover, a number of cuts are added in order to strengthen the bounds, improving the convergence to the optimal solution. The second approach in this work consists in the development of a GRASP metaheuristic. The further application of this approach is a consequence of the solution quality for larger-sized instances that could be improved, and the exact method fails in finding solutions in reasonable computation time.

Introduction *(optional)*

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Materials and Methods *(optional)*

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Results and Discussion *(optional)*

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Conclusions *(optional)*

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References *(mandatory)*

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