Scanning the Issue and Beyond: Real-Time Social Transportation with Online Social Signals

MANY OF the papers published in this issue are from a special issue on "Uncertainty in Computational Traffic Models." I would like to thank our Guest Editors, Dr. Vincenzo Punzo, University of Naples Federico II, Italy; Dr. Mark Brackstone, IOMI, Southampton, U.K.; and Dr. Constantinos Antoniou, National Technical University of Athens, Greece, for their hard work and great effort. Please check @IEEE-TITS (http://www.weibo.com/u/3967923931) in Weibo (an extended Chinese version of Twitter), https://www.facebook.com/IEEEITS in Facebook, and @IEEEITS (https://twitter.com/IEEEITS) in Twitter for any news regarding IEEE ITSS, IEEE TRANSACTIONS ON INTELLIGENT TRANSPORTATION SYSTEMS, and *IEEE Intelligent Transportation Systems Magazine*. The three sites are still under development and your participation and suggestions are extremely welcome. As for my thought on a new direction in transportation research, here I will discuss an emerging and important area: social transportation in the age of big data.

SCANNING THE ISSUE

An Axiomatic Design Approach to Passenger Itinerary Enumeration in Reconfigurable Transportation Systems

A. Viswanath, E. E. Samano Baca, and A. M. Farid

Axiomatic design is utilized to develop a theory for reconfigurable systems and operations in transportation. The methodological developments are then demonstrated on a small subsection of the Mexico City transportation system to demonstrate its wide ranging utility in reconfigurability decision-making at the planning and operations time scales. Further comparisons of axiomatic design to traditional graph theory are made, indicating the mathematical basis of the former in the latter.

Generation of a Precise Roadway Map for Autonomous Cars

K. Jo and M. Sunwoo

A map-generation algorithm for autonomous cars is constructed in three steps: 1) data acquisition; 2) data processing; and 3) road modeling. In step 1), raw trajectory and motion data are acquired through exploration using a probe vehicle. Step 2) then processes the acquired data into roadway geometry data. In step 3), the fixed-interval optimal smoothing theory and a gradual correction algorithm are used to improve the accuracy, continuity, and reliability of road geometry data. The proposed algorithm is evaluated through experimental studies that show the generated map is sufficiently accurate and reliable for autonomous driving.

Energy-Efficient Locomotive Operation for Chinese Mainline Railways by Fuzzy Predictive Control

Y. Bai, T. K. Ho, B. Mao, Y. Ding, and S. Chen

This study develops a fuzzy predictive control approach, continuously providing locomotive operation instructions, with respect to the prevailing speed limits, to reduce energy consumption of train movement. The proposed approach is implemented in an on-board decision support system to assist drivers. The system is tested on the Ning'xi line in China, and the results indicate that energy consumption on train operation is reduced by 4% while the computational requirement satisfies the demand of real-time solutions.

COTraMS: A Collaborative and Opportunistic Traffic Monitoring System

J. G. Ribeiroz, Jr., M. E. M. Campista, and L. H. M. K. Costa

A Collaborative and Opportunistic Traffic Monitoring System (COTraMS) is proposed for traffic monitoring with available IEEE 802.11 networks, and a prototype is built to evaluate its performance. Measurements from a real public wireless network in Rio de Janeiro demonstrate the possibility of obtaining traffic conditions with COTraMS. In addition, COTraMS is analyzed via simulation in scenarios with larger number of vehicles. Results using a simple architecture and a small amount of network bandwidth show high accuracy in detecting both vehicle positions and road conditions.

Using a Head-up Display-Based Steady-State Visually Evoked Potential Brain–Computer Interface to Control a Simulated Vehicle

L. Bi, X. Fan, K. Jie, T. Teng, H. Ding, and Y. Liu

A new Steady-State Visually Evoked Potential (SSVEP) brain–computer interface (BCI) with visual stimuli presented on a windshield via a head-up display is proposed and applied in conjunction with alpha rhythm for controlling a simulated vehicle. The classification models of the SSVEP BCI with three commands are built by using Support Vector Machine. A real-time brain-controlled simulated vehicle is developed and tested by using four participants to perform a driving task online. The experiments show the feasibility of using the human "mind" alone to control a vehicle.

