Considering built environment and spatial correlation in modelling pedestrian injury severity

This study looks at mitigating and aggravating factors that are associated with the injury severity of pedestrians when they have crashes with another road user and overcomes existing limitations in the literature by posing attention on the built environment and considering spatial correlation across crashes. Reports for 6539 pedestrian crashes occurred in Denmark between 2006 and 2015 were merged with geographic information system resources containing detailed information about built environment and exposure at the crash locations. A linearised spatial logit model estimated the probability of pedestrians to sustain a severe or fatal injury conditional on the occurrence of a crash with another road user. This study confirms previous findings about older pedestrians and intoxicated pedestrians being the most vulnerable road users, and crashes with heavy vehicles and in roads with higher speed limits being related to the most severe outcomes. This study provides also novel perspectives by showing positive spatial correlation of crashes with the same severity outcome and emphasising the role of the built environment in the proximity of the crash. This study emphasises the need for thinking about traffic calming measures, illumination solutions, road maintenance programs and speed limit reductions. Moreover, this study emphasises the role of the built environment, as shopping areas, residential areas, and walking traffic density are positively related to a reduction in pedestrian injury severity. Often, these areas have in common a larger pedestrian mass that is more likely to make other road users more aware and attentive, while the same does not seem to apply to areas with lower pedestrian density.
Effects of new bus and rail rapid transit systems – an international review

Cities worldwide are implementing modern transit systems to improve mobility in the increasingly congested metropolitan areas. Despite much research on the effects of such systems, a comparison of effects across transit modes and countries has not been studied comprehensively. This paper fills this gap in the literature by reviewing and comparing the effects obtained by 86 transit systems around the world, including Bus Rapid Transit (BRT), Light Rail Transit (LRT), metro and heavy rail transit systems. The analysis is twofold by analysing (i) the direct operational effects related to travel time, ridership and modal shifts, and (ii) the indirect strategic effects in terms of effects on property values and urban development. The review confirms the existing literature suggesting that BRT can attract many passengers if travel time reductions are significantly high. This leads to attractive areas surrounding the transit line with increasing property values. However, a statistical comparison of 41 systems did not show significant deviations between effects on property values resulting from BRT, LRT and metro systems, respectively. Hence, this paper indicates that large strategic effects can be obtained by implementing BRT systems at a much lower cost.
D-efficient or deficient? A robustness analysis of stated choice experimental designs

This paper is motivated by the increasing popularity of efficient designs for stated choice experiments. The objective in efficient designs is to create a stated choice experiment that minimizes the standard errors of the estimated parameters. In order to do so, such designs require specifying prior values for the parameters to be estimated. While there is significant literature demonstrating the efficiency improvements (and cost savings) of employing efficient designs, the bulk of the literature tests conditions where the priors used to generate the efficient design are assumed to be accurate. However, there is substantially less literature that compares how different design types perform under varying degree of error of the prior. The literature that does exist assumes small fractions are used (e.g., under 20 unique choice tasks generated), which is in contrast to computer-aided surveys that readily allow for large fractions. Further, the results in the literature are abstract in that there is no reference point (i.e., meaningful units) to provide clear insight on the magnitude of any issue.

Our objective is to analyze the robustness of different designs within a typical stated choice experiment context of a trade-off between price and quality. We use as an example transportation mode choice, where the key parameter to estimate is the value of time (VOT). Within this context, we test many designs to examine how robust efficient designs are against a misspecification of the prior parameters. The simple mode choice setting allows for insightful visualizations of the designs themselves and also an interpretable reference point (VOT) for the range in which each design is robust. Not surprisingly, the D-efficient design is most efficient in the region where the true population VOT is near the prior used to generate the design: the prior is $20/h and the efficient range is $10–$30/h. However, the D-efficient design quickly becomes the most inefficient outside of this range (under $5/h and above $40/h), and the estimation significantly degrades above $50/h. The orthogonal and random designs are robust for a much larger range of VOT. The robustness of Bayesian efficient designs varies depending on the variance that the prior assumes. Implementing two-stage designs that first use a small sample to estimate priors are also not robust relative to uninformative designs. Arguably, the random design (which is the easiest to generate) performs as well as any design, and it (as well as any design) will perform even better if data cleaning is done to remove choice tasks where one alternative dominates the other.
The role of intention as mediator between latent effects and behavior: application of a hybrid choice model to study departure time choices

An increasing number of papers are focusing on integrating psychological aspects into the typical discrete choice models. The majority of these studies account for several latent effects, but they mainly focused on the direct effect of attitudes, perception, and norms in the discrete choice. None of them consider the effect of intention and its role as mediator between those psychological effects and the choice, as implied in the Theory of Planned Behavior. In this paper we contribute to the literature in this field by specifically studying the direct effect of the intention on the actual behavior, while attitude, social norms, and perceived behavioral control affect the intention to behave in a given way. We apply a hybrid choice model to study the departure time choice. For this, we use data from Danish commuters in the morning rush hours in the Greater Copenhagen area. We find a significant effect of the intention to arrive at work on time on the departing time choice, and also a significant effect of the lower level mediators on intention. Furthermore, the attitude toward short travel time is also significant in explaining the departure time choice. Finally, in terms of forecasting, we find that individuals who have a strong intention to be at work on time will be less likely to reschedule their departure time. This suggests that campaigns targeting the working culture could affect the subject norms among colleagues, which in turn influence individuals’ intention to be on time or to reschedule to a less congested time slot.

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A Bayesian Additive Model for Understanding Public Transport Usage in Special Events

Public special events, like sports games, concerts and festivals are well known to create disruptions in transportation systems, often catching the operators by surprise. Although these are usually planned well in advance, their impact is difficult to predict, even when organisers and transportation operators coordinate. The problem highly increases when several events happen concurrently. To solve these problems, costly processes, heavily reliant on manual search and personal experience, are usual practice in large cities like Singapore, London or Tokyo. This paper presents a Bayesian additive model with Gaussian process components that combines smart card records from public transport with context information about events that is continuously mined from the Web. We develop an efficient approximate inference algorithm using expectation propagation, which allows us to predict the total number of public transportation trips to the special event areas, thereby contributing to a more adaptive transportation system. Furthermore, for multiple concurrent event scenarios, the proposed algorithm is able to disaggregate gross trip counts into their most likely components related to specific events and routine behavior. Using real data from Singapore, we show that the presented model outperforms the best baseline model by up to 26 percent in R-2 and also has explanatory power for its individual components.

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Battery electric vehicles (EVs) have received vast attention in the recent decade, especially due to their potential environmental benefits. The car industry has invested huge amounts in the battery electric vehicle technology, leading to a much larger selection of car models with better comfort, driving range and options for recharging the batteries. Several studies have indicated that a great share of car households would now be able to maintain their current mobility patterns with only a minor level of adaption (Christensen 2011; Pearre et al. 2011; Greaves et al. 2014). Still, the driving range of a fully recharged EV is of great importance to the potential users (Jensen et al. 2013; Dimitropoulos et al. 2013; Mabit & Fosgerau 2011; Franke & Krems 2013), but as the battery capacity of the EVs continue to increase, the mobility constraints related to former EV models will most probably be reduced. Thus, the EV alternative has changed from being a product for a very small group of enthusiasts to being an actual car alternative for a common household and knowledge about which type of households would be interested in EVs is extremely valuable for both industry and policy makers. However, as the EV market is still quite immature in most countries, lack of data on EV users is a common problem for researchers. Data on EV purchase and use have thus often been collected by means of data from intentional statements...
A Joint Route Choice Model for Electric and Conventional Car Users

Introduction

Worldwide, governments have committed to reducing air pollution and carbon emissions. With a higher share of renewable sources in the electricity production, battery electric cars (EVs) could play a significant role in maintaining these commitments. Growing literature shows an increasing interest in EVs and their market, but current EV travel demand studies are usually based on data collected from users of conventional gasoline or diesel engine cars (CVs) (see e.g. (Golob & Gould 1998; Franke & Krems 2013; Jensen et al. 2014). EVs are however different from CVs in a number of ways, in particular when it comes to the driving range and the refuelling/recharging which can lead to behavioural changes (Jensen and Mabit 2015). EV users might avoid longer and less-planned trips and, when deciding on a route, they might select roads where the general speed is lower, the trip length is shorter, or the charging facilities are better. On the other hand, over a longer period of time, many users do not need charging other than overnight charging at home in order to keep up with their current behaviour (Christensen et al. 2010). Thus, the impact on traffic of a large scale EV adoption is not obvious, as it cannot be assumed that CVs currently on the road are simply replaced by EVs and individual behaviour otherwise stays constant.

Understanding the behaviour of EV users is important in a number of ways. Beside potential environmental effects, there is a need to understand other related effects, such as effects on the electricity network and the transport network. The objective of this study is to use revealed preferences (RP) data to investigate differences in route choice behaviour between CV and EV users. To our knowledge, this is the first time that a state-of-the-art route choice model has been estimated on RP EV data. In addition, the level of detail in the data allows for accounting for congestion, reliability, topology, weather and socioeconomic background.

Method
This study exploits a unique and vast dataset consisting of GPS records from a large demonstration project about EVs conducted in Denmark during the period 2011-2013. Households participating in the trial had an EV available for a period of three months during which all trips were GPS logged. Additionally, some of the households GPS logged trips by their CV in the month before and the month after the EV was received. The GPS traces were matched to the very detailed NAVTEQ street network (NAVTEQ 2010). The high level of detail of the network is crucial, as EV users might use smaller roads with lower speeds in order to save energy due to current technological restrictions on driving distances. Following the procedure in Prato et al. (2014), route choice behaviour is modelled with a two-stage approach consisting of choice set generation and model estimation. The first stage used a doubly stochastic generation process to generate a choice set consisting of a maximum of 100 unique alternatives for each observed route. Subsequently, the observations were filtered to exclude observations for which the choice set contained only one alternative route or did not contain any alternative reasonably similar to the observed route. In the second stage, a mixed path size correction logit model was estimated for modelling route choice behaviour, (Bovy et al. 2008). Comparison of EV and CV preferences is made possible by estimating jointly across data from each technology using a logit scaling approach with at least one generic parameter across data (Bradley and Daly 1997).

Data

After the map matching and filtering processes, GPS records were available for about 90,000 EV trips from 379 households. About 6,500 CV trips were logged for about 100 households in the month before and after the EV was used. The sample of households was based on voluntary participation under the condition that the household already owned at least one car and had a dedicated parking space where the EV could be home charged. In the trial period, the household had access to both their CV and EV, but they were encouraged to use the EV as the primary option. The participating households resided in 27 of the 98 municipalities in Denmark and were distributed across the entire country (see Figure 1). For trial participation purposes, one household member filled an online application form with information about the household and its composition. Each trip has been merged with weather information from local weather stations, inducing that information about precipitation, wind speed, temperature and visibility at the time of departure is available. The NAVTEQ network consists of 636,243 links covering the entire country and all road classes from large highways to minor local roads.

