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Introduction to the special issue on advances in vehicle routing and logistics optimization: heuristics

Christelle Guéret[1] · **Fabien Lehuédé**[2] · **Jorge E. Mendoza**[3] · **Olivier Péton**[2] · **Marc Sevaux**[4]

VeRoLog is the Working Group on Vehicle Routing and Logistics Optimization within EURO, the Association of the European Operational Research Societies. This special issue follows the VeRoLog 2016 conference organized in Nantes (France) and the VeRoLog special track on vehicle routing and logistics optimization at EURO 2016 in Poznan (Poland). The call for papers was separated in two parts. The first part is dedicated to heuristics, and the second to exact methods.

The VeRoLog community is rapidly growing and becoming increasingly active. For example, over 200 academics and professionals from 20 different nationalities attended the conference in Nantes in 2016. As part of its regular activity, VeRoLog also now organizes a dissertation prize, a summer school, and a significant number of streams and sessions at EURO conferences. In the last few years, the working group has also contributed to tightening the relationship between academia and industry. Examples of this accelerating collaboration

✉ Fabien Lehuédé
fabien.lehuede@imt-atlantique.fr

Christelle Guéret
christelle.jussien-gueret@univ-angers.fr

Jorge E. Mendoza
jorge.mendoza@univ-tours.fr

Olivier Péton
olivier.peton@imt-atlantique.fr

Marc Sevaux
marc.sevaux@univ-ubs.fr

[1] Université d'Angers, LARIS, Angers, France

[2] IMT Atlantique, LS2N, UMR CNRS, Nantes, France

[3] Université de Tours LIFAT, Tours, France

[4] Lab-STICC, Université Bretagne Sud, Lorient, France

include the solver challenges and the tutorials and brainstorming sessions featured in the annual conferences. VeRoLog also supports resource sharing initiatives such as the Vehicle Routing Problem Repository (http://www.vrp-rep.org). This special issue seeks to contribute to the expanding activity of the working group.

Since the seminal work on the Traveling Salesman Problem nearly 70 years ago, the community has made significant progress in heuristic optimization for vehicle routing and logistics. In recent years, new paradigms (e.g., matheuristics) have emerged and "pure" vehicle routing algorithms have been extended and generalized to solve larger, more integrated, and more realistic problems. For this special issue of the EURO Journal of Transportation and Logistics optimization, we have selected three original contributions that are clear examples of these advances.

First, Tommaso Bianconcini, David Di Lorenzo, Alessandro Lori, Fabio Schoen, and Leonardo Taccari introduce the concept of independent moves in vehicle routing problems (VRPs). In short, independent moves are those that can be simultaneously applied to a given solution without interfering with each other. The authors' underlying idea is that applying a set of independent (and improving) moves at each iteration of a local search algorithm yields better results than applying only one move (as is usually done in the literature). They use the capacitated VRP to illustrate the implementation of their concept in a tabu search and a ruin-and-recreate approach. They report computational experiments on two known sets of instances. Their results suggest that the independent moves' strategy enhances the performance of the heuristics, turning the two relatively simple algorithms into approaches that are competitive with state-of-the-art methods. We believe this paper opens interesting perspectives for VRP researchers as the concept of independent moves could be applied to several rich VRP variants and other logistics problems.

Next, in their paper, Thomas Borthen, Henrik Loennechen, Xin Wang, Kjetil Fagerholt, and Thibaut Vidal address an original vehicle routing problem arising from applied offshore supply planning. It is called the offshore supply vessel planning problem. This problem consists in determining the optimal size of a fleet of vessels, as well as their weekly routes and schedules, to supply offshore installations from an onshore depot. The authors present a new heuristic approach adapted from the hybrid genetic search with adaptive diversity control, already successfully applied to several VRP variants. The main novelty of the version proposed by the authors is its extension to tackle problems with routes lasting several days, which is common in maritime transport. The experiments done on real instances provided by the Norwegian State Oil Company suggest that the approach is very competitive and can solve industrial problems of realistic size.

Finally, Timothy Curtois, Dario Landa-Silva, Yi Qu, and Wasakorn Laesanklang present new results on the classical pickup and delivery problem with time windows. The authors report 142 new best solutions for the 354-instance testbed of Li and Lim. They propose a smart hybridization of three heuristic approaches: local search, large neighborhood search, and guided ejection search. Extensive experiments have been performed to analyze the individual

contribution of each component on the minimization of the number of vehicles used in solutions as well as on the total distance. All new best solutions have already been made available on the SINTEF website.

This special issue is the result of the work of many people. We would like to acknowledge the work of all the referees who contributed their time to review the 12 submissions we received. We also want to sincerely thank Michel Bierlaire for giving us the opportunity to prepare this issue, and for his valuable assistance and guidance during the process.