Special issue on "Modelling passenger flows in multi-modal public transport systems"

Public transport services are constantly transforming resulting with a mosaic of passenger services that call for the development of innovative approaches to adequately model the passenger flows in this complex environment. Given a graph representation of a public transport network and a matrix that reflects the estimated origin-destination demand, public transport assignment models describe how passenger flows are distributed over the respective services. Public transport assignment models are commonly categorized into frequency-based and schedule-based models - differing in their network supply representation and their implications on the passenger loading procedure. Passengers are assigned to common line corridors in frequency-based models while schedule-based models assign passengers to specific vehicle trips.

Since their introduction in the last 1980s, public transport assignment models have undergone a series of advancements to incorporate key system phenomena such as comfort, capacity constraints, information and service reliability. This special issue on Modelling Passenger Flows in Multi-Modal Public Transport Systems is dedicated to methodological and theoretical developments that focus on further advancing the state-of-the-art of public transport flow models while considering the whole journey passenger perspective in a multi-modal context. The call was made in conjunction with the ERA-NET TRANS-FORM project and hEART2018 (7th Symposium of the European Association for Research in Transportation). This special issue is comprised of two papers that develop advanced public transport assignment models to consider users' access to real-time information while applying capacity constraints and the development of an assignment model that combines both frequency- and scheduled-based approaches to allow for modelling mixed networks.

The increasing availability of real-time information changes the way passengers make travel choices in public transport systems. In "A Frequency based Transit Assignment Model that Considers Online Information and Strict Capacity Constraints" Oliker and Bekhor develop a flow distribution model that not only accounts for access to information concerning vehicle arrival times but also about downstream on-board occupancy conditions. They adopt a frequency-based assignment approach and propose a heuristic method that starts from the unconstrained solution and thereafter iteratively reassigns the so-called surplus of flows that exceeded the service capacity in the previous iteration. They then investigate the impacts of different information provision scenarios on passenger flow (re)distribution.

While public transport assignment models are divided into either frequency- or schedule-based, in reality public transport systems often constitute a combination of high-frequency and low-frequency services. This calls for the development of models that allow for their joint representation as the one proposed in "An Assignment Model for Public Transport Networks with both Schedule- and Frequency-based Services" by Eltved, Nielsen and Rasmussen.[1] The authors formulate a network representation, choice-set generation and route choice modelling steps that allow accommodating mixed services, along with the respective consequences for passenger waiting times. They apply their model to the Greater Copenhagen area and compare the model results to those obtained by models that adopt a strictly frequency-based or strictly schedule-based approaches.

The papers included in this special issue provide methodological advancements to the state of the art of passenger flow modelling in multi-modal public transport systems. We thank the authors for their contributions and the referees for their thorough reviews. We also thank the journal's editor-in-chief, Prof. Michel Bierlaire, for his support throughout this process.

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[1] This paper was mistakenly published in volume 8(5) of the journal.