V**OR** träge zum Operations Research

Kolloquium des Instituts für Operations Research

Zeit:	Dienstag, 01. Juli 2025, 16:00 – 17:00 Uhr
Ort:	**Raum 4A-21.1, Gebäude 05.20**
Es sprechen:	Prof. Dr. Tanka Nath Dhamala Former Head, Central Department of Mathematics, Tribhuvan University
	Hari Nandan Nath Junior Researcher/Investigator, Assistant Professor at Bhaktapur Multiple Campus, Tribhuvan University

Zu den Themen:

Efficient Network Flow Approaches for Speed-Adjusted Congestion Reduction
Tanka Nath Dhamala (joint work with Durga Prasad Khanal and Stefan Nickel)

Finding an efficient solution to a general dynamic flow problem is a challenging task, both from theoretical and computational viewpoints. It is even more critical if a prompt response is required, in scenarios of emergency traffic movements, where heavy congestion occurs. This work is motivated by traffic congestion on saturated arcs of a network. We propose a twofold framework to address this issue. In the first stage, we adjust the speeds of the congested segments while keeping the rest of the network unchanged [Dhamala-Khanal-Dempe, Annals of Operations Research 347(3), 2025]. In the second stage, we optimize the allocation of a limited budget to expand selected portions of the congested segments, while simultaneously reducing travel times on the remaining arcs where no budget is allocated.

The problems, with and without contraflow, with and without intermediate storage of the excess flow are modeled, polynomial time algorithms are presented and proven their validity. If flow units are pushed outward from the source at maximum capacity but are unable to reach the destination due to limited forward network capacity or a restricted permissible time window, they are subsequently transshipped through the downstream network to reach their destinations.

Bicriteria Network Flow Location Modeling Maximizing the Total Utility of Facilities

Hari Nandan Nath (joint work with Tanka Nath Dhamala and Stefan Nickel)

If an assignment of facilities to an arc of a network reduces the capacity of the arc, there may be a reduction in the value of the flow or an increase in the egress time of the flow. Given a directed network with capacity and transit time on arcs, a set of facilities with given sizes and utilities, and a set of arcs to assign the facilities, this work focusses on optimal placement of facilities to maximize the value of the flow and simultaneously maximizing the total utility of the facilities placed. Formulating the problem as a bicriteria optimization problem, we propose an epsilon-constraint-based algorithm to obtain exact Pareto optimal solutions and develop an NSGA-II-based approach to generate non-dominated solutions that move closer to the true Pareto front over generations. Through computational experiments on the road network of Bhaktapur city, Nepal with 502 nodes and 1354 arcs, we find that the epsilon-constraint method is practical for up to about 250 facilities to be placed on about 100 arcs. The NSGA-II algorithm is more efficient for larger problem instances, where the epsilon-constraint method either becomes too time-consuming or the MILP solver used in its subroutines fails to deliver a solution.

Die Vorträge zum Operations Research wenden sich an alle Interessierten!

Bei Rückfragen wenden Sie sich bitte an:
Prof. Dr. Stefan Nickel, Institut für Operations Research