Using Delayed Observations for Long-Term Vehicle Tracking in Large Environments

M. Shan, S. Worrall, F. Masson, and E. Nebot

Algorithms for long-term vehicle motion estimation are proposed with a model that incorporates the properties of the working environment and information collected by other mobile agents and fixed infrastructure collection points. A limited

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number of data collection points distributed around the field are used to update the estimates, with negative information also used to improve the prediction. Experimental results from a typical large-scale mining operation are presented to validate the algorithms.

Overcoming Drowsiness by Inducing Cardiorespiratory Phase Synchronization

I. Takahashi, T. Takaishi, and K. Yokoyama

The key to overcoming drowsiness is to keep the body constantly supplied with oxygen, and cardio-respiratory phase synchronization (CRPS) offers a way to recover from oxygen desaturation during drowsiness. This study finds it possible to induce CRPS by paced breathing (PB) using pulse sound synchronized with heartbeats. The experiments show SpO2 measured from forehead increased during this PB, which is larger than that of yawns, deep breathing, or a period of drowsiness reduced spontaneously. In conclusion, inducing CRPS by PB has the potential to reduce drowsiness physiologically.

An Agent-Based Microscopic Pedestrian Flow Simulation Model for Pedestrian Traffic Problems

S. Liu, S. Lo, J. Ma, and W. Wang

This paper introduces CityFlow, an agent-based microscopic pedestrian flow simulation model. Typical pedestrian flow phenomena, including the unidirectional and bidirectional flow in a corridor as well as the flow through bottlenecks, are simulated and further compared with empirical study results. The comparison reveals that the model can approach the density–speed fundamental diagrams as well as the empirical flow rates at bottlenecks within acceptable system dimensions. The simulation of the bidirectional pedestrian flow also shows that the model can reproduce the lane formation phenomenon.

A Particle-Based Solution for Modeling and Tracking Dynamic Digital Elevation Maps

R. Danescu and S. Nedevschi

This paper describes a novel approach for modeling the dynamic 3-D driving environment, the particle-based dynamic elevation map. The dynamic elevation map is represented by a population of particles, each particle having a position, a height, and a speed. Particles move from one cell to another based on their speed vectors, multiplied or destroyed using an importance-resampling mechanism, which is driven by the measurement data provided by a stereovision sensor. The proposed model is highly descriptive for the driving environment and is proven robust and accurate in real driving scenarios, by comparison with ground truth data.

Energy-Sustainable Traffic Signal Timings for a Congested Road Network With Heterogeneous Users

X.-Y. Ge, Z.-C. Li, W. H. K. Lam, and K. Choi

This paper proposes a novel model to address the energy-efficient traffic signal timing problem for a congested road network with heterogeneous users. To model the route choice behavior of heterogeneous users, a multiclass stochastic traffic network equilibrium problem that considers vehicle delays at signalized intersections and travel demand elasticity is described and formulated as a variational inequality. A simulated-annealing-based solution algorithm is developed to solve the proposed model. The findings show that the implementation of the fuel surcharge policy can cause spatial and social inequity issues.

Modeling and Simulating a Narrow Tilting Car Using Robotics Formalism

S. Maakaroun, W. Khalil, M. Gautier, and P. Chevrel

A narrow urban tilting car, which should significantly decrease traffic congestion, pollution, and parking problem, is modeled and simulated. The modified Denavit and Hartenberg description, commonly used in robotics, is used by considering the vehicle as a mobile robot composed of a multibody polyarticulated system where the terminal links are the wheels. This allows calculating automatically the symbolic expressions of the geometric, kinematic, and dynamic models. A simulator is developed with MATLAB/Simulink, and the simulation of different scenarios is performed and analyzed.