Analysing improvements to on-street public transport systems: a mesoscopic model approach

Light rail transit and bus rapid transit have shown to be efficient and cost-effective in improving public transport systems in cities around the world. As these systems comprise various elements, which can be tailored to any given setting, e.g. pre-board fare-collection, holding strategies and other advanced public transport systems (APTS), the attractiveness of such systems depends heavily on their implementation. In the early planning stage it is advantageous to deploy simple and transparent models to evaluate possible ways of implementation. For this purpose, the present study develops a mesoscopic model which makes it possible to evaluate public transport operations in details, including dwell times, intelligent traffic signal timings and holding strategies while modelling impacts from other traffic using statistical distributional data thereby ensuring simplicity in use and fast computational times. This makes it appropriate for analysing the impacts of improvements to public transport operations, individually or in combination, in early planning stages. The paper presents a joint measure of reliability for such evaluations based on passengers’ perceived travel time by considering headway time regularity and running time variability, i.e. taking into account waiting time and in-vehicle time. The approach was applied on a case study by assessing the effects of implementing segregated infrastructure and APTS elements, individually and in combination. The results showed that the reliability of on-street public transport operations mainly depends on APTS elements, and especially holding strategies, whereas pure infrastructure improvements induced travel time reductions. The results further suggested that synergy effects can be obtained by planning on-street public transport coherently in terms of reduced travel times and increased reliability.
Applying LCA in decision making- the need and the future perspective

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Considering built environment and spatial correlation in modelling pedestrian injury severity
This study looks at mitigating and aggravating factors that are associated with the injury severity of pedestrians when they have crashes with another road user and overcomes existing limitations in the literature by posing attention on the built environment and considering spatial correlation across crashes. Reports for 6539 pedestrian crashes occurred in Denmark between 2006 and 2015 were merged with geographic information system resources containing detailed information about built environment and exposure at the crash locations. A linearised spatial logit model estimated the probability of pedestrians to sustain a severe or fatal injury conditional on the occurrence of a crash with another road user. This study confirms previous findings about older pedestrians and intoxicated pedestrians being the most vulnerable road users, and crashes with heavy vehicles and in roads with higher speed limits being related to the most severe outcomes. This study provides also novel perspectives by showing positive spatial correlation of crashes with the same severity outcome and emphasising the role of the built environment in the proximity of the crash. This study emphasises the need for thinking about traffic calming measures, illumination solutions, road maintenance programs and speed limit reductions. Moreover, this study emphasises the role of the built environment, as shopping areas, residential areas, and walking traffic density are positively related to a reduction in pedestrian injury severity. Often, these areas have in common a larger pedestrian mass that is more likely to make other road users more aware and attentive, while the same does not
seem to apply to areas with lower pedestrian density.

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Cyklistuheld – hvilken betydning har vejen, køretøjet og trafikanten


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Delay estimation on a railway-line with smart use of micro-simulation

This paper formulates a delay propagation model that estimates total railway line delay as a polynomial function of a single primary delay. The estimate is derived from a finite series of delays over a horizon that spans two dimensions: the length of the railway line and the number of trains in the service plan. The paper shows that the total delay estimate is a cubic relation for small primary delays.

A probabilistic approach is presented to combine the total delay functions of primary delays given to different trains. The final estimate is the total delay on railway lines, after a random incident has occurred. The model can be integrated in railway timetable analysis to reduce the number of necessary simulations, and can be used when the computation speed is an issue, such as on-line rescheduling algorithms. The model is demonstrated with an analysis of a Danish suburban railway.

Demand pattern analysis of taxi trip data for anomalies detection and explanation

Due to environmental and economic stress, strong investment exists now towards adaptive transport systems that can efficiently utilize capacity, minimizing costs and environmental impacts. The common vision is a system that dynamically changes itself (the supply) to anticipate traveler needs (the demand). In some occasions, unexpected and unwanted demand patterns are noticed in the traffic network that lead to system failures and cost implications. Significantly low speeds or excessively low flows at an unforeseeable time are only some of the phenomena that are often noticed and need to be explained for transport system’s better future response. The objective of this research is the formulation of a proper methodology that identifies anomalies on traffic networks and correlates them with special events using internet data. Our main subject of interest is the investigation of why traffic congestion is happening as well as why there are demand fluctuations in days were there are no apparent reasons for the occurrence of such phenomena. We evaluated our system using Google’s NYC taxi trips public dataset. We defined initially the “normality” baseline and thereunder we studied individual days’ demand patterns for outliers’ detection. Our approach enabled us to detect demand fluctuations, analyze and correlate them with disruptive events scenarios like extreme weather conditions, public holidays, religious festivities and parades. Using kernel density analysis, the affected areas as well as the significance of the observed differences compared to the average day are depicted.
Dynamisk vejvalgsmodel for Hovedstadsområdet

Trængselsniveauet i Hovedstadsområdet er stigende. Dette medfører store udsving i trafikmængder og hastigheder over dagnet og myldretiderne, men dette repræsenteres ikke i traditionelle statiske modeller. Dynamiske modeller opererer på et langt større detaljeningsniveau og modellerer sådanne udsving på realistisk vis. Der er netop blevet udviklet en dynamisk vejvalgsmodel for Hovedstadsområdet, og artiklen præsenterer de indledende resultater.

Effekten af autonome og selvkørende biler på kortere og lang sigt


Der er i Danmark og USA enighed om, at helt autonome køretøjer vil være på markedet fra 2030-35, hvorved de vil de være sålet igennem den hele bilparken om ca. 50 år. Men inden for 10 år vil en del nye biler være selvkørende på niveau 4, og dermed vil de teknisk set kunne det samme som autonome køretøjer. Muligvis vil der endda være godkendte autonome minibusser på vejene inden for 10 år. Det bør derfor allerede inden for 5 år overvejes, hvordan udviklingen vi bilparken kan undnyttet til fordel for samfundet, og hvilke krav det politisk vil være relevant at stille til godkendelse af autonome køretøjer. Allerede i dag ved vi stort set, hvad autonome og selvkørende biler basalt set må forventes at kunne.

Det interessante er derfor, hvilken effekt disse egenskaber vil have på trafikken, trængslen, vores byer, behov for infrastruktur osv.

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Organisations: Department of Management Engineering, Transport DTU, Transport Modelling
Authors: Christensen, L. (Intern)
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Empirical analyses of a choice model that captures ordering among attribute values

In most choice models, the evaluation of attributes depends on differences of attribute values. Some research, mainly in marketing and psychology, suggests that the differences do not give the full picture of how decision makers evaluate choice alternatives, e.g. some decision makers may penalise an alternative additionally because it has the highest price. In this paper, we specify a discrete choice model that takes into account the ordering of attribute values across alternatives. This model is used to investigate the effect of attribute value ordering in three case studies related to alternative-fuel vehicles, mode choice, and route choice. In our application to choices among alternative-fuel vehicles, we see that especially the price coefficient is sensitive to changes in ordering. The ordering effect is also found in the applications to mode and route choice data where both travel time and cost sensitivities are affected by the ordering. Overall, the ordering effects have implications for both parameter estimates and the evaluation of willingness-to-pay measures.

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BFI (2014): BFI-level 1
Enabling Bus Transit Service Quality Co-Monitoring Through Smartphone-Based Platform

The growing ubiquity of smartphones offers public transit agencies an opportunity to transform ways to measure, monitor, and manage service performance. The potential of a new tool is demonstrated for engaging customers in measuring satisfaction and co-monitoring [Editor’s note: This is the authors’ word, meaning “agencies using public feedback to supplement official monitoring and regulation.”] bus service quality. The pilot project adapted a smartphone-based travel survey system, Future Mobility Sensing, to collect real-time customer feedback and objective operational measurements on specific bus trips. The system used a combination of GPS, Wi-Fi, Bluetooth, and accelerometer data to track transit trips while soliciting users’ feedback on trip experience. Though not necessarily intended to replace traditional monitoring channels and processes, these data can complement official performance monitoring through a more real-time, customer-centric perspective. The pilot project operated publicly for 3 months on the Silver Line bus rapid transit in Boston, Massachusetts. Seventy-six participants completed the entrance survey, half of them actively participated and completed more than 500 questionnaires while on board either at the end of a trip, at the end of a day, or both. Participation was biased toward frequent Silver Line users, the majority of whom were white and of higher income. Indicative models of user-reported satisfaction reveal some interesting relationships, but the models can be improved by fusing the app-collected data with actual performance characteristics. Broader and more sustained user engagement remains a critical future challenge.

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Europæernes rejsevaner belyst igennem Ferie- og Forretningsrejseundersøgelserne

Der er i dag kun en begrænset viden om fjernrejser. Enkelte undersøgelser viser, at fjernrejserne har en substantiel miljømæssig belastning og at rejseaktiviteten vokser hurtigt. Behovet for bedre viden og forståelse af rejseaktiviteten er derfor stor. Mangel på data er en væsentlig grund til de få analyser der findes af fjernrejser. Eurostat indsamler imidlertid hvert år data fra en survey, som alle medlemslande er forpligtede til at gennemføre efter nogle fælles overordnede retningslinier. I Danmark kaldes undersøgelsen Ferie og forretningsrejseundersøgelsen. En Europæisk fællesbetegnelse er snarest Tourism Demand Survey. Selv om undersøgelserne ikke fuldt ud lever op til de krav, man stiller til en transport survey fra en transport tilgang (speelt er der ingen information om rejseafstande), at kvaliteten af undersøgelserne i de
enkelte lande er ret blandet, og at data kun foreligger som indikator tabeller, finder forfatterne materialet anvendeligt til at belyse Europæernes rejseaktivitet, ikke mindst fordi det dækker 30 lande over en 15 års tidsserie for en væsentlig del af landene.

Papiret præsenterer først en oversigt over rejsefrekvensen i de enkelte lande og en sammenstilling af, hvor stor en del af de enkelte landes befolkning, der foretager private udlands og indenlands rejser med overnatning af forskellig varighed. Derefter gennemføres en analyse af udviklingen i rejsefrekvensen på private udlandsrejser med mindst 4 overnatninger. Analyserne viser, at de 30 lande kan inddeles i 3 grupper, 1) de gamle mellem- og nordeuropæiske medlemslande med den højeste rejsefrekvens på private udlandsrejser og den største andel af befolkningen, der er rejseaktiv, 2) 5 Middelhavslande med en meget lav rejsefrekvens på private udlandsrejser, men med en væsentlig større andel der holder ferie m.v. indenlands samt 3) de nye medlemslande, der har en lavere rejsefrekvens end førstnævnte gruppe, men væsentlig højere end middelhavslandene.

