บทความที่น่าสนใจประจำเดือนพฤษภาคม 2556

1. Changes in the Correlation Between Eye and Steering Movements Indicate Driver Distraction

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วารสาร: Intelligent Transportation Systems, IEEE Transactions on, Volume: 14, Issue: 1, 2013, Page(s): 136 - 145

Abstract: Driver distraction represents an increasingly important contributor to crashes and fatalities. Technology that can detect and mitigate distraction by alerting distracted drivers could play a central role in maintaining safety. Based on either eye measures or driver performance measures, numerous algorithms to detect distraction have been developed. Combining both eye glance and vehicle data could enhance distraction detection. The goal of this paper is to evaluate whether changes in the eye–steering correlation structure can indicate distraction. Drivers performed visual, cognitive, and cognitive/visual tasks while driving in a simulator. The auto- and cross-correlations of horizontal eye position and steering wheel angle show that eye movements associated with road scanning produce a low eye–steering correlation. However, even this weak correlation is sensitive to distraction. Time lead associated with the maximum correlation is sensitive to all three types of distraction, and the maximum correlation coefficient is most strongly affected by off-road glances. These results demonstrate that eye–steering correlation statistics can detect distraction and differentiate between types of distraction.

2. Weather Adaptive Traffic Prediction Using Neurowavelet Models

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วารสาร: Intelligent Transportation Systems, IEEE Transactions on, Volume: 14, Issue: 1, 2013, Page(s): 370 - 379

Abstract: Climate change is a prevalent issue facing the world today. Unexpected increase in rainfall intensity and events is one of the major signatures of climate change. Rainfall influences traffic conditions and, in turn, traffic volume in urban arterials. For improved traffic management under adverse weather conditions, it is important to develop a traffic prediction algorithm considering the effect of rainfall. This inclusion is not intuitive as the effect is not immediate, and the influence of rainfall on traffic volume is often unrecognizable in a direct correlation analysis between the two time-series data sets; it can only be observed at certain frequency levels. Accordingly, it is useful to employ a multiresolution prediction framework to develop a weather adaptive traffic forecasting algorithm. Discrete wavelet transform (DWT) is a well-known multiresolution data analysis methodology. However, DWT imparts time variance in the transformed signal and makes it unsuitable for further time-series analysis. Therefore, the stationary form of DWT known as stationary wavelet transform (SWT) has been used in this paper to develop a neurowavelet prediction algorithm to forecast hourly traffic flow considering the effect of rainfall. The proposed prediction algorithm has been evaluated at two urban arterial locations in Dublin, Ireland. This paper shows that the rainfall data successfully augments the traffic flow data as an exogenous variable in periods of inclement weather, resulting in accurate predictions of future traffic flow at the two chosen locations. The forecasts from the neurowavelet model outperform the forecasts from the standard artificial neural network (ANN) model.

3. Estimating Real-Time Traffic Carbon Dioxide Emissions Based on Intelligent Transportation System Technologies

ผู้แต่ง: Chang, X.; Chen, B.Y.; Li, Q.; Cui, X.; Tang, L.; Liu, C.

วารสาร: Intelligent Transportation Systems, IEEE Transactions on, Volume: 14, Issue: 1, 2013, Page(s): 469 - 479

Abstract: In this paper, a bottom–up vehicle emission model is proposed to estimate real-time CO_2 emissions using intelligent transportation system (ITS) technologies. In the proposed model, traffic data that were collected by ITS are fully utilized to estimate detailed vehicle technology data (e.g., vehicle type) and driving pattern data (e.g., speed, acceleration, and road slope) in the road network. The road network is divided into a set of small road segments to consider the effects of heterogeneous speeds within a road link. A real-world case study in Beijing, China, is carried out to demonstrate the applicability of the proposed model. The spatiotemporal distributions of CO_2 emissions in Beijing are analyzed and discussed. The results of the case study indicate that ITS technologies can be a useful tool for real-time estimations of CO_2 emissions with a high spatiotemporal resolution.