Intelligent Trip Modeling for the Prediction of an Origin–Destination Traveling Speed Profile

J. Park, Y. L. Murphey, R. McGee, J. G. Kristinsson, M. L. Kuang, and A. M. Phillips

An Intelligent Trip Modeling System (ITMS) is developed to predict the traveling speed profile for a selected route based on the traffic information available at the trip starting time. The ITMS contains neural networks to predict short-term traffic speed and was trained and evaluated by using traffic data provided by California and Michigan. Experiments show that ITMS is capable of providing accurate predictions of dynamic traffic changes and traveling speed at the beginning of a trip and can generalize well to prediction of speed profiles on the routes other than that the system was trained on.

Research on a DSRC-Based Rear-End Collision Warning Model

X. Xiang, W. Qin, and B. Xiang

Problems in rear-end collision warning systems based on Dedicated Short-Range Communication are addressed without using expensive high-end devices. Simulations have shown that high rates of missing alarms occur in the Vehicle Kinematics model, as well as false alarms in the Vehicle Kinematics with Maximum Compensation model. Pertaining to these rates, a novel model based on neural network is implemented and is able to provide emergency warnings with an improved performance of false-alarm probability under 20%, and the missing alarm probability under 10% for all test cases.

Multilevel Modeling of the Traffic Dynamic

P. Kumar, R. Merzouki, B. Conrard, V. Coelen, and B. O. Bouamama

Here is a multilevel model of traffic: At the submicroscopic level a bond graph model of a four-wheeled vehicle, at the microscopic level a car-following model based on virtual interconnection between the submicroscopic bond graph models of vehicles, then, at the macroscopic level, macroscopic variables from the submicroscopic and microscopic models are deduced. This allows combining two properties of modeling simulation, one in real-time mode at microscopic and submicroscopic levels and the other at offline mode at macroscopic level.

Thus, the whole supervision of the road traffic can be performed. Simulations and experiments are performed for model validating.

Finite-State Markov Modeling for Wireless Channels in Tunnel Communication-Based Train Control Systems

H. Wang, F. R. Yu, L. Zhu, T. Tang, and B. Ning

A finite-state Markov channel (FSMC) model for tunnel channels in CBTC systems is developed. Unlike most existing models, which are not related to specific locations, the proposed FSMC channel model takes train locations into account to have a more accurate channel model. The distance between the transmitter and the receiver is divided into intervals, and an FSMC model is applied in each interval. The accuracy of the proposed FSMC model is illustrated by the simulation results generated from the model and the real field measurement results.

Development and Evaluation of an Intelligent Energy-Management Strategy for Plug-in Hybrid Electric Vehicles

G. Wu, K. Boriboonsomsin, and M. J. Barth

An intelligent energy management strategy for plug-in hybrid electric vehicles is proposed. At the trip level, the strategy, extended to optimize fuel consumption at the tour level for certain cases, takes into account *a priori* knowledge in generating a synthesized velocity trajectory for the trip, which is then used to determine battery's charge-depleting control. Its effectiveness is evaluated against the binary energy management strategy using real-world trip/tour examples in California, and results show that the fuel savings over the binary mode strategy are around 10%–15%.

Improving Group Transit Schemes to Minimize Negative Effects of Maritime Piracy

O. Vaněk, O. Hrstka, and M. Pěchouček

Maritime piracy presents a serious threat to the global shipping industry, and the International Recommended Transit Corridor (IRTC) is one of countermeasures to minimize the probability of a successful ship hijack. Currently, all ships transiting the Gulf of Aden are recommended to follow the IRTC and take part in group transit schemes (GTS). The approach here provides a number of contributions that improve GTS. The scalability and structure of the approach, and the improvement over the current GTS with respect to the number of ships grouped as well as the time saved, are addressed.

GNSS Accuracy Improvement Using Rapid Shadow Transitions

R. Yozevitch, B. Ben-Moshe, and A. Dvir

Receiver modules in Global Navigation Satellite Systems (GNSS) are capable of providing positioning and velocity estimations sufficiently accurate for road navigation. Yet, even in optimal open-sky conditions, GNSS-based positioning carries an average error of 2–4 m and thus imposes an effective limitation on GNSS-based vehicle lane detection. A novel framework for lane-level accuracy using GNSS devices and 3-D shadow matching is presented by detecting and analyzing rapid changes in navigation satellites' signal strength, and its applicability is tested using both simulations and field experiments.

