JOHANNES GUTENBERG UNIVERSITÄT MAINZ

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Südwestworkshop für quantitative Methoden in der Betriebswirtschaftslehre

19.02.2010

Johannes Gutenberg-Universität Mainz

Programm:

Ab 09:30	Eintreffen der Teilnehmer, Willkommenscafe
10:00	*Begrüßung* Franz Rothlauf
10:10	*A Vehicle Routing Problem with Driver Learning* Michael Schneider TU Kaiserslautern
10:55	*Algorithmic Approaches to Revenue Management in Make-to-Stock Production* Yao Yang Universität Mannheim
11:40	*Hub Location and Hub Network Design* Sibel A. Alumur Karlsruher Institut für Technologie
12:25-14:00	Mittagspause
14:00	*Variants of the Shortest Path Problem* Lara Turner TU Kaiserslautern
14:45	*Systematischer Entwurf von heuristischen Optimierungsverfahren am Beispiel des OCST Problems* Wolfgang Steitz Universität Mainz
15:30	*Verabschiedung* Franz Rothlauf

Der Südwestworkshop findet im Hörsaal **RW3** statt. Der RW3 liegt im neuen Gebäude der Rechts- und Wirtschaftswissenschaftlichen Fakultät. Auf der letzten Seite finden Sie einen Lageplan. Der RW3 liegt neben dem Großhörsaal RW1, welcher im Lageplan eingezeichnet ist.

Bei Fragen wenden Sie sich bitte an Franz Rothlauf (rothlauf@uni-mainz.de), Jörn Grahl (grahl@uni-mainz.de) oder an Heike Kirsch (Tel.: 06131 39 22734).

10:10-10:55

A Vehicle Routing Problem with Driver Learning

Michael Schneider, TU Kaiserslautern

Motivated by an industry project, we consider the influence of driver familiarity with routes and customers on the routing operations of small package shipping companies. Driver familiarity can be achieved by means of fixed delivery districts for each driver, but this approach forfeits routing flexibility. Thus, if the value of routing flexibility increases, the solution quality of any approach based on such fixed delivery areas is likely to suffer. In today's small package shipping, flexibility is of particular importance due to a very high percentage of time-definite deliveries. Therefore, our routing method forgoes any fixing of delivery areas. Instead, our vehicle routing model explicitly considers individual driver knowledge by means of driver specific travel and service times. Thus, drivers have an incentive to stay in familiar areas due to shorter driving and service times while maintaining their flexibility. In this way, we can find an optimal trade-off between driver familiarity and routing flexibility. We develop an ant colony optimization method specifically tailored to the described routing problem and investigate its performance in numerical studies.

Notizen:

10:55-11:40

Algorithmic Approaches to Revenue Management in Make-to-Stock Production

Yao Yang, Moritz Fleischmann, Universität Mannheim

Revenue management (RM) originates from and gains great success in service industries, e.g. the airline, hotel and car rental businesses. However, its potential is also being recognized in other sectors, including manufacturing. In this project, we consider RM approaches for a make-to-stock production system with known exogenous replenishments and multiple customer classes. In previous research, deterministic linear programming (DLP) and stochastic dynamic programming models have been developed to deal with the order acceptance problem of the MTS production system. However, both of them have their limitations. The DLP model considers only expected demand and neglects demand uncertainty, while the stochastic dynamic program is computationally expensive and therefore hardly scalable. In this presentation, we first discuss potential directions of algorithmic approaches which may help overcome the limitations of the above methods. Subsequently, we elaborate in more detail on one of these approaches, namely incorporating safety margins into the deterministic linear programming model to account for uncertainty. The basic idea is analogous with that of safety stocks, i.e. to reserve more stock than expected demand as "safety margin" for more profitable customers. We use an expected marginal seat revenue (EMSR) heuristic to calculate safety margins and integrate them into the DLP calculation. The results of our numerical study suggest that the DLP model with safety margins is not only efficient to solve but also improves the performance of a pure DLP model.

Notizen:

11:40-12:25

Hub Location and Hub Network Design

Sibel A. Alumur, Karlsruher Institut für Technologie

Hubs are special facilities that serve as switching, transshipment, and sorting points in many-to-many distribution systems. The hub location problem deals with finding the location of hub facilities and allocating the demand nodes to these hub facilities so as to effectively route the demand between origin–destination pairs. Hub location problems arise in various application settings in telecommunication and transportation. In the extensive literature on the hub location problem, it has widely been assumed that the subgraph induced by the hub nodes, the hub network, is complete. In this talk, hub location problems are approached from a network design perspective. In addition to the location and allocation decisions, we also study the decision on how the hub network must be designed. In this context, we introduce the multimodal hub location and hub network design problem. In this problem, we jointly consider transportation costs and travel times, which are studied separately in hub location problems presented in the literature. We include the possibility of using different hub links, and allow for different transportation modes between hubs, and for different types of service time promises between origin–destination pairs, while designing the hub network in the multimodal problem. A linear integer programming model is proposed together with some sets of effective valid inequalities and an efficient heuristic. Lastly, computational analysis is presented on the Turkish network data set.