Analysen af udviklingen i rejseaktivitet viser en samlet indkomstelasticitet på 1,8 for alle land under ét, og væsentlig over 1 for de 3 grupper hver for sig. Et muligt mætningspunkt i udviklingen diskuteres. Dette foreslås at ligge ved at ca. 90% af befolkningen rejser udenlands årligt og har ca 2 rejser i gennemsnit. Men hertil kommer de kortere rejser, typisk weekendrejser, som ikke er analyseret i detaljer i dette paper.

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ISI indexed (2013): ISI indexed no  
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Web of Science (2012): Indexed yes  
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**Evaluating the police service quality for handling traffic crash reporting: A combined MCDA and LCA approach**

Purpose The phenomenon of traffic crash under-reporting has been extensively documented in terms of its extent, but not equally analysed in terms of its reasons. As police distrust has been recently identified as a major reason for crash under-reporting, the purpose of this paper is to look at the police service quality for handling the reporting of traffic crashes. Design/methodology/approach This study introduces a novel approach to evaluate service quality that combines multi-criteria decision analysis (MCDA) with latent class analysis (LCA). Moreover, this study presents the design of a web-based survey on the basis of the SERVQUAL approach to detecting strengths, opportunities and threats with crash reporting to the police at a strategic level. Transportation stakeholders (e.g. researchers, authorities, consultants, NGO
representatives, suppliers) with an interest in traffic safety in Denmark participated in the survey that yielded 86 complete responses. Findings The novel approach was successfully applied and its implementation demonstrated the usefulness of the tool even in countries with a high police service. Results showed that the participating stakeholders perceived human factors as more important than physical factors in order to increase the crash reporting, with responsiveness as the most important and tangibles as the least important dimensions. Nevertheless, most stakeholders viewed a mixture of human and physical factors as crucial to increase crash reporting rates. Originality/value This study advances the knowledge about police service quality with a novel expert-based decision support tool based on SERVQUAL, MCDA and LCA, demonstrates its applicability in countries with a high-police service, and opportunities and barriers for increasing the crash reporting rate.

General information
State: Published
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling, Management Science, Operations Management, University of Queensland, Hebrew University of Jerusalem
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Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 0.8 SJR 0.482 SNIP 0.935
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BFI (2014): BFI-level 1
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BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.353 SNIP 0.855 CiteScore 0.68
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.459 SNIP 0.715 CiteScore 0.67
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.426 SNIP 0.789 CiteScore 0.71
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.542 SNIP 0.778
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.362 SNIP 0.72
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.223 SNIP 0.434
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Scopus rating (2006): SJR 0.272 SNIP 0.615
Scopus rating (2005): SJR 0.325 SNIP 0.726
Scopus rating (2004): SJR 0.513 SNIP 0.826
Scopus rating (2003): SJR 0.321 SNIP 0.837
Scopus rating (2002): SJR 0.237 SNIP 0.43
Scopus rating (2001): SJR 0.303 SNIP 0.546
Scopus rating (2000): SJR 0.316 SNIP 0.689
Scopus rating (1999): SJR 0.266 SNIP 0.283
Original language: English
SERVQUAL, Latent class analysis, Multi-criteria decision analysis, Police distrust, Traffic crash reporting, Public policy & environmental management, Policing, Criminal justice, Juvenile/youth crime, Police studies, Health & social care, Criminology & forensic psychology, Criminology & criminal justice
Harvesting big data for estimating the energy consumption and driving range of electric vehicles

Analyzing the factors that affect the energy efficiency of vehicles is crucial to the overall improvement of the environmental efficiency of the transport sector, one of the top polluting sectors at the global level. This study analyses the energy consumption rate (ECR) and driving range of battery electric vehicles (BEVs) and provides insight into the factors that affect their energy consumption by harnessing big data from real-world driving. The analysis relied on four data sources: (i) driving patterns collected from 741 drivers over a two-year period; (ii) drivers' characteristics; (iii) road type; (iv) weather conditions. The results of the analysis measure the mean ECR of BEVs at 0.183 kW h/km, underline a 34% increase in ECR and a 25% decrease in driving range in the winter with respect to the summer, and suggest the electricity tariff for BEVs to be cost efficient with respect to conventional ones. Moreover, the results of the analysis show that driving speed, acceleration and temperature have non-linear effects on the ECR, while season and precipitation level have a strong linear effect. The econometric model of the ECR of BEVs suggests that the optimal driving speed is between 45 and 56 km/h and the ideal temperature from an energy efficiency perspective is 14 °C. Clearly, the performance of BEVs highly depends on the driving environment, the driving patterns, and the weather conditions, and the findings from this study enlighten the consumers to be more informed and manufacturers to be more aware about the actual utilization of BEVs.

General information
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Organisations: Department of Management Engineering, Transport Modelling, Transport DTU, University of Queensland
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Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.08 SJR 1.195 SNIP 1.573
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
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Web of Science (2015): Indexed yes
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Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.213 SNIP 1.663 CiteScore 2.08
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.061 SNIP 1.705 CiteScore 2
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 0.962 SNIP 1.72 CiteScore 1.86
ISI indexed (2011): ISI indexed yes
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How indicative is a self-reported driving behaviour profile of police registered traffic law offences?

Although most motorised countries have experienced massive improvements in road safety over the last decades, human behaviour and differences in accident risk across sub-groups of drivers remains a key issue in the area of road safety. The identification of risk groups requires the identification of reliable predictors of safe or unsafe driving behaviour. Given this background, the aim of this study was to test whether driver sub-groups identified based on self-reported driving behaviour and skill differed in registered traffic law offences and accidents, and whether group membership was predictive of having traffic law offences. Sub-groups of drivers were identified based on the Driver Behaviour Questionnaire (DBQ) and the Driver Skill Inventory (DSI), while traffic offences and accidents were register-based (Statistics Denmark). The participants (N = 3683) were aged 18–84 years and randomly selected from the Danish Driving License Register. Results show that the driver sub-groups differed significantly in registered traffic offences but not in registered accidents. In a logistic regression analysis, the sub-group “Violating unsafe drivers” was found predictive of having a traffic offence, even when socio-demographic variables and exposure were controlled for. The most important predictive factor, however, was having a criminal record for non-traffic offences, while gender, living without a partner, and being self-employed also had a significant effect. The study confirms the use of the DBQ and DSI as suitable instruments for predicting traffic offences while also confirming previous results on accumulation of problematic behaviours across life contexts. The finding that driver sub-groups did not differ in registered accidents supports the recent research activities in finding and modelling surrogate safety measures.
Integrated Optimisation for Public Transport System with Joint Schedule- and Frequency-Based Services
Integrating environmental impacts into cost-benefit analysis: The value of environmental pollutants

Integrating police reports with geographic information system resources for uncovering multidimensional patterns of pedestrian crashes in Denmark

Investigating the reasons behind the intention to report cycling crashes to the police and hospitals in Denmark
Joint modeling of schedule- and frequency-based services in public transport assignment models
Learning Supervised Topic Models for Classification and Regression from Crowds
The growing need to analyze large collections of documents has led to great developments in topic modeling. Since documents are frequently associated with other related variables, such as labels or ratings, much interest has been placed on supervised topic models. However, the nature of most annotation tasks, prone to ambiguity and noise, often with high volumes of documents, deem learning under a single-annotator assumption unrealistic or unpractical for most real-world applications. In this article, we propose two supervised topic models, one for classification and another for regression problems, which account for the heterogeneity and biases among different annotators that are encountered in practice when learning from crowds. We develop an efficient stochastic variational inference algorithm that is able to scale to very large datasets, and we empirically demonstrate the advantages of the proposed model over state-of-the-art approaches.
Logical Entity Level Sentiment Analysis
We present a formal logical approach using a combinatory categorial grammar for entity level sentiment analysis that utilizes machine learning techniques for efficient syntactical tagging and performs a deep structural analysis of the syntactical properties of texts in order to yield precise results. The method should be seen as an alternative to pure machine learning methods for sentiment analysis, which are argued to have high difficulties in capturing long distance dependencies, and can be dependent on significant amount of domain specific training data. The results show that the method yields high correctness, but further investment is needed in order to improve its robustness.

Modelling production-consumption flows of goods in Europe: the trade model within Transtools3
The paper presents a new model for trade flows in Europe that is integrated with a logistics model for transport chain choice through Logsum variables. Logsums measures accessibility across an entire multi-modal logistical chain, and are calculated from a logistics model that has been estimated on disaggregated micro data and then used as an input variable in the trade model. Using Logsums in a trade model is new in applied large-scale freight models, where previous models
have simply relied on the distance (e.g. crow-fly) between zones. This linkage of accessibility to the trade model makes it possible to evaluate how changes in policies on transport costs and changes in multi-modal networks will influence trade patterns. As an example the paper presents outcomes for a European-wide truck tolling scenario, which showcases to which extent trade is influenced by such a policy. The paper discusses how such a complex model can be estimated and considers the choice of mathematical formulation and the link between the trade model and logistics model. In the outcomes for the tolling scenario we decompose the total effects into effects from the trade model and effects from the logistics model.

**General information**

State: Published  
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling, University of Leeds, John Bates Services  
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**Predicting the Potential Market for Electric Vehicles**

Forecasting the potential demand for electric vehicles is a challenging task. Because most studies for new technologies rely on stated preference (SP) data, market share predictions will reflect shares in the SP data and not in the real market. Moreover, typical disaggregate demand models are suitable to forecast demand in relatively stable markets, but show limitations in the case of innovations. When predicting the market for new products it is crucial to account for the role played by innovation and how it penetrates the new market over time through a diffusion process. However, typical diffusion models in marketing research use fairly simple demand models. In this paper we discuss the problem of predicting market shares for new products and suggest a method that combines advanced choice models with a diffusion model to take into account that new products often need time to gain a significant market share. We have the advantage of a relatively unique databank where respondents were submitted to the same stated choice experiment before and after experiencing an electric vehicle. Results show that typical choice models forecast a demand that is too restrictive in the long period. Accounting for the diffusion effect, instead allows predicting the usual slow penetration of a new product in the initial years after product launch and a faster market share increase after diffusion takes place.