Two-Half-Barrier Level Crossings Versus Four-Half-Barrier Level Crossings: A Comparative Risk Analysis Study

M. Ghazel and E.-M. El-Koursi

A risk assessment comparative study is conducted with two main types of Automatic Protection Systems (APS): a pair of half-barriers and four half-barriers. The study here is based on some behavioral models describing the global dynamics within the LC area. The proposed models take into account not only railway and road traffic but also the risk due to human factors while focusing on two major risky situations. The simulation clearly shows the potential risk with each of the investigated APSs, according to various features of the dynamics within the LC area.

Sizing Finite-Population Vehicle Pools

T. Carpenter, S. Keshav, and J. Wong

A vehicle pool is a number of vehicles at a single location used for the same purpose. Here, the focus is on sizing vehicle pools for a finite set of subscribers, and the goal is to minimize the number of vehicles while still meeting nearly all requests. Three analytical techniques and a heuristic sizing method are proposed for a finite population of subscribers according to the pools' busy period demand to guarantee that all requests are served with probability 1-epsilon, and their effectiveness is confirmed using seven years of data from a local car share.

Commuter Route Optimized Energy Management of Hybrid Electric Vehicles

V. Larsson, L. Johannesson Mårdh, B. Egardt, and S. Karlsson

A commuter-route-optimized energy management system is introduced where the bulk of the computations are performed on a server. The idea is to identify commuter routes from historical driving data using hierarchical agglomerative clustering and then precompute an optimal energy management strategy with Dynamic Programming; the obtained solution can then be transmitted to the vehicle in the form of a lookup table. The simulation indicates that the average fuel consumption can be reduced by 4%–9% and battery usage by 10%–15%.

Modeling and Analysis of an Infrastructure Service Request Queue in Multichannel V2I Communications

M. Khabbaz, M. Hasna, C. M. Assi, and A. Ghrayeb

A concise yet comprehensive description of a multichannel Vehicle-to-Infrastructure communication system is presented. The complexity and the nonexistance of closed-form analytical expressions are an issue for this model. Approximations are exploited as a means to enhance this model's mathematical tractability. Simulations are conducted in the context of a realistic scenario with the objective of validating the proposed approximate model, verifying its accuracy and characterizing the system's performance in terms of several new metrics.

Combining Priors, Appearance, and Context for Road Detection

J. M. Álvarez, A. M. López, T. Gevers, and F. Lumbreras

Road priors and contextual information are introduced here for road detection. First, an algorithm is proposed to estimate road priors online using geographical information providing

relevant initial information about the road location. Then, contextual cues including horizon lines, vanishing points, lane markings, 3-D scene layout, and road geometry are used in addition to low-level cues derived from the appearance of roads. Finally, a generative model is used to combine these cues and priors leading to a road detection that is, to a large degree, robust to varying imaging conditions, road types, and scenarios.

Performance Improved Methods for Communication-Based Train Control (CBTC) Systems With Random Packet Drops

B. Bu, F. R. Yu, and T. Tang

The impact of random packet drops on communication-based train control (CBTC) systems is studied, and two novel schemes are introduced to improve their stability and performance. Unlike the existing works that only consider a single train and study the communication and control issues separately, here, a group of trains as a networked control system with packet drops is addressed. Extensive field tests and simulations are presented. Results show that the proposed schemes provide less energy consumption, better riding comfortability, and higher line capacity.

Comparison of Three Electrochemical Energy Buffers Applied to a Hybrid Bus Powertrain With Simultaneous Optimal Sizing and Energy Management

X. Hu, N. Murgovski, L. M. Johannesson, and B. Egardt

Three different electrochemical energy storage systems (ESSs), i.e., Li-ion battery, supercapacitor, and dual buffer, are comparatively examined for a hybrid bus powertrain in Gothenburg, Sweden, with the following contributions: 1) The three ESSs are compared in a framework of simultaneous optimal ESS sizing and energy management; 2) convex optimization is used to implement the framework; 3) both hybrid electric vehicle and plug-in hybrid electric vehicle scenarios for the powertrain are considered; and 4) a sensitivity analysis is carried out to evaluate how price variations of the on-board energy carriers affect the results and conclusions.