Notizen:

14:00-14:45

Variants of the Shortest Path Problem

Lara Turner, Horst Hamacher, TU Kaiserslautern

Sorting the edges along path P by non-increasing costs, we introduce the universal shortest path problem which is of sum type and associates a multiplicative weight λ_i with the i-largest cost edge of path P. For weights chosen from {0,±1}, our model generalizes many shortest path objective functions such as sum, bottleneck or balanced objective. Pointing to the differences between classical and universal shortest paths, we study further variants of the (universal) shortest path problem among which we focus on the so-called $(k+l)$-trimmed-mean problem. In this variation, the k largest and l smallest cost edges in path P are ignored while the costs of the remaining edges are added up in the objective function. Applying results of Gupta and Punnen (1990), Punnen and Aneja (1996) and Gorski and Ruzika (2009) on k-sum and k-max optimization, this problem can be solved in polynomial time by a sequence of special constrained shortest path problems.

Notizen:

14:45-15:30

Systematischer Entwurf von heuristischen Optimierungsverfahren am Beispiel des OCST Problems

Wolfgang Steitz, Universität Mainz

Facing the task of solving a hard, real-world optimization problem, it is likely that this problem is too hard to be solved by exact approaches. Using metaheuristics we are able to find high-quality solutions for those hard problems. But often this is only true for small problem instances. Confronted with larger, real-world instances metaheuristic do not perform well out-of-the box. Wolpert and Macready [Wolpert1997] explain this observation with their no-free-lunch theorem, which says that efficient problem solving is not possible without making problem-specific assumptions about the problem's structure. Correspondingly, problem-specific adaptation of a metaheuristic allows us to overcome these limitations and to build high-quality problem solvers.

For most problems we have only little, if any, a priori knowledge of the structure of good solutions. Logically, the first design step would be to analyze the problem thoroughly and collect as much knowledge as possible before developing a metaheuristic. But often this step is neglected and problem-specific adoptions are made based on assumptions or even by accident.

The optimal communication spanning tree (OCST) problem [Hu1974] is an example of such an hard optimization problem. It is a combinatorial problem and seeks a spanning tree that satisfies some communication requirements at minimum total costs. In this paper we present relevant graph properties for analyzing a tree optimization problem like the OCST problem. We use those properties to perform an in-depth analysis of high-quality solutions. Then, we make use of the gained knowledge to systematically design metaheuristic which extend existing approaches.

Notizen:

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Anreise mit öffentlichen Verkehrsmitteln

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Die folgenden Buslinien fahren die Haltestellen der Universität an:

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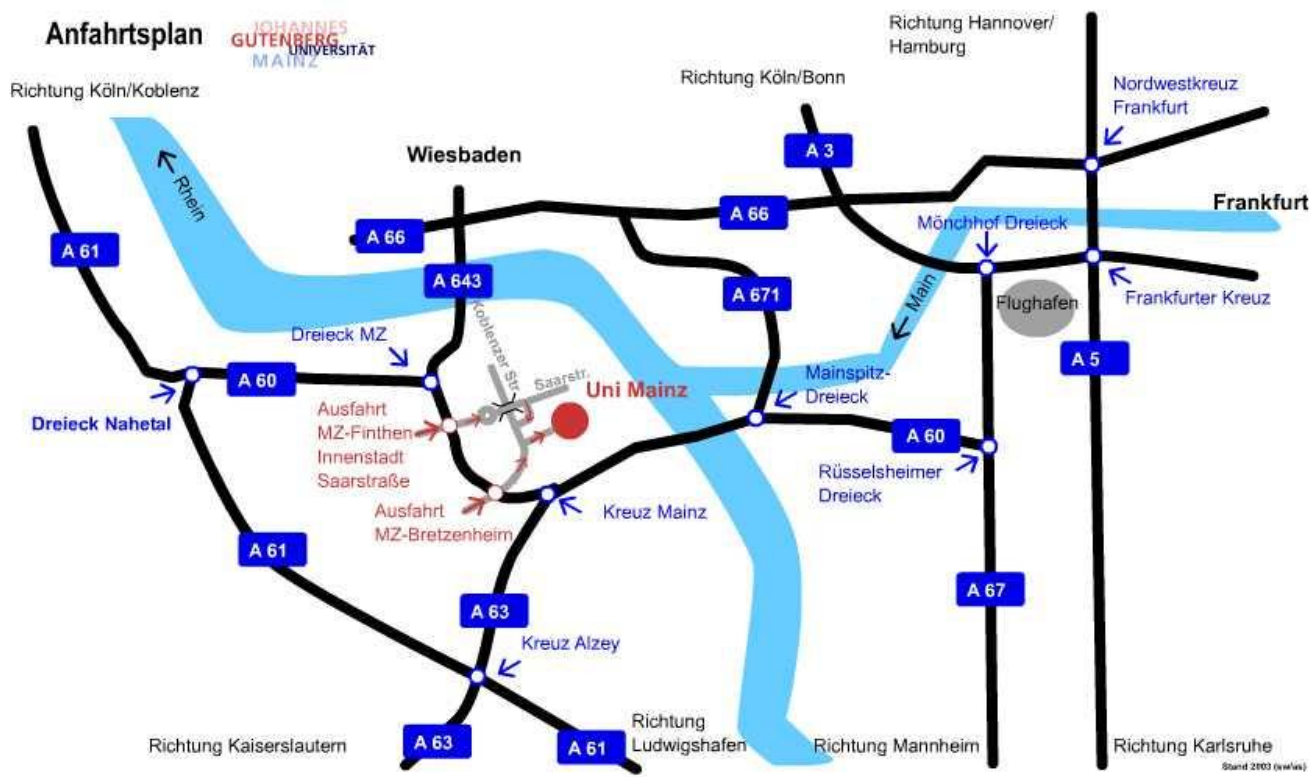

