

A cordial invitation to the opening talk of the  
Brown Bag Seminar  
*Recent Developments in Data Science:*

**Combined Dynamic Programming and Integer  
Programming for Solving NP-hard Variants of the  
Picker Routing and Order Batching Problem**

By  
Prof. Dr. Stefan Irnich

Date: 01.02.2024 (Thursday) at 12:00

Location: SR 027 WIWI

Link and further  
information: Course 39740 Seminar: Doctoral Seminar "Recent  
Developments in Data Science" in Stud.IP

**Abstract:**

Warehouse activities include receiving, storing, picking, packing, and shipping operations. We address order picking, which is the process of retrieving inventory items from their storage locations in response to specific customer requests. More than 80 percent of all order-picking systems in Western Europe are manual (non-automated) low-level picker-to-parts picking systems, where pickers move through the warehouse in order to retrieve articles from the storage locations (picker-to-parts). In this context, the single picker routing problem (SPRP) is the basic routing problem and seeks for a minimum-length picker tour given the warehouse layout and the pick locations from where items must be collected. We show that the well-known dynamic-programming approach of Ratliff and Rosenthal can be extended and modified to model and solve NP-hard problems that have the SPRP as a subproblem. In particular, we consider warehouses with scattered storage and order batching problems as such hard optimization problems.

**Speaker:**

Prof. Dr. Stefan Irnich

Stefan Irnich is a Full Professor of Logistics Management at the Gutenberg School of Management and Economics, Johannes Gutenberg University Mainz, Germany. He is an associate editor of *Transportation Science*, a member of the editorial board of the *EURO Journal on Transportation and Logistics*, and a member of the editorial advisory board of *Computers and Operations Research*. His research interests include the development and application of optimization methods to solve problems in logistics and transportation, network design, and algorithmic graph theory. Over the years, his research has focused on mathematical programming decomposition methods and also on modeling and solving rich vehicle-routing problems.