Direct and Steering Tilt Robust Control of Narrow Vehicles

L. Mourad, F. Claveau, and P. Chevrel

Narrow Tilting Vehicles (NTVs), the convergence of a car and a motorcycle, are expected to be the new generation of city cars for their dimensions and efficiency. However, to maintain lateral stability, NTVs must tilt when cornering. Unlike the motorcycle where drivers tilt himself, the tilting of an NTV should be automatic through Direct or Steering Tilt Control, or their combination. Here, multivariable control tools are used to design lateral assistance controllers for DTC, STC, or DTC/STC systems, and gain scheduling is provided to make them robust to longitudinal speed variations.

Energy-Efficient Train Operation in Urban Rail Transit Using Real-Time Traffic Information

Q. Gu, T. Tang, F. Cao, and Y. Song

A new energy-efficient train operation model is proposed through a nonlinear programming method, leading to an energy-efficient driving strategy with real-time interstation running time monitored by the automatic train supervision system. Its novelty lies not only in a new model for energy-efficient train operation but also in the utilization of combining analytical and numerical methods for deriving energy-efficient strategies. In contrast to most existing methods, the proposed model turns out to be a small-scale problem; its effectiveness is confirmed by both comparative analysis and simulation verification.

Study on the Display Positions for the Haptic Rotary Device-Based Integrated In-Vehicle Infotainment Interface

R. Tian, L. Li, V. S. Rajput, G. J. Witt, V. G. Duffy, and Y. Chen

An experimental infotainment system is studied to evaluate the proper display position in vehicles. Measurements used include task completion time, reaction to road event, lane/velocity keeping during secondary tasks, and user preference. High mounted, cluster, and center stack positions are considered, and the results show that with increased on-road and off-road visual loads, the cluster display can reduce lane position deviation significantly compared to high mounted and center stack positions. Also, high mounted display and cluster display are better toward two different road events including strong wind gust and extreme deceleration of the lead car.

Vision-Only Localization

H. Lategahn and C. Stiller

This paper presents a real-time system for six degrees of freedom ego localization that uses only a single monocular camera. The camera image is harnessed to yield an ego pose relative to a previously computed visual map. The process to automatically extract the ingredients of this map involves a mapping trajectory relative to the first pose, global scene signatures, and local landmark descriptors. It demonstrates centimeter-level accuracy by a set of experiments in an urban environment. Several screenshots of the augmented reality system are shown confirming centimeter-level accuracy and subdegree angular precision.

Design and Performance Enhancements in Communication-Based Train Control Systems With Coordinated Multipoint Transmission and Reception

L. Zhu, F. R. Yu, B. Ning, and T. Tang

Here, CoMP is proposed to enhance the train control performance where a train can communicate with a cluster of base stations simultaneously, different from the current CBTC systems where a train can only communicate with a single base station at any given time. Moreover, in order to mitigate the impacts of communication latency on control performance, an optimal guidance trajectory calculation scheme is proposed in the control procedure that takes full consideration of the tracking error caused by handoff latency. Simulation shows significant performance improvement by the proposed system.

Toward Dynamic Scene Understanding by Hierarchical Motion Pattern Mining

L. Song, F. Jiang, Z. Shi, R. Molina, and A. K. Katsaggelos

A two-level motion pattern mining approach is proposed for analyzing and understanding dynamic video scenes. At the first level, activities are modeled as distributions over patch-based features. At the second level, traffic states are modeled as distributions over activities. Compared to other works, moving

speed is considered to describe visual words, and traffic states are detected and assigned to every video frame. The approach is successfully tested on some challenging traffic surveillance sequences containing both pedestrian and vehicle motions.

An Exploratory Study of Two Efficient Approaches for the Sensitivity Analysis of Computationally Expensive Traffic Simulation Models

Q. Ge, B. Ciuffo, and M. Menendez

Two experimental studies using two different traffic simulation models are presented to understand and compare the quasi-OTEE and Kriging methods for Sensitivity Analysis (SA). Results show that both methods are able to identify the important parameters. In particular, the quasi-OTEE is better in screening the parameters, whereas the Kriging approach has higher precision in ranking the parameters; therefore, the first can be used to screen the parameters while the second to refine the analysis and calculate first-order indexes to identify the correct rank of the important parameters.

