Stochastic Travel Times in City Logistics Routing

Master Thesis

City logistics service providers (CLSP) are concerned with the efficient fulfillment of logistic operations in urban areas. Major tasks are the routing and scheduling of last-mile deliveries. CLSP are influenced by other traffic participants within the urban traffic infrastructure. Due to varying traffic loads and congestion, travel times generally are uncertain and differ during the day. To ensure cost-efficient routing while satisfying promised delivery dates, information on expected travel times and the variation variation of travel times between customers needs to be exploited.

The goal of this thesis is to implement and evaluate methods that allow the exploitation of stochastic travel time information within the city logistics routing. Therefore, appropriate methods from the domain of stochastic optimization[1] have to be identified and adapted. Further, appropriate input date has to be extracted from real-world traffic data and integrated into the optimization model.

Desired are programming skills (Java/Python) as well as a profound understanding of vehicle routing and statistics. The thesis can be written in English or German language.

If you have further questions feel free to contact me.

_____

Patrick-Oliver Groß, M.Sc.
Technische Universität Braunschweig
Business Information Systems
Decision Support Group

Mühlenpfordtstrasse 23
38106 Braunschweig, Germany
phone: +49 531 391-3216
E-Mail: `p.gross@tu-braunschweig.de`
`https://www.tu-braunschweig.de/winfo/team/gross`

References

Ehmke, J. F., Campbell, A. M., and Urban, T. L. (2015). Ensuring service levels in routing problems with time windows and stochastic travel times. *European Journal of Operational Research*, 240(2):539–550.

Gendreau, M., Laporte, G., and Séguin, R. (1996). Stochastic vehicle routing. *European Journal of Operational Research*, 88(1):3–12.

Taş, D., Gendreau, M., Dellaert, N., van Woensel, T., and de Kok, A. (2014). Vehicle routing with soft time windows and stochastic travel times: A column generation and branch-and-price solution approach. *European Journal of Operational Research*, 236(3):789–799.

---

[1]e.g., chance constrained programming or stochastic programming with recourse