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Editorial: Data science methods for solving real-world problems in transportation, security and beyond

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Editorial on the Research Topic
Data science methods for solving real-world problems in transportation, security and beyond

1 Introduction

The contemporary world is rife with opportunities and challenges in the fields of security and transportation. Urbanization, globalization, digitalization, and population growth have all contributed to creating dynamic, complicated problems that need creative, practical solutions. Large and complex data sets generated in these domains can be analyzed, understood, and used with the help of solid tools provided by data science, which includes a wide range of techniques, including computer vision, machine learning, deep learning, statistics, natural language processing, etc. In fact, data science can potentially improve society's safety and wellbeing as well as the effectiveness and performance of security and transportation systems.

In this sense, some reflections linked to the Research Topic are raised, such as how data science can contribute to improving transport management and what is the impact of road infrastructure, urban design and transport systems in developing more sustainable and safer mobility for citizens? Or can data science identify which variables influence users' driving decisions and behaviours? Consequently, this Research Topic aims to respond to these issues and demonstrate the state-of-the-art research and advances in data science that can address real-world problems in transportation, security and beyond.

2 The main findings of the articles

Kongsap and Kaewunruen examine the applications of agent-based and multi-agent-based models for addressing the problems associated with long-distance interconnected transportation demands. The results show certain practical limits to the existing

employment of agents or multi-agent models. Previous research demonstrated that, despite the methods' potential for time-consuming results, mathematical techniques can generate more satisfactory results when used to evaluate the resilience of vital infrastructures, schedule trains, and dispatch vehicles. Agent-based and multi-agent-based models, on the other hand, can reduce processing times and identify disruptive events earlier. Thus, the article presents several novel ideas, such as applying big data to crisis management, examining the interconnection of high-speed rail infrastructure, and improving transportation resilience.

Yang et al. investigate the impact of various working circumstances on the asphalt pavement to create a three-dimensional finite element model of the pavement. The findings demonstrate that the structure model for asphalt pavement can accurately represent the effects of various working conditions on the pavement; the transverse stress and strain of the pavement are primarily influenced by the conditions encountered when cornering, and the maximum value is primarily located on the outer edge line of the wheel and a distance from it; on the other hand, the longitudinal tensile stress and strain of the pavement are primarily influenced by the conditions encountered when driving and braking, and the maximum value is primarily distributed in the centre line of the single.

Se et al., using a three-dimensional finite element model, analyze the impact of various working circumstances on the asphalt pavement. The findings demonstrate that the model of the structure of asphalt pavement can capture the effects of various working conditions on the pavement; most notably, the working conditions during cornering have the most significant impact on the transverse stress and strain of the pavement, with the maximum value primarily distributed in the centre line of the single wheel and a distance from it; on the other hand, the working conditions during driving and braking have the most significant impact on the longitudinal tensile stress and strain of the pavement.

Rezapour and Ksaibati revealed that the mixed hybrid latent class model's model fit was much better than that of the primary hybrid, simple mixed random regret minimization (RRM), and random utility maximization (RUM) models. Some variables that have been discovered to influence drivers' decisions include gender, distraction, emotional states of the drivers, and environmental circumstances. The findings indicate that a considerable fraction of attributes are processed by the RRM, even if most attributes are treated following the RUM. Based on several paradigms, the hybrid model offers a deeper understanding of the variables influencing drivers' actions before crashes.

Rezapour and Ksaibati studied RUM and RRM to understand driver behavior that led to collisions. The findings demonstrated that although the RRM model is outperformed by the conventional RUM model, the other approaches are outperformed by the standard mixed models and the mixed models that take observed heterogeneity into account. They discovered that the performance of RRM is susceptible to the included qualities, as would be predicted given its methodological framework. For example, we discovered that the RRM model performs much better than the RUM model when the traits of drivers' conditions and drivers under influence are excluded. Given that the inclusion of those factors deteriorates the total of pairwise regret comparison, the impact may be related to the fact that when drivers are under abnormal conditions or the influence of drugs or alcohol.

3 Potential impacts of research on the Research Topic

The papers that make up this Research Topic address different issues related to transportation and mobility from a data science perspective. Therefore, they present practical applications for multiple incident factors in road safety.

On the one hand, the research developed by Kongsap and Kaewunruen offers findings on transport infrastructure management, highlighting the application of models to improve the resilience of long-distance transport. On the other hand, both the study by Yang et al. and Se et al. examine the impact of various working conditions on asphalt pavement, being findings with a potential impact on the optimization of the design and maintenance of such road infrastructures, with the repercussion of increased road durability.

Potential impacts on understanding driver behaviour and accident prevention are also identified. Thus, the studies conducted by Rezapour and Ksaibati provide information on the factors that influence drivers' decisions, which are essential elements for developing technologies, measures, and policies for preventing road accidents and improving mobility.

Author contributions

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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