IWCTS 2022

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Computational Transportation Science

(IWCTS'22)

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FOREWORD

The 15th International Workshop on Computational Transportation Science (IWCTS 2022) is particularly timely given the prominence of human mobility data, such as probe data from cell phones and connected automated vehicles, volunteered geographic information, and other sensing data. This unprecedented access to sensing data of mobility, and of integration of this analytics into smart cities management has led to innovations in intelligent transportation systems, building information management, and urban planning. Due to the scale of the data, these developments are deeply computational.

We will build upon the success of previous workshops to continue to focus on computational approaches for (not limited to):

1. **Sustainability**: Socioeconomic and environmental impact, mitigation strategies (e.g. emission analysis and reduction, decarbonization, alternative fuels, transportation equity, and environmental justice.
2. **Smart City Operations:** Resiliency during extreme weather events (e.g. floods, tornadoes, etc), Intelligent Transportation Systems (ITS), Connected and Autonomous Vehicles (CAVs), Building Information and Energy Modeling (BIM/BEM), electric grid management, decision support, and optimization.
3. **Infrastructure Sensing**: Digital Twin technologies, urban sensing infrastructure, edge computing, Internet of Things (IoT) devices.
4. **Human Dynamics Analysis**: Modeling and simulation of population and freight movements, dynamic routing algorithms, computational traffic flow models and control algorithms, and the role of transportation in the smart city.

This year we received 18 paper submissions out of which 2 were withdrawn. The remaining 16 papers went through the rigorous peer-review process. After the peer-review process, we selected 14 papers (8 full papers, 4 short papers, 1 demo paper, and 1 position paper) for the presentation at the workshop. The workshop program has one keynote talk Dr. Rajesh Paleti, an expert in human behavior modeling.

Since this year's workshop is a primarily in-person workshop with some hybrid participation due to travel restrictions. We have presenters from several different time zones, and we did our best to accommodate reasonable presentation times for them during our workshop. The coffee breaks will be catered by the conference. During the lunch break, each participant will be responsible for acquiring their own lunch, but we encourage the formation of groups for joint lunches. Furthermore, we have added a social gathering at the end of the day, which we would like to serve as an opportunity for all workshop participants to get to know each other and discuss future collaborations.

We hope you enjoy this workshop.

Andy Berres
Kuldeep Kurte
Haowen Xu

KEYNOTE

Title: A Multi-Commodity Air Freight Origin-Destination Demand Analysis

ABSTRACT

Increasing volumes of air freight have created new challenges for airports and the cities and regions that house them, necessitating the development of models that are better able to estimate demand. This paper presents a novel analytical framework to forecast air freight tonnage by commodity type between an origin-destination (OD) pair as a function of socio-demographic composition, employment by industry type, economic conditions, and airport density at the two ends of that OD pair. The proposed framework is comprised of three modeling components - (1) a binary selection model to determine OD pairs with non-zero demand in at least one commodity category, (2) a stochastic frontier model to analyze total air freight demand across all commodity types while accounting for inefficiencies in the system that may reduce the maximum output (i.e., demand), and (3) a demand composition that allocates the total demand across different commodity types. Each of these models was estimated using the 2017 Freight Analysis Framework (FAF) data. To evaluate the efficacy of this tool in practice a policy analysis was undertaken to quantify the air freight demand changes in the region surrounding the Dallas Fort-Worth International Airport under different scenarios. The results of this case study demonstrate the practical applicability of the proposed framework to a large international airport.

BIOGRAPHY

Rajesh Paleti is a Senior Research Scientist at Amazon and has 10+ years of experience in statistical inference, applied econometrics, and machine learning. His work includes several fundamental methodological contributions to discrete choice analysis consistent with utility-based microeconomic theory of consumer behavior. Rajesh is passionate about building data-driven models of human behavior informed by latest developments in data science, economics, and psychology literature. Rajesh published 50+ journal articles with 2,400 citations in leading econometrics journals. Prior to joining Amazon, Rajesh worked as a Research Scientist at Oak Ridge National Laboratory and Assistant Professor at Pennsylvania State University and Old Dominion University. Rajesh graduated from the University of Texas at Austin with a doctoral degree in Civil Engineering.