A Sensitivity-Analysis-Based Approach for the Calibration of Traffic Simulation Models

B. Ciuffo and C. Lima Azevedo

In this paper, a multistep sensitivity analysis (SA) approach for model calibration is proposed and applied to a complex traffic simulation model with more than 100 parameters. The proposed methodology was applied to an urban motorway case study simulated using MITSIMLab. A Kriging metamodel was estimated and integrated with the SA results for a global calibration framework in the presence of uncertainty. Results confirm the great potential of this approach and open up to a novel view for the calibration of a traffic simulation model.

A Metamodel for Estimating Error Bounds in Real-Time Traffic Prediction Systems

F. C. Pereira, C. Antoniou, J. A. Fargas, and M. Ben-Akiva

A methodology for estimating the upper and lower bounds of a real-time traffic prediction system, i.e., its prediction interval (PI), is proposed to complement any preexisting prediction system with extra uncertainty information such as the 5% and 95% quantiles. The methodology is verified with three different traffic prediction models applied to two freeway data sets from Irvine, CA, and Tel Aviv in Israel. Several evaluation measures based on earlier literature and two new ones are applied. The available data set confirms that the proposed method outperforms the homoscedastic baseline in the vast majority of the indicators.

Multimodel Ensemble for Freeway Traffic State Estimations

L. Li, X. Chen, and L. Zhang

An ensemble learning framework with least square, ridge, and lasso regression is proposed to appropriately combine estimation results from multiple macroscopic traffic flow models for better accuracy. It first assumes that any models existing are imperfect and have their own strengths/weaknesses, then estimates the online traffic states in a rolling horizon scheme, and automatically ensembles the information from each individual estimation models based on their performance during the selected regression horizon. A field test based on real freeway measurements indicates that lasso ensemble best handles various uncertainties and improves estimation accuracy significantly.

Bayesian Precalibration of a Large Stochastic Microsimulation Model

A. Boukouvalas, P. Sykes, D. Cornford, and H. Maruri-Aguilar

This paper proposes a fast iterative probabilistic precalibration framework and demonstrates how it can be applied to a real-world traffic simulation model. The efficiency of the method stems from the use of emulators of the stochastic microsimulator, which provide fast surrogates of the traffic model. It is shown that automatic precalibration of this real-world microsimulator, using turn count observational data, is possible considering all parameters at once and that this precalibrated microsimulator improves on the fit to observations compared to the traditional expert tuned microsimulator.

An Adaptive Bi-Level Gradient Procedure for the Estimation of Dynamic Traffic Demand

G. Cantelmo, E. Cipriani, A. Gemma, and M. Nigro

An in-depth analysis of the bilevel gradient approximation approach was presented for dynamic traffic demand adjustment and the development of new adaptive approaches. Initially, a comparison between the Simultaneous Perturbation Stochastic Approximation (SPSA), Asymmetric Design (AD), Polynomial Interpolation (PI) method, first proposed by the authors in 2010–2011, and its second-order development is presented; then, a sensitivity analysis of the parameters of the SPSA AD-PI is reported; finally, some new advances of the estimation method based on an adaptive approach are proposed and evaluated on a real test network.

A Monte Carlo Approach to Simulate the Stochastic Demand in a Continuous Dynamic Traffic Network Loading Problem

M. T. Sánchez-Rico, R. García-Ródenas, and J. L. Espinosa-Aranda

A discrete-event algorithm is proposed for the continuous Dynamic Network Load problem based on flow discretization that creates homogeneous traffic packets across the network links, divided into the running and the vertical queue sections by the Whole-link Travel Time model. A generalization of the point-queue model is introduced to tackle dynamic link capacities. The resulting model satisfies the FIFO rule, and it is used to obtain a computationally tractable model that allows stochastic demands to be dealt with a Monte Carlo simulation. This scheme is computationally expensive but can be addressed through distributed computing techniques.