**General information**

State: Published  
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling, Traffic Modelling, Pontificia Universidad Catolica de Chile  
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Probabilistic Modeling and Visualization for Bankruptcy Prediction

In accounting and finance domains, bankruptcy prediction is of great utility for all of the economic stakeholders. The challenge of accurate assessment of business failure prediction, specially under scenarios of financial crisis, is known to be complicated. Although there have been many successful studies on bankruptcy detection, seldom probabilistic approaches were carried out. In this paper we assume a probabilistic point-of-view by applying Gaussian Processes (GP) in the context of bankruptcy prediction, comparing it against the Support Vector Machines (SVM) and the Logistic Regression (LR). Using real-world bankruptcy data, an in-depth analysis is conducted showing that, in addition to a probabilistic interpretation, the GP can effectively improve the bankruptcy prediction performance with high accuracy when
compared to the other approaches. We additionally generate a complete graphical visualization to improve our understanding of the different attained performances, effectively compiling all the conducted experiments in a meaningful way. We complete our study with an entropy-based analysis that highlights the uncertainty handling properties provided by the GP, crucial for prediction tasks under extremely competitive and volatile business environments.

General information
State: Published
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling, University of Coimbra
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BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 4.29 SJR 1.308 SNIP 2.037
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.511 SNIP 2.29 CiteScore 4
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.696 SNIP 2.816 CiteScore 4.29
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.579 SNIP 2.684 CiteScore 4.06
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.187 SNIP 2.279 CiteScore 3.48
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.273 SNIP 3.476 CiteScore 4.65
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.952 SNIP 2.211
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 1.024 SNIP 1.942
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.808 SNIP 1.774
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.489 SNIP 2.06
Scopus rating (2006): SJR 0.458 SNIP 1.472
Scopus rating (2005): SJR 0.593 SNIP 1.472
Scopus rating (2004): SJR 0.186 SNIP 0.77
Scopus rating (2003): SJR 0.164 SNIP 0.881
Scopus rating (2002): SJR 0.156 SNIP 0.351
Original language: English
DOIs: 10.1016/j.asoc.2017.06.043
Road signage comprehension and overload: The role of driving style and need for closure

This study looks at the provision of information via traffic signs and its relation with driving styles, need for closure and socio-economic characteristics of road users. A web-based questionnaire allowed collecting information about traffic signs and road surface markings in 12 traffic locations that were presented in two variations: (i) in the first 6 cases, a first configuration contained information that led to ambiguity about the manoeuvres that were legal and a second configuration added traffic signs to eliminate the ambiguity; (ii) in the second 6 cases, a first configuration presented the road environment without signs and a second configuration added traffic signs to verify information redundancy. Respondents indicated for each location which manoeuvres they deemed legal and how many conflicts they estimated without traffic signs, and safety perception and comfort level improved with the traffic signs. Moreover, respondents reported their socio-economic characteristics and filled two questionnaires about need for closure and driving styles. Completed questionnaires from 753 participants from Hungary with expertise in transport and traffic were analysed via statistical and factor analysis, and results reveal that: (i) road users are heterogeneous in their perception and processing of information, as the number of manoeuvres correctly identified as legal relates to their socio-economic characteristics; (ii) the perception of improvements after the provision of information relates also to the road uses’ socio-economic characteristics and their driving style and need for closure; (iii) different amounts of information are sufficient for different road users not to feel uncertain regarding manoeuvres being legal at a certain traffic location.
Strategic assessment of capacity consumption in railway networks: Framework and model

In this paper, we develop a new framework for strategic planning purposes to calculate railway infrastructure occupation and capacity consumption in networks, independent of a timetable. Furthermore, a model implementing the framework is presented. In this model different train sequences are generated and assessed to obtain timetable independence. A stochastic simulation of delays is used to obtain the capacity consumption. The model is tested on a case network where four different infrastructure scenarios are considered. Both infrastructure occupation and capacity consumption results are obtained efficiently with little input. The case illustrates the model's ability to quantify the capacity gain from infrastructure scenario to infrastructure scenario which can be used to increase the number of trains or improve the robustness of the system.

General information
State: Published
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling, Rambøll Danmark A/S, Erasmus University Rotterdam
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Web of Science (2017): Indexed yes
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Scopus rating (2016): CiteScore 4.43 SJR 1.935 SNIP 2.531
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.941 SNIP 2.678 CiteScore 4.23
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.046 SNIP 3.228 CiteScore 3.84
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.847 SNIP 3.673 CiteScore 4.01
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.585 SNIP 2.782 CiteScore 2.76
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.356 SNIP 3.217 CiteScore 2.85
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 0.975 SNIP 2.438
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 1.087 SNIP 2.351
BFI (2008): BFI-level 2
Suitability of commercial transport for a shift to electric mobility with Denmark and Germany as use cases

This paper identifies commercial sectors suitable for a shift to electric mobility in Denmark and Germany by analysing daily driving distance. The paper concludes that construction, human health and other service sectors are the most suitable sectors for electric mobility because many vehicles are registered in these sectors and daily mileage is reasonably low. They should be primary target groups of specific policy measures to promote the use of electric vehicles. Both Denmark and Germany have incentives to promote the use of electric vehicles. Nevertheless, electric vehicles do generally not show economic benefits unless travel distance is high. However, today the travel range of large vans is an important barrier for electrification due to battery weight and the limitation of 3.5 tonnes gross vehicle weight for driving with a normal driving licence. The rule needs amendments for electric vehicles, as has been done in Germany. The paper recommends EU countries follow the German rule allowing EVs up to 4.25 tonnes to be driven with a class B licence, thereby potentially creating a market for big vans with long travel range.

General information
State: Published
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling, German Aerospace Center, COWI AS
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Main Research Area: Technical/natural sciences

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Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.42 SJR 0.789 SNIP 1.177
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.652 SNIP 0.83 CiteScore 1.13
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.874 SNIP 1.365 CiteScore 1.23
Testing the slope model of scheduling preferences on stated preference data

The valuation of travel time variability is derived either from a structural model, given information on departure time, or directly from a reduced-form model where departure time is assumed to be optimally chosen. The two models are theoretically equivalent under certain assumptions, hence are expected to yield similar results. We use stated preference data to compare the valuation of travel time variability under a structural model where trip-timing preferences are defined in terms of time-dependent utility rates, the “slope model”, against its reduced-form model. Two choice experiments are used that are identical except one has a fixed departure time while the other allows respondents to choose departure time freely. The empirical results in this paper do not support the theoretical equivalence of the two models as the implied value of travel time variability under the reduced-form model is an order of magnitude larger. This finding, which is robust to various specification tests, is in line with a recent Swedish study by Börjesson, Eliasson and Franklin [Transportation Research Part B: Methodological, 46(7), 855–873 (2012)]. Since our data allows a direct comparison of the two approaches, we are able to rule out some potential explanations lined up by past research for the observed discrepancy between the two models.

General information
State: Published
Organisations: Department of Management Engineering, Systems Analysis, Transport DTU, Transport Modelling
Authors: Abegaz, D. F. (Intern), Hjorth, K. (Intern), Rich, J. (Intern)
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The forming of truck platoons: How to make it work

General information
State: Published
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling
Authors: Rasmussen, T. K. (Intern), Rich, J. (Ekstern), Nielsen, O. A. (Intern), Pedersen, T. R. (Intern)
The Recharging Infrastructure Needs for Long Distance Travel by Electric Vehicles: A Comparison of Battery-Switching and Quick-Charging Stations

On-road electric vehicle recharging infrastructure is essential in the transformation of electric vehicles into a practical transportation option. This study focuses upon assessing the need for recharging infrastructure for long distance travel for a large market share of electric vehicles, finding the optimal infrastructure deployment, and understanding the economic, social and environmental costs and benefits associated with the optimal infrastructure deployment. The analysis considers quick-charging and battery-switching as plausible recharging technologies. Results show: (i) the promotion of electric vehicles is beneficial when considering economic costs and benefits for operators and users, tax redistribution, and environmental externalities, even with a relatively modest market share; (ii) the number of required recharging stations for satisfaction of the travel demand is at the magnitude of 1–2% of the current gasoline infrastructure, under the assumption of wide availability of off-road recharging at home and the workplace; (iii) the optimal deployment of the recharging stations is along the main national highways outside of urban conurbations, under the assumption of wide availability of home recharging; (iv) the battery-switching technology is far more attractive to the consumer than the quick-charging technology for long-distance travel requiring more than one recharging visit.

General information

State: Published
Organisations: Office for Finance and Accounting, Transport Modelling, Department of Management Engineering, Transport DTU, Management Science, Operations Research, Systems Analysis
Authors: Christensen, L. (Intern), Jensen, T. C. (Intern), Kaplan, S. (Intern), Røpke, S. (Intern), Olsen, A. (Intern)
Number of pages: 21
Pages: 341-361
Publication date: 2017

The restricted stochastic user equilibrium with threshold model: Large-scale application and parameter testing

This paper presents the application and calibration of the recently proposed Restricted Stochastic User Equilibrium with Threshold model (RSUET) to a large-scale case-study. The RSUET model avoids the limitations of the well-known Stochastic User Equilibrium model (SUE) and the Deterministic User Equilibrium model (DUE), by combining the strengths of the Boundedly Rational User Equilibrium model and the Restricted Stochastic User Equilibrium model (RSUE). Thereby, the RSUET model reaches an equilibrated solution in which the flow is distributed according to Random Utility Theory among a consistently equilibrated set of paths which all are within a threshold relative to the cost on the cheapest path and which do not leave any attractive paths unused. Several variants of a generic RSUET solution algorithm are tested and calibrated on a large-scale case network with 18,708 arcs and about 20 million OD-pairs, and comparisons are performed with respect to a previously proposed RSUE model as well as an existing link-based mixed Multinomial Probit (MNP) SUE model. The results show that the RSUET has very attractive computation times for large-scale applications and demonstrate that the threshold addition to the RSUE model improves the behavioural realism, especially for high congestion cases. Also, fast and well-behaved convergence to equilibrated solutions among non-universal choice sets is observed across different congestion levels, choice model scale parameters, and algorithm step sizes. Clearly, the results highlight that the RSUET outperforms the MNP SUE in terms of convergence, calculation time and behavioural realism. The choice set composition is validated by using 16,818 observed route choices collected by GPS devices in the same network and observing their reproduction within the equilibrated choice sets generated by the RSUET model.
The role of information systems in non-routine transit use of university students: Evidence from Brazil and Denmark

In this study we seek to understand the relation between travel information, transit use intentions and night travel. We hypothesize that transit use is related to the perceived usefulness and the ease-of-use of the system, which are related to information quality and real-time information availability. The hypothesized relations are anchored theoretically in the Technology Acceptance Model and validated empirically in two case-studies: (i) Copenhagen (Denmark), characterized by a highly integrated transit system with an advanced web-based information system; (ii) Recife and Natal (Brazil), characterized by a lower perceived level-of-service and non-integrated information sources. Data from a tailor-made survey of 1123 university students were collected. Structural equation models were employed for explaining the use of transit as a function of the observed respondent characteristics and the latent constructs. The results show that: (i) information search quality and source explain transit use; (ii) information quality underlies level-of-service and familiarity;
(iii) the use of real-time information links to information quality and familiarity; (iv) general transit use and non-routine use during night and to unfamiliar places are correlated; and (v) the behavioral framework is confirmed with the two case-studies. (C) 2016 Elsevier Ltd. All rights reserved.