4. A model for estimating the optimal cycle length of demand responsive feeder transit services

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วารสาร: Transportation Research Part B: Methodological, Volume 51, May 2013, Pages 1–16

Abstract: The general lack of first/last mile connectivity is one of the main challenges faced by today's public transit. One of the possible actions towards a solution to this problem is the planning, design and implementation of efficient feeder transit services. This paper develops an analytical model which allows for an easy computation of near optimal terminal-to-terminal cycle length of a demand responsive feeder service to maximize service quality provided to customers, defined as the inverse of a weighted sum of waiting and riding times. The model estimates the recommended cycle length by only plugging in geometrical parameters and demand data, without relying on extensive simulation analyses or rule of thumbs. Simulation experiments and comparisons with real services validate our model, which would allow planners, decision makers and practitioners to quickly identify the best feeder transit operating design of any given residential area.

5. A model of pedestrians' intended waiting times for street crossings at signalized intersections

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วารสาร: Transportation Research Part B: Methodological, Volume 51, May 2013, Pages 17–28

Abstract: For the purposes of both traffic-light control and the design of roadway layouts, it is important to understand pedestrian street-crossing behavior because it is not only crucial for improving pedestrian safety but also helps to optimize vehicle flow. This paper explores the mechanism of pedestrian street crossings during the red-man phase of traffic light signals and proposes a model for pedestrians' waiting times at signalized intersections. We start from a simplified scenario for a particular pedestrian under specific traffic conditions. Then we take into account the interaction between vehicles and pedestrians via statistical unconditioning. We show that this in general leads to a U-shaped distribution of the pedestrians' intended waiting time. This U-shaped distribution characterizes the nature of pedestrian street-crossing behavior, showing that

in general there are a large proportion of pedestrians who cross the street immediately after arriving at the crossing point, and a large proportion of pedestrians who are willing to wait for the entire red-man phase. The U-shaped distribution is shown to reduce to a J-shaped or L-shaped distribution for certain traffic scenarios. The proposed statistical model was applied to analyze real field data.

6. Behavioural changes in drivers experiencing highly-automated vehicle control in varying traffic conditions

ผู้แต่ง: A. Hamish Jamson, Natasha Merat, Oliver M.J. Carsten, Frank C.H. Lai

วารสาร: Transportation Research Part C: Emerging Technologies, Volume 30, May 2013, Pages 116–125

Abstract: Previous research has indicated that high levels of vehicle automation can result in reduced driver situation awareness, but has also highlighted potential benefits of such future vehicle designs through enhanced safety and reduced driver workload. Well-designed automation allows drivers' visual attention to be focused away from the roadway and toward secondary, in-vehicle tasks. Such tasks may be pleasant distractions from the monotony of system monitoring.

This study was undertaken to investigate the impact of voluntary secondary task uptake on the system supervisory responsibilities of drivers experiencing highly-automated vehicle control. Independent factors of Automation Level (manual control, highly-automated) and Traffic Density (light, heavy) were manipulated in a repeated-measures experimental design. 49 drivers participated using a high-fidelity driving simulator that allowed drivers to see, hear and, crucially, feel the impact of their automated vehicle handling.

Drivers experiencing automation tended to refrain from behaviours that required them to temporarily retake manual control, such as overtaking, resulting in an increased journey time. Automation improved safety margins in car following, however this was restricted to conditions of light surrounding traffic. Participants did indeed become more heavily involved with the in-vehicle entertainment tasks than they were in manual driving, affording less visual attention to the road ahead. This might suggest that drivers are happy to forgo their supervisory responsibilities in preference of a more entertaining highly-automated drive. However, they did demonstrate additional attention to the roadway in heavy traffic, implying that these responsibilities are taken more seriously as the supervisory demand of vehicle automation increases. These results may dampen some concerns over driver underload with vehicle automation, assuming vehicle manufacturers embrace the need for positive system feedback and drivers also fully appreciate their supervisory obligations in such future vehicle designs.