Robust Optimization of Dynamic Motorway Traffic Via Ramp Metering

A. H. F. Chow and Y. Li

This paper presents a robust optimization model for motorway management aiming to minimize motorway delay via ramp metering with consideration of uncertainties in traffic demand and its characteristics. The performances of different control policies are illustrated through working examples with traffic data collected from UK M25 motorway. Experiments

reveal that the robust control provides a reliable performance over a range of uncertain scenarios. Results also show that the proposed controller is particularly effective during transition periods when congestion has yet fully developed.

Social Transportation

Over a decade ago, I introduced the term "social computing" as a new direction for computational social studies. Two years ago, we published the first monograph on social computing. Today, I'm glad to say that social computing has emerged as a major research direction worldwide. Now I would like to coin another term—social transportation—to describe another emerging field of research, development, and application for intelligent transportation systems.

In my musings on the term, I wasn't sure if there was already any research activity in this direction, so I did a cursory search in Google and found that journalists were already using the term in news reports. Specifically, I found two articles that cited "social transportation," one entitled "The Future of Social Transportation: Bandwagon Is Helping You Share Cab Rides," which is a story about a ride-sharing app called Bandwagon for mass carpools in New York City (especially for trips to JFK and LaGuardia airports). Bandwagon aims through the app to coax the city's taxi system into a future of "modular transportation," making it "more social, more efficient, more like transit" and facilitating a shift to thinking of the "car as part of a larger transportation network" in which "anyone can catch a cab-share at any time and from any corner" with the ultimate aim of making our society "easier and less expensive to be carless." And another, entitled "Social Transportation for Seniors," discusses "reconnecting senior residents of North Richland Hills, Texas with the community by providing free transportation to leisure and social activities." Both are related to my own thoughts, but I was surprised to find that stories and news about ridesharing app pioneer Uber did not use the term "social transportation" before. Also, despite Uber- and Bandwagon-like apps mushrooming in China now, the term "social transportation" has not appeared there. As for academic research, no one has mentioned social transportation, at least according to Google and Baidu. By the way, I also searched for the term "social traffic" and was surprised that the top items were about data traffic of social websites, nothing about real world traffic flows on the road!

However muted its Internet presence, social transportation has existed and developed without a name for quite a while. To me, traffic analysis and forecasting using data from mobile phones and social media are just the typical examples of social transportation research. Social transportation should emphasize real-time computing and embedded applications in transportation systems with online and interactive big data, as this is how the field differentiates from works in the sociology of transportation, which are offline and usually historical. Social transportation has the potential to rapidly become an important and independent field of research in transportation. We can do this by focusing on the following five areas: 1) traffic or transportation analytics with big data and social signals using data mining, machine learning, and natural language processing methods; 2) crowdsourcing mechanisms for transportation based social media, social networking, and the Internet of Things (IoT) or even the Internet of Everything, especially the coming vehicles to vehicles, websites, people, infrastructures communication; 3) new services beyond location-based services (LBS), such as transportation knowledge automation, especially decision-based services (DBS) or task-based services (TBS) that collecting required information in real time for transportation decisions or tasks, and information or intelligence-based services (IBS) or knowledge-based services (KBS) that recommending agents or organizations who might find the identified intelligence or knowledge useful for solving traffic problems or improving the transportation performance; 4) web-based agent technology for transportation control and management, such as software robots or web surrogates for traffic monitoring, safe driving, vehicular heath, and energy management (at this point, the effort should be directed in developing various smart apps that collect social traffic data and link people to traffic and cars in real time); 5) real applications and feedback for more research and development. This year I have graduated my first PhD candidate in social transportation, and I hope within the next few years we will dedicate more papers, special issues, books, and conferences in this important field.

More than 100 years ago, we started the march toward an Auto Society, and we have since become so successful that many nations, first in the United States and now in China, have become "nations on wheels." Today, we now face the consequences of this modern revolution—because many large cities around the world experience traffic congestion and pollution, we need to fix these problems, and I hope the emerging field of Social Transportation will be a big help in this effort.

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