General information
State: Published
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling, Universidade Federal de Pernambuco, Universidade Federal do Rio Grande do Norte
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Publication date: 2017
Main Research Area: Technical/natural sciences

Publication information
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Volume: 95
ISSN (Print): 0965-8564
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
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Web of Science (2017): Indexed yes
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Scopus rating (2016): CiteScore 3.26 SJR 1.613 SNIP 1.944
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.781 SNIP 1.906 CiteScore 3.02
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.25 SNIP 2.597 CiteScore 3.49
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.355 SNIP 2.824 CiteScore 3.46
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 2.42 SNIP 2.652 CiteScore 3
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.87 SNIP 2.538 CiteScore 2.61
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.648 SNIP 2.202
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 2.225 SNIP 2.136
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 2.325 SNIP 2.435
Scopus rating (2007): SJR 1.573 SNIP 2.165
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 2.39 SNIP 2.895
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.869 SNIP 1.716
Scopus rating (2004): SJR 1.915 SNIP 2.545
Scopus rating (2003): SJR 1.473 SNIP 2.014
Web of Science (2003): Indexed yes
The use of electric vehicles: A case study on adding an electric car to a household

The market share of battery electric vehicles (EVs) is expected to increase in the near future, but so far little is known about the actual usage of this emergent technology. Consumer preference studies have indicated that the current limitation on driving distance is important. At the same time studies on the actual use of household vehicles indicate modest requirements for daily travel. An unresolved issue is to what extent these range limitations affect daily travel in EVs. In this study, we use real electric vehicle trip data to study the distribution of daily use and types of home-based journeys where a household decides to use an electric vehicle instead of their conventional vehicle. The results show how several factors related to distance and number of necessary charging events have plausible effects on electric vehicle travel behaviour. Further, the modelling indicates that the EV alternative is mostly used for well-planned transport and that EV use will not be the same as use of the conventional vehicle in two-vehicle households.
Threshold-based Stochastic User Equilibrium models

General information
State: Published
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling, University of Leeds
Authors: Watling, D. P. (Ekstern), Rasmussen, T. K. (Intern), Nielsen, O. A. (Intern), Prato, C. G. (Ekstern)
Publication date: 2017
Event: Abstract from INFORMS Transportation and Logistics Society 2017, Chicago, United States.
Main Research Area: Technical/natural sciences
Publication: Research - peer-review › Conference abstract for conference – Annual report year: 2017

Use of Taxi-Trip Data in Analysis of Demand Patterns for Detection and Explanation of Anomalies
Because of environmental and economic stress, current strong investment in adaptive transport systems can efficiently use capacity, minimizing costs and environmental impacts. The common vision is of a system that dynamically changes itself (the supply) to anticipate the needs of travelers (the demand). In some occasions, unexpected and unwanted demand patterns are noticed in the traffic network; these patterns lead to system failures and cost implications. Significantly, low speeds or excessively low flows at an unforeseeable time are only some of the phenomena that are often noticed and need to be explained for a transport system to develop a better future response. The objective of this research was the formulation of a methodology that could identify anomalies on traffic networks and correlate them with special events by using Internet data. The main subject of interest in this study was the investigation of why traffic congestion was occurring as well as why demand fluctuated on days when there were no apparent reasons for such phenomena. The system was evaluated by using Google’s public data set for taxi trips in New York City. A "normality" baseline was defined at the outset and then used in the subsequent study of the demand patterns of individual days to detect outliers. With the use of this approach it was possible to detect fluctuations in demand and to analyze and correlate them with disruptive event scenarios such as extreme weather conditions, public holidays, religious festivities, and parades. Kernel density analysis was used so that the affected areas, as well as the significance of the observed differences compared with the average day, could be depicted.

General information
State: Published
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling
Authors: Markou, I. (Intern), Rodrigues, F. (Intern), Pereira, F. C. (Intern)
Pages: 129-138
Accounting for the Theory of Planned Behaviour in departure time choice

Motivating people to change their departure time could play a key role in reducing peakhour congestion, which remains one of the most prevalent transport problems in large urban areas. To achieve this behavioural change, it is necessary to better understand the factors that influence departure time choice. So far departure time choice modelling focussed mainly on objective factors, such as time and costs as main behavioural determinants. In this study, we derived psychological factors based on the Theory of Planned Behaviour, estimated them based on structural equation modelling, and included them into a discrete choice model. The psychological factors were measured based on an online questionnaire addressed to car commuters to the city centre of Copenhagen (N = 286). The questionnaire additionally included a travel diary and a stated preference experiment with nine departure time choice scenarios. All psychological factors had a significant effect on departure time choice and could improve the model as compared to a basic discrete choice model without latent constructs. As expected, the effects of the psychological factors were different depending on framework conditions: for people with fixed starting times at work, the intention to arrive at work on time (as estimated by subjective norm, attitude, perceived behavioural control) had the strongest effect; for people with flexible working hours, the attitude towards short travel time was most relevant. Limitations, the inclusion of additional psychological factors and their possible interactions are discussed.

General information
State: Published
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling
Authors: Thorhauge, M. (Intern), Haustein, S. (Intern), Cherchi, E. (Intern)
Pages: 94–105
Publication date: 2016
Main Research Area: Technical/natural sciences

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Journal: Transportation Research. Part F: Traffic Psychology and Behaviour
Volume: 38
ISSN (Print): 1369-8478
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BFI (2018): BFI-level 2
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BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 2.36 SJR 1.065 SNIP 1.392
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.023 SNIP 1.454 CiteScore 2.06
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 0.986 SNIP 1.601 CiteScore 2.02
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 0.988 SNIP 1.765 CiteScore 2.22
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.62 SNIP 2.441 CiteScore 2.54
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.28 SNIP 2.175 CiteScore 2.56
Bounded rational choice behaviour: applications in transport

Even though the theory of rational behaviour has been challenged for almost 100 years, the dominant approach within the field of transport has been based upon the assumptions of neoclassical economics that we live in a world of rational decision makers who always have perfect knowledge and aim to maximise some subjective measure. Where other fields, for example within the social sciences and psychology, have made serious efforts to explore alternative models derived from principles of bounded rationality, this direction has begun to take speed within transport applications only recently. Bounded rational choice behaviour focuses on how the latter approach can be seriously taken into account within transport applications. As the editors discuss in the introduction, a true optimal choice can only be made if an individual has full and perfect information of all relevant attributes in his/her choice set. An individual is said to demonstrate bounded rational behaviour if he/she does not systematically consider all attributes deemed relevant for the decision problem at hand, does not consider all choice options and/or does not choose the best choice alternative. Such simplified representation and limited processing may occur due to time constraints, low involvement in the decision at hand, relying on habits or the task requiring too high a mental effort.

General information
State: Published
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling
Authors: Jensen, A. F. (Intern)
Pages: 680-681
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information
Journal: Transport Reviews
Volume: 36
Issue number: 5
ISSN (Print): 0144-1647
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
Mapping Social Media for Transportation Studies

General information
State: Published
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling, Technical University of Munich
Authors: Chaniotakis, E. (Ekstern), Antoniou, C. (Ekstern), Pereira, F. C. (Intern)
Number of pages: 7
Pages: 64-70
Publication date: 2016
Main Research Area: Technical/natural sciences
Mest trafiksikkerhed for pengene
Ny forskning fra DTU peger på, at det er muligt at forbedre prioriteringen af infrastrukturforbedringer på baggrund af viden om vejenes tilstand, de skønnede udbedringsomkostninger samt uheldsforekomst og alvorlighedsgrad.
On the need for integrating LCA into decision making

The need for sustainable solutions has gained attention both in academia and industry research due to increasing demands of human beings, which are incompatible with limitations in resources availability. Several methods, such as Life Cycle Assessment (LCA), were developed in the past decades to assess the environmental profile of products and services. However, when decision makers have several alternatives at hand to solve a problem, environmental performance is not the only criterion for choosing the best alternative. Other criteria such as risks and economical costs and benefits that are associated with the alternatives will also influence the final choice. Sometimes the most environmentally sustainable alternative may not be the safest or cheapest one. How to make a balanced decision considering environmental performance together with other criteria is not straightforward.

Decision analysis is broadly used to help decision makers identify the best solution among alternatives. The decision is based on expected utility generation, which incorporates consequences (or impacts) associated with each alternative. Depending on the research field and goal of the study, the included consequences can be e.g. environmental impacts, property damages from natural hazards and/or human health impacts. We examined the current decision analysis practice as it is applied in different research fields. The review shows that generally environmental impacts are considered less often than the other consequences. Meanwhile, LCA has been applied in many research fields to assess a wide range of environmental impacts associated with products or services. There is a huge potential for integrating LCA into other decision analysis tools to include assessments of the environmental profile of alternatives. This will provide the possibility of systematical inclusion of environmental considerations in the decision making process, thus facilitating a more holistic decision. However, due to different scopes and purposes of LCA and other decision analysis tools, the integration is not straightforward. The lack of consistency in e.g. system boundaries and handling of uncertainty needs to be carefully managed.

Suitability of commercial transport for a shift to electric mobility

This paper identifies commercial sectors suitable for a shift to electric mobility. The paper concludes that the construction and the health care service sectors are the most suitable for electric mobility because many vehicles are registered in these sectors and daily mileage is reasonably low. They should be primary target groups of specific policy measures to promote the use of electric vehicles. Denmark has only had a few incentives to promote the use of commercial electric vehicles. Until now electric vehicles do generally not show economic benefits unless travel distance is high. However, today the travel range of large vans is an important barrier for electrification due to the battery weight and the limitation of 3.5 tonnes gross vehicle weight for driving with a normal driving licence. The rule needs amendments for electric vehicles, as has been done in Germany. The paper recommends EU countries to follow the German rule allowing EVs up to 4.25
tonnes to be driven with a class B licence, thereby potentially creating a market for big electric vans.

