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EDITORIAL

Special Issue

Advanced OR Approaches for Transportation Network Analysis

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Guest Editor

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Rapidly rising fuel prices, consumption of dwindling resource, and economic recession have brought the issue of developing sustainable goods and passenger related transportation networks to the fore. Most such transportation networks are large scale networks making transportation network analysis one of the fields where operations research and computer technology meet. Transportation network analysis is a topic of importance not only from the point of view of researchers, scholars and practitioners but also has an impact on public user opinions. The most challenging aspect in transportation network analysis stems from the high complexity of the system itself, the intrinsic uncertainty and its dynamic nature, in terms of the goods, people and information involved in the network.

Transportation network analysis is concerned with the spatial and temporal movements of people and freight that are channeled through the network. This special issue has received several submissions tackling problems in different transportation networks. We invite at least two anonymous referees to review each submitted manuscript for guaranteeing the usual rigorous peer review process by this journal. Finally, five papers have been accepted for publication in this special issue. Three of them focus on problems in logistics/distribution networks while the other two address problems in traffic networks.

In "Myopic and Anticipated Planning in Stochastic Swap Container Management" by Huth and Mattfeld, the authors introduce the stochastic swap container problem for hub-to-hub shipments in hub-and-spoke networks. The operational problem is formulated as a general pickup and delivery problem while the tactical problem for swapping empty containers are balanced throughout the hub-network in order to match the stochastic demand in future periods. Four different integrated solution strategies in a myopic and anticipated way are proposed. Benchmark instances for vehicle routing problems with time windows are adopted for evaluating the proposed strategies. The authors observe that the model with more detailed stochastic information outperforms the expected value transportation model.

In "Hybrid MIP Method for a Pickup and Delivery Problem with Time Windows and Dock Service Constraints" by Fabian, the author proposes a mixed integer programming model for the pickup and delivery vehicle routing problem with time windows (PDP-TWDS) with the dock service capacity constraints. A three-stage solution approach is proposed. In the first stage the initial solution is constructed without considering the time windows and dock service capacity. The other two stages impose time windows and dock service constraints within a cut generation scheme. The author provides a number of examples with 100 single-haul vehicles and 500 transportation orders to illustrate the proposed algorithm.

In "Optimization of Coordinated Multi-Ramp Metering Control with Simultaneous Perturbation Stochastic Approximation (SPSA)" by Chien, Luo and Ting, the authors discuss coordinated ramp metering control for freeways. A dynamic model is developed to optimize metering rates for a series of on-ramps which maximize the total throughput, by the simultaneous perturbation stochastic approximation (SPSA) approach with real-time information. A calibrated microscopic traffic simulation model, CORSIM, is used with real world freeway data to evaluate the performance of the developed model. Results show that the total throughput of the studied freeway can be improved without increasing the total delay after implementing the coordinated optimal metering rates.

In "A Scheduling Approach for Autonomous Vehicle Sequencing Problem at Multi-Intersections" by Yan, Dridi and El Moudni, the authors study the autonomous vehicle sequencing problem at an intersection network

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with the consideration of vehicle to infrastructure communication. All vehicles are assumed to be equipped with an in-vehicle information system that can communicate with central intersection controller, and they can traverse the intersection autonomously when informed. The problem is decomposed into several vehicle sequencing problems at isolated intersections to minimize the number of late jobs and total tardiness. Each intersection is modeled as a special single machine scheduling problem with family jobs. The branch-and-bound approach and a heuristic for obtaining the upper bound are presented. Their algorithms are illustrated on various examples and show good performances.

In "A Multiple-Period Facility Location Model for Large-Scale Distribution Network Design Problems with Budget and Service Level Considerations" by Lin, Yang and Huang, the authors present a mixed integer programming model and a genetic algorithm heuristic procedure for locating facilities in each period such that the total cost is minimized. The budget in each period as well as service level constraints are considered. Various experiments are conducted and the results compared using LINGO. The results show that the proposed genetic algorithm can obtain the optimal solutions in all problems.

We sincerely thank all of the authors for submitting their original research results for consideration in this special issue, and all the referees for their valuable time and high quality reviews. We also appreciate the International Journal of Operations Research Editorial Office for their support and guidance.

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