Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

Ausschreibung: Abschlussarbeit am
Institut für Operations Management

Thema

The Price of Fairness in Routing Problems

Kurzbeschreibung

Dial-a-Ride service providers, such as MOIA, leverage flexible pickup points to significantly enhance operational efficiency. However, such flexibility transfers some inconvenience to customers, requiring them to travel to these pickup points. Providers compensate for this inconvenience through price discounts, balancing efficiency gains against potential revenue loss and perceived fairness among customers.

This thesis will investigate how fairness perceptions among customers influence optimal pricing and routing decisions in collaborative transportation systems. It will quantify the trade-off between achieving fairness (envy-free pricing) and maximizing revenue, known as the "price of fairness."

Research Objectives.

1. To formally define fairness in the context of collaborative pickup points, including proximity-sensitive envy-freeness.

2. To develop and analyze mathematical models for revenue optimization in routing problems both with and without fairness constraints.

3. To implement algorithms that estimate the price of fairness in a realistic transportation context.

4. To perform a comparative analysis illustrating how fairness constraints affect service provider revenue and customer satisfaction.

Depending on individual interests, this thesis could pursue various research paths ranging from behavioral approaches (such as customer surveys and experiments), applied optimization (implementing practical models and algorithms), to theoretical analyses. Research objectives can be tailored accordingly.

Zusätzliche Informationen

Bachelor / Master	Bachelor / Master
Betreuer	Julian Golak
Unternehmenspartner	-

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Forschungsfrage	What is the price of fairness in routing problems?
Methodik und Implementierung	Conceptual Modelling, Algorithm Design, Programming
Literaturhinweise	[1] Gambella, C., Naoum-Sawaya, J., & Ghaddar, B. (2018). The vehicle routing problem with floating targets: Formulation and solution approaches. *INFORMS Journal on Computing*, *30*(3), 554-569.
	[2] Zhang, W., Jacquillat, A., Wang, K., & Wang, S. (2023). Routing optimization with vehicle–customer coordination. *Management Science*, *69*(11), 6876-6897.
	[3] Guruswami, V., Hartline, J. D., Karlin, A. R., Kempe, D., Kenyon, C., & McSherry, F. (2005, January). On profit-maximizing envy-free pricing. In *SODA* (Vol. 5, pp. 1164-1173).
Sonstige Hinweise	-