
Fundamentals for Real World Applications of Metaheuristics:
The vehicular case
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# Executive Summary

TITLE: **D3.5.2: A new seft-adaptive distributed algorithm for dynamic problems**

PAPERS RELATED:

- Khouadjia, M. R., Talbi, E. G., Jourdan, L., Sarasola, B., and Alba, E. (2013). Multi-environmental cooperative parallel metaheuristics for solving dynamic optimization problems. The Journal of Supercomputing, 63(3), 836-853.

ABSTRACT: In dynamic optimization problems, changes occur over time. These changes could be related to the optimization objective, the problem instance, or involve problem constraints. In most cases, they are seen as an ordered sequence of sub-problems or environments that must be solved during a certain time interval. The usual approaches tend to solve each sub-problem when a change happens, dealing always with one single environment at each time instant. We propose a multi-environmental cooperative model for parallel metaheuristics to tackle dynamic optimization problems. It consists in dealing with different environments at the same time, using different algorithms that exchange information coming from these environments. A parallel multi-swarm approach is presented for solving the Dynamic Vehicle Routing Problem. The effectiveness of the proposed approach is tested on a well-known set of benchmarks, and compared with other meta-heuristics from the literature.

GOALS:

1. Propose a multi-environmental cooperative algorithmic-level parallel model of meta-heuristics for solving DOPs.
2. Characterize its adaptive integration strategies, which should be designed to take into account a parallel solving of different sub-problems
3. Validate the approach in a well-known real-world problem (the Dynamic Vehicle Routing Problem).

CONCLUSIONS:

1. A multi-swarm meta-heuristic to solve the Dynamic VRP has been designed.
2. Several policies are given for the integration of the immigrant solutions into the different environments.
3. Experimental results show that our multi-environmental approach outperforms conventional meta-heuristics on this problem.

RELATION WITH PAST DELIVERABLES:

PRE: D3.5.1 (advisable reading)