7. Self-reported frequency and perceived difficulty of adopting eco-friendly driving behavior according to gender, age, and environmental concern

ผู้แต่ง: Patricia Delhomme, Mioara Cristea, Françoise Paran

วารสาร: Transportation Research Part D: Transport and Environment, Volume 20, May 2013, Pages 55–58

Abstract: This study considers the difficulties people have in adopting and maintaining eco-friendly driving behavior. A sample of drivers completed an online survey about eco-friendly behavior focusing on; anticipation, steady speed, low motor regime and shifting up, and others indirectly-related to the driving activity, as well as their attitudes towards environmental issues, and

driving history. In general, drivers found adopting eco-friendly behavior quite easy. Drivers report anticipation behavior more frequently and perceived them as less difficult to adopt than the other changes. Inversely, low revolution motor running and the shifting up of gears were reported the least frequently and seen as the most difficult to adopt. Young and/or middle-aged drivers reported the four categories of behavior less frequently and more difficult to adopt as compared to the other age groups.

8. Limits to active transport substitution of short car trips

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วารสาร: Transportation Research Part D: Transport and Environment, Volume 22, July 2013, Pages 10–13

Abstract: This paper examines trip related factors that affect the potential of active transport modes. The paper reports on the results of a long-term travel survey where daily activity-car travel patterns were automatically monitored for a cohort of people. Analysis of the results demonstrates that 64% of all monitored car trips were shorter than 8 km and can thus theoretically be replaced by active transport modes. After taking into account trip related criteria that may hamper substitution of car trips by active forms of transport, only 9.5% of the monitored trips can still be walked or cycled. If all of these remaining trips were substituted by non-motorized modes, this would correspond to approximately 2% of the travelled distance and 3% of the fuel consumption.

9. Generating Emissions Information for Route Selection: Experimental Monitoring and Routes Characterization

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วารสาร: Journal of Intelligent Transportation Systems, Volume 17, Issue 1, 2013, pages 3-17

Abstract: Infrastructure and traffic management technologies can have substantial impact on fuel use and emissions. This article explores a way to generate information about emissions and other route characteristics for drivers faced with a choice of routes. Global positioning system (GPS)-equipped vehicles were used to traverse various paths between origins and destinations to collect second-by-second trajectory data required for microscale emission analysis. A methodology based on the vehicle specific power (VSP) concept was used to estimate the emissions impact. On-board video footage recorded route features, traffic incidents, and congestion levels. Two different vehicles and drivers traversed several urban and intercity routes to enable the consideration of the influence of driver behavior and vehicle dynamics. It was found that the choice of a route can substantially affect emission rates of the analysed pollutants and that smoother driving styles can also result in considerable emissions reduction. A trade-off between reducing CO_2/fuel consumption and local pollutants has been identified. Specifically, faster intercity routes are more desirable in terms of fuel use and CO_2 emissions. However, these same routes yielded carbon monoxide, nitrous oxides, and hydrocarbons emission increases of up to 150%. These findings have implications for future investment and policy decisions regarding eco routing strategies.

10. Intelligent Transportation Systems-Enabled Optimal Emission Pricing Models for Reducing Carbon Footprints in a Bimodal Network

ผู้แต่ง: Sushant Sharma & Sabyasachee Mishra

วารสาร: Journal of Intelligent Transportation Systems, Volume 17, Issue 1, 2013, pages 54-64

Abstract: Scientists and policymakers intend worldwide emissions reduction of up to 80% of carbon dioxide (CO_2) and other greenhouse gases (GHGs) in the next four decades to stabilize atmospheric concentrations. Henceforth, an immediate response from the transportation sector, one of the largest producers of GHGs (up to 30% in the United States), is critical for GHGs reduction. Recent advancement in intelligent transportation systems (ITS) offers a technical solution to implement emission pricing effectively in a reasonable period of time. Further, this strategy can foster demand for efficient vehicles and high transit ridership while reducing GHGs emission and generating revenue. Therefore, in this study, we propose models for understanding the reduction of GHGs emission and shifts of private vehicle trips to transit by implementing ITS-based optimal emission pricing to reduce GHGs emission by a certain percentage in a composite transportation network (transit and highway network). The bilevel models presented in this study take into account the planner's policy decision and the road user's response to such policies in a simple and methodologically robust framework. The complex decision of choosing transit over private vehicle and road user behavior in the study has been studied by mode split functions and the classical user equilibrium principle. The performance of proposed models is compared to the base case (do nothing); reductions in total GHGs emission by optimal emission pricing shows efficacy of the models. The presented methodology in this article is generalizable and can be applied to any transportation network.