**General information**

State: Published
Organisations: Transport DTU, Transport Modelling, COWI AS, DLR Institute of transport research
Authors: Christensen, L. (Intern), Kveiborg, O. (Ekstern), Klauenberg, J. (Ekstern), Rudolph, C. (Ekstern)
Number of pages: 14
Publication date: 2016
Conference: Ålborg, Denmark, 22/08/2016 - 22/08/2016
Main Research Area: Technical/natural sciences

**Publication information**

Journal: Selected Proceedings from the Annual Transport Conference at Aalborg University
ISSN (Print): 1603-9696
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- BFI (2017): BFI-level 1
- BFI (2016): BFI-level 1
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- BFI (2014): BFI-level 1
- BFI (2013): BFI-level 1
- ISI indexed (2013): ISI indexed no
- BFI (2012): BFI-level 1
- ISI indexed (2012): ISI indexed no
- Web of Science (2012): Indexed yes
- BFI (2011): BFI-level 1
- ISI indexed (2011): ISI indexed no
- Web of Science (2011): Indexed yes
- BFI (2010): BFI-level 1
- BFI (2009): BFI-level 1
- BFI (2008): BFI-level 1
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Electronic versions:
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Source: PublicationPreSubmission
Source-ID: 141916830
Publication: Research - peer-review › Conference article – Annual report year: 2017

**The Danish national passenger model – Model specification and results**

The paper describes the structure of the new Danish National Passenger model and provides on this basis a general discussion of large-scale model design, cost-damping and model validation. The paper aims at providing three main contributions to the existing literature. Firstly, at the general level, the paper provides a description of a large-scale forecast model with a discussion of the linkage between population synthesis, demand and assignment. Secondly, the paper gives specific attention to model specification and in particular choice of functional form and cost-damping. Specifically we suggest a family of logarithmic spline functions and illustrate how it is applied in the model. Thirdly and finally, we evaluate model sensitivity and performance by evaluating the distance distribution and elasticities. In the paper we present results where the spline-function is compared with more traditional function types and it is indicated that the spline-function provides a better description of the data. Results are also provided in the form of a back-casting exercise where the model is tested in a back-casting scenario to 2002.

**General information**

State: Published
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling, COH ApS
Authors: Rich, J. (Intern), Hansen, C. O. (Ekstern)
Pages: 573-599
Publication date: 2016
Main Research Area: Technical/natural sciences

**Publication information**

Journal: European Journal of Transport and Infrastructure Research
Volume: 16
Issue number: 4
Uncertainty in Bus Arrival Time Predictions: Treating Heteroscedasticity With a Metamodel Approach

Arrival time predictions for the next available bus or train are a key component of modern traveler information systems (TISs). A great deal of research has been conducted within the intelligent transportation system community in developing an assortment of different algorithms that seek to increase the accuracy of these predictions. However, the inherent stochastic and nonlinear nature of these systems, particularly in the case of bus transport, means that these predictions suffer from variable sources of error, stemming from variations in weather conditions, bus bunching, and numerous other sources. In this paper, we tackle the issue of uncertainty in bus arrival time predictions using an alternative approach. Rather than endeavor to develop a superior method for prediction, we take existing predictions from a TIS and treat the algorithm generating them as a black box. The presence of heteroscedasticity in the predictions is demonstrated and then a metamodel approach is deployed, which augments existing predictive systems using quantile regression to place bounds on the associated error. As a case study, this approach is applied to data from a real-world TIS in Boston. This method allows bounds on the predicted arrival time to be estimated, which give a measure of the uncertainty associated with the individual predictions. This represents to the best of our knowledge the first application of methods to handle the uncertainty in bus arrival times that explicitly takes into account the inherent heteroscedasticity. The metamodel approach is agnostic to the process generating the predictions, which ensures the methodology is implementable in any system.
Understanding traffic crash under-reporting: Linking police and medical records to individual and crash characteristics

Objective: This study aligns to the body of research dedicated to estimating the underreporting of road crash injuries and adds the perspective of understanding individual and crash factors contributing to the decision to report a crash to the police, the hospital, or both. Method: This study focuses on road crash injuries that occurred in the province of Funen, Denmark, between 2003 and 2007 and were registered in the police, the hospital, or both authorities. Underreporting rates are computed with the capture–recapture method, and the probability for road crash injuries in police records to appear in hospital records (and vice versa) is estimated with joint binary logit models. Results: The capture–recapture analysis shows high underreporting rates of road crash injuries in Denmark and the growth of underreporting not only with the decrease in injury severity but also with the involvement of cyclists (reporting rates of about 14% for serious injuries and 7% for slight injuries) and motorcyclists (reporting rates of about 35% for serious injuries and 10% for slight injuries). Model estimates show that the likelihood of appearing in both data sets is positively related to helmet and seat belt use, number of motor vehicles involved, alcohol involvement, higher speed limit, and females being injured. Conclusions: This study adds significantly to the literature about underreporting by recognizing that understanding the heterogeneity in the reporting rate of road crashes may lead to devising policy measures aimed at increasing the reporting rate by targeting specific road user groups (e.g., males, young road users) or specific situational factors (e.g., slight injuries, arm injuries, leg injuries, weekend).

General information
State: Published
Using internet search queries to predict human mobility in social events

While our transport systems are generally designed for habitual behavior, the dynamics of large and mega cities systematically push it to its limits. Particularly, transport planning and operations in large events are well known to be a challenge. Not only they imply stress to the system on an irregular basis, their associated mobility behavior is also difficult to predict. Previous studies have shown a strong correlation between number of public transport arrivals with the semi-structured data mined from online announcement websites. However, these models tend to be complex in form and demand substantial information retrieval, extraction and data cleaning work, and so they are difficult to generalize from city to city. In contrast, this paper focuses on enriching previously mined information about special events using automated web search queries. Since this context data comes in unstructured natural language form, we employ supervised topic model to correlate it with real measurements of transport usage. In this way, the proposed approach is more generic and a transit agency can start planning ahead as early as the event is announced on the web. The results show that using information mined from the web search not only shows high prediction accuracy of public transport demand, but also potentially provides interesting insights about popular event categories based on extracted topics.

General information
State: Published
Organisations: Department of Management Engineering, Transport Modelling, Transport DTU, KTH - Royal Institute of Technology, Singapore–Massachusetts Institute of Technology (MIT), Los Alamos National Laboratory
Authors: Borysov, S. (Ekstern), Lourenco, M. (Ekstern), Rodrigues, F. (Intern), Balatsky, A. (Ekstern), Pereira, F. C. (Intern)
Number of pages: 6
Pages: 1342-1347
Publication date: 2016

What does the Tourism Demand Survey tell about long distance travel
Long distance travel is one of the fastest increasing travel activities with a very high impact on the climate. Nevertheless the demand is scarcely documented from a transport perspective, nationally as well as internationally and policies to reduce the increase in demand are seldom addressed. This is in sharp contrast to the substantial public and private investments in infrastructure and transport modes for long distance travel by air as well as rail. Furthermore, it is a problem related to the serious environmental impact from air travel (Alonso et al., 2014; Christensen, 2016; Aamaas et al., 2013) The need for more research is therefore obvious. The aim of our paper is to get more knowledge of the development in European travel activity to better understand if there are any possible limits to the increase in long distance travel.

General information
State: Published
Organisations: Transport DTU, Transport Modelling, Department of Management Engineering
Authors: Christensen, L. (Intern), Nielsen, O. A. (Intern)
Number of pages: 28
Publication date: 2016
Main Research Area: Technical/natural sciences
Electronic versions:
From_ETC_website_5167_57e97ff25d1b7.pdf

Bibliographical note
Bemærk 2016
Source: PublicationPreSubmission
Robustness indicators and capacity models for railway networks
In a world continuous striving for higher mobility and the use of more sustainable modes of transport, there is a constant pressure on utilising railway capacity better and, at the same time, obtaining a high robustness against delays. During the planning of railway operations and infrastructure this can be assisted by improving decision support systems to enable planners to use their time more efficiently. In the context of strategic (long-term) planning, efficient decision-support tools translate into being able to evaluate infrastructure and timetable scenarios fast with little data input. This has motivated the research conducted and described in this thesis, where the objective has been to develop and improve existing methods to achieve timetable and infrastructure plans with robust capacity utilisation aimed at the strategic and early tactical planning phases.

General information
State: Published
Organisations: Department of Transport, Traffic modelling and planning, Department of Management Engineering, Transport DTU, Transport Modelling, Rambøll Danmark A/S
Authors: Jensen, L. W. (Intern), Nielsen, O. A. (Intern), Landex, A. (Intern)
Number of pages: 226
Publication date: 2015

Publications information
Publisher: DTU Management
Original language: English
Main Research Area: Technical/natural sciences
Electronic versions:
Lars_Wittrup_Jensen_PhD_thesis.pdf
Publication: Research › Ph.D. thesis – Annual report year: 2016

Projects:

Bedre Uheldsdata
Department of Management Engineering
Transport DTU
Transport Modelling
Technology and Innovation Management
Period: 01/01/2016 → 01/11/2017
Number of participants: 3
Project participant:
Janstrup, Kira Hyldekær (Intern)
Clemmensen, Mikkel Bøg (Intern)
Project Manager, academic:
Møller, Mette (Intern)

Relations
Activities:
Bedre uheldsdata
Project

Model til vurdering af infrastrukturreffekter på trafikuheld
Department of Management Engineering
Transport DTU
Transport Modelling
Technology and Innovation Management
Systems Analysis
Period: 01/01/2016 → 31/12/2018
Number of participants: 3
Project participant:
Janstrup, Kira Hyldekær (Intern)
Pilegaard, Ninette (Intern)
Project Manager, organisational:
Møller, Mette (Intern)

Relations
Activities:
Vejens skadespoint og trafiksikkerhed - Er der behov for et nyt skadespoint, som kan benyttes som trafiksikkerhedsindikator?
Asfaltindustriens valgmøde i Køge
Asfaltindustriens valgmøde i Odense
Cyklistudhold - hvilken betydning har vejen, køretøjet og trafikanten
Asfaltindustriens valgmøde i Guldborgsund
Asfaltindustriens valgmøde i Aarhus
Sammenhængen mellem vejenes tilstand, ulykker og samfundsøkonomi
Trafiksikkerhed som grundlag for bedre prioritering af vejvedligehold
Samfundsekonominiske konsekvenser af trafiksikkerhed

Activities:

Factors contributing to Bicycle accidents in Denmark - a study based on medical records
Period: 10 Jan 2018
Mette Møller (Speaker)
Kira Hyldekær Janstrup (Other)
Department of Management Engineering
Technology and Innovation Management
Transport DTU
Transport Modelling

Description
Presentation at IRTAD/NHTSA Session at TRB conference in Washington DC

Related event
TRB 97th Annual Meeting: Analysis of International Road Safety Data
07/01/2018 → 11/01/2018
United States
Activity: Talks and presentations › Conference presentations

Integrated Optimisation for Public Transport System with Joint Schedule- and Frequency-based Services
Period: 11 Dec 2017
Yu Jiang (Speaker)
Department of Management Engineering
Transport DTU
Transport Modelling

Description
22nd HKSTS Conference
Degree of recognition: International

Related external organisation
Bedre uheldsdata
Period: 6 Dec 2017 → 7 Dec 2017
Kira Hyldekær Janstrup (Other)
Mette Møller (Speaker)
Mikkel Bøg Clemmensen (Other)
Department of Management Engineering
Transport DTU
Transport Modelling
Technology and Innovation Management

Related event

Vejforum 2005
01/01/2005 → …
Nyborg Strand, Danmark
Activity: Talks and presentations › Conference presentations

Vejens skadespoint og trafiksikkerhed - Er der behov for et nyt skadespoint, som kan benyttes som trafiksikkerhedsindikator?
Period: 6 Dec 2017 → 7 Dec 2017
Kira Hyldekær Janstrup (Speaker)
Mette Møller (Other)
Ninette Pilegaard (Other)
Department of Management Engineering
Transport DTU
Transport Modelling
Technology and Innovation Management
Systems Analysis

Related event

Vejforum 2005
01/01/2005 → …
Nyborg Strand, Danmark
Activity: Talks and presentations › Conference presentations

Accident Analysis & Prevention (Journal)
Period: 15 Nov 2017 → …
Kira Hyldekær Janstrup (Reviewer)
Department of Management Engineering
Transport DTU
Transport Modelling

Description
Reviewer
Degree of recognition: International

Related journal

Accident Analysis & Prevention
0001-4575
Central database
Activity: Research › Peer review of manuscripts

Asfaltindustriens valgmøde i Aarhus
Period: 7 Nov 2017
Kira Hyldekær Janstrup (Invited speaker)
Department of Management Engineering
Transport DTU
Transport Modelling

Related event
Asfaltindustriens valgmøder
25/10/2017 → 07/11/2017
Denmark
Activity: Talks and presentations › Talks and presentations in private or public companies and organisations

Asfaltindustriens valgmøde i Guldborgsund
Period: 1 Nov 2017
Kira Hyldekær Janstrup (Invited speaker)
Department of Management Engineering
Transport DTU
Transport Modelling

Related event
Asfaltindustriens valgmøder
25/10/2017 → 07/11/2017
Denmark
Activity: Talks and presentations › Talks and presentations in private or public companies and organisations

Asfaltindustriens valgmøde i Køge
Period: 26 Oct 2017
Kira Hyldekær Janstrup (Invited speaker)
Department of Management Engineering
Transport DTU
Transport Modelling

Related event
Asfaltindustriens valgmøder
25/10/2017 → 07/11/2017
Denmark
Activity: Talks and presentations › Talks and presentations in private or public companies and organisations

Asfaltindustriens valgmøde i Odense
Period: 25 Oct 2017
Kira Hyldekær Janstrup (Invited speaker)
Department of Management Engineering
Transport DTU
Transport Modelling
Degree of recognition: National

Related event
Bus and Passenger Simulation within a Combined Agent-Based Multi-Modal Assignment Model
Period: 16 Sep 2017
Mads Paulsen (Speaker)
Department of Management Engineering
Transport DTU
Transport Modelling
Degree of recognition: International

Related event
hEART 2016: 5th Symposium of the European Association for Research in Transportation
14/09/2016 → 16/09/2016
Delft, Netherlands
Activity: Talks and presentations › Conference presentations

hEART 2017: 6th Symposium of the European Association for Research in Transportation
Period: 12 Sep 2017 → 14 Sep 2017
Mads Paulsen (Participant)
Department of Management Engineering
Transport DTU
Transport Modelling
Degree of recognition: International

Related event
hEART 2017: 6th Symposium of the European Association for Research in Transportation
12/09/2017 → 14/09/2017
Haifa, Israel
Activity: Attending an event › Participating in or organising a conference

MATSim User Meeting: Special Session @ hEART 2017
Period: 11 Sep 2017
Mads Paulsen (Participant)
Department of Management Engineering
Transport DTU
Transport Modelling

Description
User meeting on the latest development of MATSim from users around the world.
Degree of recognition: International

Related event
MATSim User Meeting: Special Session @ hEART 2017
11/09/2017 → 11/09/2017
Haifa, Israel
Activity: Attending an event › Participating in or organising a conference

Cyklistuheld – hvilken betydning har vejen, køretøjet og trafikanten
Period: 28 Aug 2017 → 29 Aug 2017
Kira Hyldekær Janstrup (Speaker)
Sustainable Development Goals (SDGs) have raised the attention of the global society to apply environmental friendly solutions to solve problems. Cost Benefit Analysis (CBA) has been broadly used in different contexts and disciplines to facilitate decision makers in choosing among alternatives. CBA assumes that for each alternative there is a set of consequences, divided between costs and benefits that can be expressed in monetary terms. The preferred alternative is the one with the higher benefit cost ratio or Net Present Value (NPV). The considered consequences vary depending on the decision context. For example, the consequences that are covered in conventional transport projects include, among
others, financial costs, travel time savings, variation in distance traveled, and the so called externalities, including number of accidents, noise impacts and some air pollutants (e.g. CO2, NOx, SOx, CO and HC from fuel consumption). With respect to the air pollutants, monetary values are provided by CBA guidelines for transport as well as for other disciplines. However, CBA overlooks the full life cycle of infrastructures and vehicles, and the full set of environmental impacts, due to the lack of methodology to quantify the comprehensive impacts and the lack of monetary values of those impacts. Life Cycle Assessment (LCA) is a robust methodology that assesses environmental profiles of products and services through their whole life cycles. For a given solution to a decision problem, LCA can quantify environmental pollutants and resource consumptions that are associated with the physical elements in the solution (e.g. infrastructures and vehicles). Note that LCA provides an inventory that covers a comprehensive list of pollutants and resource consumptions, which can also be translated into damages on the protected area, namely ecosystem health, human health and resources availability, via life cycle impact assessment (LCIA). This gives possibilities of monetizing environmental impacts either on the inventory level, or on the damage level. Nevertheless, the monetizing values of different pollutants and resources should be consistent with the damages (and thus the monetizing values of the damages) that they may cause on the protected area.

This research aims to 1) investigate the monetary values of environmental pollutants in the chosen application disciplines; 2) understand if those values are consistent with the monetized damages calculated by LCA methods and; 3) compare CBA with and without LCA, considering the uncertainty, using a transport case study. Our study shows that the monetized damages calculated by LCA methods lie within the range of values reviewed in transport and waste treatment studies. The variation of pollutant prices can vary up to 2-3 orders of magnitude depending on the chosen methodology. The results from the transport case study show that including the monetized LCA result in the traditional CBA doubles the NPV. This suggests that the price assigned to particularly CO2 can change the NPV dramatically, which can influence the decision when more options are available. In sum, integrating monetized LCA results into current CBA is a feasible way of including environmental impacts in decision making, increasing the environmental relevance of the decision support.

Degree of recognition: International

Links:
http://isie-issst2017.uic.edu/

Related event

ISIE 2017: Science for Sustainable and Resilient Communities
25/06/2017 → 29/06/2017
Chicago, United States
Activity: Talks and presentations › Conference presentations

Samfundsøkonomiske konsekvenser af trafiksikkerhed
Period: 14 Jun 2017
Kira Hyldekær Janstrup (Invited speaker)
Department of Management Engineering
Transport DTU
Transport Modelling

Related external organisation

Brancheforeningen Sikre Veje
Lautrupvej 2, 2750, Ballerup, Denmark
Activity: Talks and presentations › Talks and presentations in private or public companies and organisations

Trafiksikkerhed som grundlag for bedre prioritering af vejvedligehold
Period: 12 Jun 2017 → 13 Jun 2017
Kira Hyldekær Janstrup (Invited speaker)
Department of Management Engineering
Transport DTU
Transport Modelling

Related event

NVF - Vejteknologisk sommermøde
12/06/2017 → 13/06/2017
Stockholm, Sweden
**Ambitøse mål for trafiksikkerhed**
Period: 31 May 2017  
Kira Hyldekaer Janstrup (Speaker)  
Department of Management Engineering  
Transport DTU  
Transport Modelling  

**Related event**
*Transport Summer Summit DTU 2017: Challenges, research and new developments within transportation, mobility and sustainability*
31/05/2017 → 31/05/2017  
Lyngby, Denmark  

**Creating Ideal Railway Traffic in a Multi-Modal Simulation Universe**
Period: 31 May 2017  
Mads Paulsen (Speaker)  
Department of Management Engineering  
Transport DTU  
Transport Modelling  

**Description**
Pecha Kucha presentation in the railway pitch session.  
Degree of recognition: National  
Documents:  
CreatingIdealRailwayTrafficInAMultiModalSimulationUniverse  

**Related event**
*Transport Summer Summit DTU 2017: Challenges, research and new developments within transportation, mobility and sustainability*
31/05/2017 → 31/05/2017  
Lyngby, Denmark  

**Applying LCA in decision making- the need and the future perspective**
Period: 10 May 2017  
Yan Dong (Speaker)  
Simona Miraglia (Other)  
Stefano Manzo (Other)  
Stylianos Georgiadis (Other)  
Hjalte Jomo Danielsen Sarup (Other)  
Elena Boriani (Other)  
Tine Hald (Other)  
Sebastian Thøns (Other)  
Michael Zwicky Hauschild (Other)  
Department of Management Engineering  
Quantitative Sustainability Assessment  
Centre for oil and gas – DTU  
Transport DTU
There is nowadays a need of including sustainable considerations in the policy and decision making. Sound decision making requires evidence-based support, i.e. decision analysis to help decision makers in identifying the best alternative based on the associated impacts. Decision analysis includes four steps: 1) structure decision problem; 2) assess possible impacts associated with alternatives; 3) determine stakeholder preferences and 4) evaluate alternatives. Decision analysis
can be performed applying different tools, such as cost-benefit analysis (CBA), risk assessment, and life cycle assessment (LCA).