SCHEDULE

All times are given in Pacific time as the conference is taking place in Seattle, Washington.

8:00-9:00	**Breakfast**
9:00-9:10	**Opening Remarks**
Session 1: Ride Sharing and Public Transportation	
9:10-9:25	PoolLines: Modeling Carpooling as Ephemeral Lines in GTFS for effective integration with Public Transit *Youssef Chaabouni, Andrea Araldo, André de Palma and Souhila Arib*
9:25-9:40	A graph-database approach to assess the impact of demand-responsive services on public transit accessibility *Cathia Le Hasif, Andrea Araldo, Stefania Dumbrava and Dimitri Watel*
9:40-10:00	Assessing micro-mobility services in pandemics for studying 10-minutes cities concept in India using geospatial data analysis: an application *Sumit Mishra, Devanjan Bhattacharya, Atanshi Chaturvedi and Nikhil Singh*
10:00-10:20	Learn2Pool: Efficient and Effective Ride Assignment in Ride Sharing Systems *Ryan Cheng, Sylvakumar Jayaraman, Robert Fitzgerald and Farnoush Banaei-Kashani*
10:20-10:50	**Coffee Break**
Session 2: Freight Analysis	
10:50-11:50	**Keynote** "A Multi-Commodity Air Freight Origin-Destination Demand Analysis" *Rajesh Paleti*
11:50-12:10	Extracting Journeys from Truck GPS Traces *Bo Xu, Rohit Gupta, Basel Hashisho, Reinhard Köhn and Sebastian van de Hoef*
12:10-14:00	**Lunch Break** (not catered)
Session 3: Trajectories and Routing	
14:00-14:20	Deep Classification of Frequently-Changing Activities from GPS Trajectories *Emre Eftelioglu, Gil Wolff, Tejaswi Nimmagadda, Vishal Kumar and Amber Roy Chowdhury*
14:20-14:40	Optimizing Crowdsourced Delivery Routes Through Concurrent Selection of Pickup Stores and Drivers *Oscar Correa, Egemen Tanin, Kotagiri Ramamohanarao, Lars Kulik, Arkady Zaslavsky and Hairuo Xie*
14:40-14:55	BikeVibes: An App for Crowdsourcing Open Road Quality Data From a Cyclist Perspective *Kai Luedemann and Mario Nascimento*
14:55-15:10	Solving a Multi-Trip VRP with Real Heterogeneous Fleet and Time Windows based on Ant Colony Optimization: An Industrial Case Study *Jihee Han, Arash Mozhdehi, Yunli Wang, Sun Sun and Xin Wang*
15:10-15:30	Applying Network Kernel Density Estimation and Temporal Network Kernel Estimation for Generating Safer Routes *Antonios Karatzoglou*
15:30-16:00	**Coffee Break**
Session 3: Smart Cities and Electrification	
16:00-16:15	Revolutionizing Electric Vehicle Management: Spatial Computing Challenges and Opportunities *Hyeonjung Jung, Mingzhou Yang, Matthew Eagon and William Northrop*

16:15-16:35	Speed and Energy Consumption for Electrical Vehicles *Rodrigo Sasse David, Esteban Zimányi, Kristian Torp and Mahmoud Sakr*
16:35-16:55	Efficient On-Street Parking Sensor Placement *Lukas Rottkamp, Matthias Schubert and Niklas Strauß*
16:55-17:10	Group Anomaly Detection for Spatio-Temporal Collective Behaviour Scenarios in Smart Cities *Andreas Lohrer, Johannes Josef Binder and Peer Kröger*
17:10-17:20	**Closing Remarks**
17:20-18:00	**Social**

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