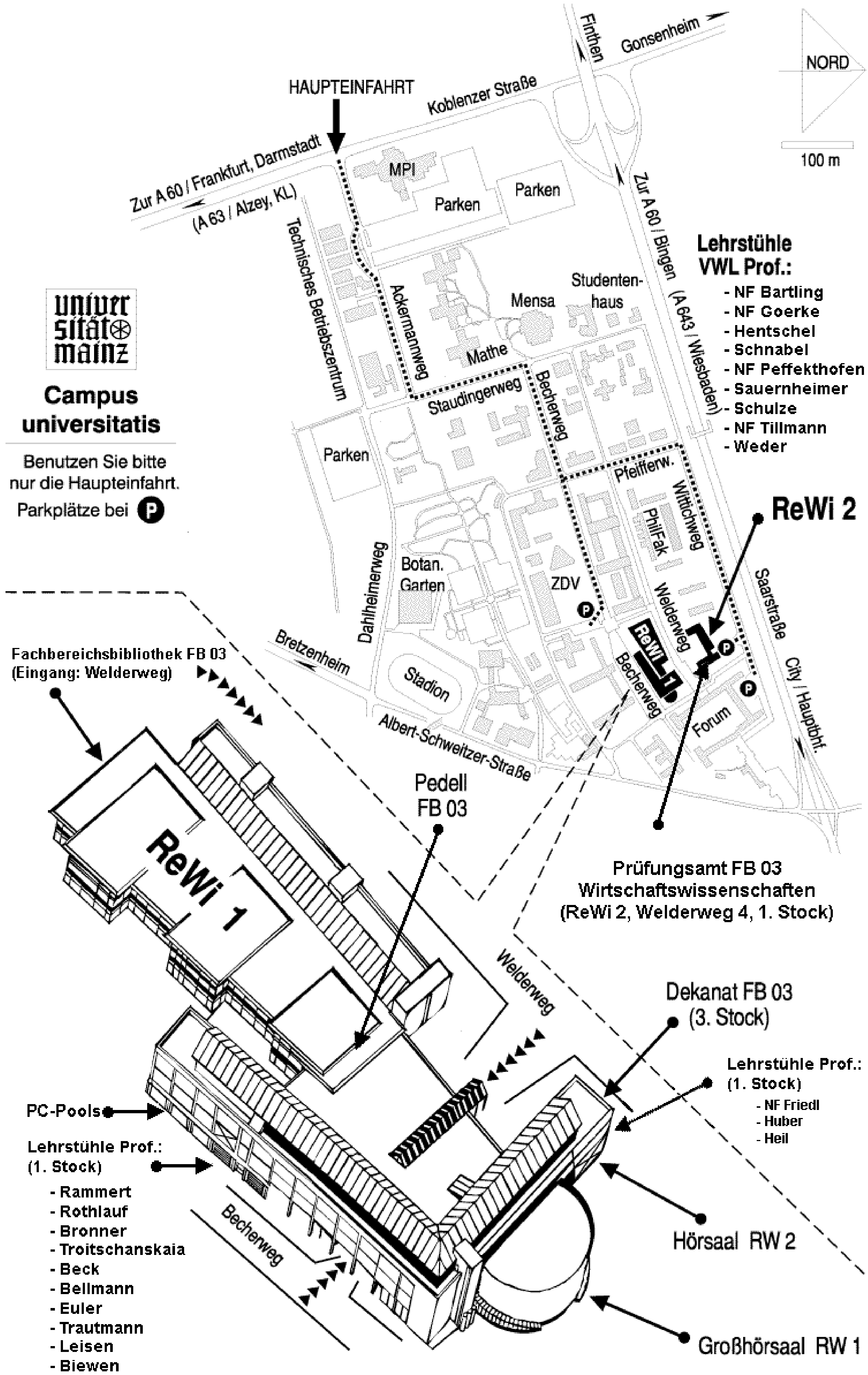

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