LCA is a decision analysis tool that focuses on environmental impacts. One limit is that LCA is based on defined impact categories and therefore does not provide information for those impacts and consequences out of the LCA scope. However, the LCA framework closely follows the decision analysis scheme and has the potential to be integrated with other decision analysis tools to enhance their assessment of environmental impacts.

To understand why LCA is needed in the policy decision context, we looked into the decision support for policy in several disciplines. Taking sustainable transport policy as an example, the traditional decision analysis tool for choosing the best alternative is CBA. CBA mainly analyses socio-economic impacts, such as travel time savings and costs, while only some environmental impacts are considered; i.e. the damage costs of greenhouse gas emissions, particulate matters, SOx, NOx and noise. Therefore, current transport policy making rarely reflect a full environmental profile of the suggested alternatives. Making decisions based on incomplete information may lead to sub-optimal solutions, especially where the environment is a major concern. There is a growing attention of conducting LCA in transport. Some identified environmental hotspots, such as consumer and household behavior, which may be the focus for future policies. Others assess the environmental impacts associated with building infrastructures and vehicle use. These studies verify that LCA can successfully quantify the environmental profile of alternatives in transport policy, if the relevant physical changes, e.g. vehicle travel distance and new infrastructures, are well-defined. However, before integrating LCA with other decision analysis methods for decision support, the study system, objectives, scopes, evaluation metrics and uncertainty handling need to be aligned.

Degree of recognition: International

Links:
https://brussels.setac.org/

Related event

SETAC Europe: 27th Annual Meeting – Environmental Quality Through Transdisciplinary Collaboration
07/05/2017 → 13/07/2017
Brussels, Belgium
Activity: Talks and presentations › Conference presentations

Exposure group meeting - Walk21
Period: 18 Apr 2017
Kira Hyldekær Janstrup (Speaker)
Department of Management Engineering
Transport DTU
Transport Modelling

Related event

OECD - International Transport Forum: IRTAD - Meeting
18/04/2017 → 20/04/2017
Paris, France
Activity: Talks and presentations › Talks and presentations in private or public companies and organisations

Sammenhængen mellem vejenes tilstand, ulykker og samfundsøkonomi
Period: 30 Mar 2017
Kira Hyldekær Janstrup (Invited speaker)
Department of Management Engineering
Transport DTU
Transport Modelling

Related external organisation

Asfaltindustrien
Lautrupvej 2, 2750, Ballerup, Denmark
Activity: Talks and presentations › Talks and presentations in private or public companies and organisations

Subcommity of AB10 Long Distance and Intercity Travel Joint Subcommity
Period: 9 Jan 2017
Modelling production-consumption flows of goods in Europe: the trade model within Transtools 3
Period: 5 Oct 2016
Gerard de Jong (Speaker)
Reto Tanner (Other)
Jeppe Rich (Other)
Mikkel Thorhauge (Other)
Otto Anker Nielsen (Other)
John Bates (Other)
Department of Management Engineering
Transport DTU
Transport Modelling

Description
Estimation results and elasticities are presented for the trade model within the European transport model Transtools3. We also explain how the outcomes of this model are used in the overall freight model.

Related event
European Transport Conference 2016
05/10/2016 → 05/10/2016
Barcelona, Spain
Activity: Talks and presentations › Conference presentations

A model for freight transport chain choice in Europe
Period: 14 Sep 2016 → 16 Sep 2016
Anders Fjendbo Jensen (Speaker)
Mikkel Thorhauge (Other)
Gerard de Jong (Speaker)
Jeppe Rich (Other)
Thijs Dekker (Other)
Daniel Johnson (Other)
Manuel Ojeda Cabral (Other)
John Bates (Other)
Otto Anker Nielsen (Other)
Department of Management Engineering
Transport DTU
Transport Modelling

Description
This paper describes the structure of the Transtools3 freight transport chain choice model for Europe and the data at the shipment level that were used in estimation, and presents the estimation results and resulting elasticities. It also discusses the structure of the overall freight model and how production-consumption matrices from a trade model are combined with the transport chain choice model in model application. In the estimation of the transport chain choice model on the available disaggregate data sources (the Swedish Commodity Flow Survey 2009 and the French ECHO survey) we tested several options for the specification of transport costs in the model and various nesting structures.

Degree of recognition: International

Documents:
TT3 transport chain choice hEART 2016 v5

Related event

date 2016
14/09/2016 → 16/09/2016
Delft, Netherlands
Activity: Talks and presentations › Conference presentations

Synthesis of household based trip diaries
Period: 14 Sep 2016
Mikkel Thorhauge (Speaker)
Jeppe Rich (Other)
Department of Management Engineering
Transport DTU
Transport Modelling
Documents:
Thorhauge - Trafikdage 2016 - Synthetic HH

Related event

date 2016
14/09/2016 → 16/09/2016
Delft, Netherlands
Activity: Talks and presentations › Conference presentations

Workshop on Public Transport Modelling and Analytics
Period: 13 Sep 2016
Mads Paulsen (Participant)
Department of Management Engineering
Transport DTU
Transport Modelling

Related event

Workshop on Public Transport Modelling and Analytics
13/09/2016 → 13/09/2016
Delft, Netherlands
Activity: Attending an event › Participating in or organising a conference

Udvikling af transportvanedata for husholdninger
Period: 23 Aug 2016
Mikkel Thorhauge (Speaker)
Jeppe Rich (Other)
Department of Management Engineering
Transport DTU
Transport Modelling
Description
The focus of this study is departure time choice modeling of car commuters in the morning rush hours. To model this we use the approach first formulated by Small (1982), i.e. the Scheduling Model. This study will contribute to the research of departure time choice modeling in three distinct ways. Firstly, by designing an efficient stated choice design specifically built to capture the trade-offs being made in the choice of departure times. Secondly, to account for detailed level of flexibility not only in relation to the specific trip under question, but for trips and activities throughout a 24 hour time period. This is important because a crucial problem when studying departure time is that the choice of when to realize a given trip is (often) related to the full daily activity pattern, such as a restriction or a preference in one activity may form restrictions in the flexibility of other activities and thereby affects the preference for the related departure time. And thirdly, to incorporate latent variables to measure underlying preferences that potentially affect departure time following the Theory of Planned
Behavior, as these preferences are believed to be an important factor in explaining behavior. 

**Documents:**

Thorhauge_Feb2014

**Links:**

https://safetrec.berkeley.edu/news/safetrec-uctc-seminar-departure-time-choice-modeling

**Related event**

**SafeTREC-UCTC Seminar: Departure time choice modeling**

07/02/2014 → 07/02/2014

Berkeley, United States

Activity: Talks and presentations › Conference presentations

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**hEART2013 2nd Symposium of the European Association for Research in Transportation**

Period: 4 Sep 2013 → 6 Sep 2013

Mads Paulsen (Participant)

Department of Management Engineering

Transport DTU

Transport Modelling

Degree of recognition: International

**Related event**

**hEART2013 2nd Symposium of the European Association for Research in Transportation**

04/09/2013 → 06/09/2013

Stockholm, Sweden

Activity: Attending an event › Participating in or organising a conference

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**Samfundsekonomiske fordele i køreplaner ved hjælp af passagerforsinkelsesmodeller**

Period: 9 May 2012

Mikkel Thorhauge (Speaker)

Department of Management Engineering

Transport DTU

Transport Modelling

Degree of recognition: National

**Documents:**

Mikkel_Thorhauge_Banekonferencen_2012

**Related event**

**Danish Railway Conference 2012**

09/05/2012 → …

Copenhagen, Denmark

Activity: Talks and presentations › Conference presentations

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**Prizes:**

**DTU’s Young Researcher Award**

Kira Hyldekær Janstrup (Recipient)

Department of Management Engineering, Transport DTU, Transport Modelling

**Details**

Awarded date: 30 Sep 2016

Granting Organisations: Technical University of Denmark

event: PhD graduation ceremony

Prize: Prizes, scholarships, distinctions
INFORMS Railway Application Section 2016 Student Paper Award - Second Place
Fabrizio Cerreto (Recipient), Otto Anker Nielsen (Recipient) & Steven Harrod (Recipient)
Department of Management Engineering, Transport DTU, Transport Modelling, Management Science

Description
RAS (Railway Applications Section), a subdivision of INFORMS (Institute for Operations Research and Management Sciences), is sponsoring a student research paper contest on analytics and fact-based decision making in railway applications.

Operations Research (OR) and the Management Sciences (MS) are professional disciplines that deal with the application of information technology for informed decision making. OR/MS professionals aim to provide rational bases for decision making by seeking to understand and structure complex situations and to use this understanding to predict system behavior and improve system performance. Much of this work is done using analytical and numerical techniques to develop and manipulate mathematical and computer models of organizational systems composed of people, machines, and procedures. RAS provides a forum for bringing together practitioners, consultants, and academics interested in applying OR/MS techniques to the railroad industry. RAS activities include roundtables, paper sessions at INFORMS national meetings, workshops, and focus groups. Roundtables provide attendees with a unique opportunity to explore, in-depth, topics ranging from eBusiness to simulation to network modeling together with a panel of experts. Paper sessions feature the latest in OR/MS research pertaining to the rail industry.

Details
Awarded date: 13 Nov 2016
Degree of recognition: International
Granting Organisations: INFORMS
event: INFORMS Nashville 2016 Annual Meeting
Prize: Prizes, scholarships, distinctions

Prof. P.H. Bendtsens Transport Research Award
Mikkel Thorhauge (Recipient)
Department of Management Engineering, Transport DTU, Transport Modelling

Details
Awarded date: 22 Aug 2016
Degree of recognition: National
event: Trafikdage 2016
Prize: Prizes, scholarships, distinctions

Third best paper and presentation at ECTRI-FERSI Young Researchers Seminar
Kira Hyldekær Janstrup (Recipient)
Department of Management Engineering, Transport DTU, Transport Modelling

Details
Awarded date: 7 Jun 2013
Granting Organisations: Forum of European Road Safety Institutes ( FERSI)
event: FERSI Young Researchers’ Seminar
Prize: Prizes, scholarships, distinctions

Press clippings:

Dårlige veje i Odense kommune kan betyde flere uheld
Kira Hyldekær Janstrup
25/10/2017
Department of Management Engineering, Transport Modelling, Transport DTU

Media contribution (1)

Dårlige veje i Odense Kommune kan betyde flere uheld
25/10/2017
DR, Denmark, Web
https://www.dr.dk/nyheder/regionale/fyn/daarlige-veje-i-odense-kommune-kan-betyde-flere-uheld
Kira Hyldekær Janstrup