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Editorial

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The papers selected for this issue of *Proceedings of the Institution of Civil Engineers – Transport* all highlight the increasing sophistication of data harvesting and analysis and the major influence this has on the future direction of the civil engineering profession. The availability of powerful computation tools is increasingly freeing engineers from the manual collation of data and instead allowing them to use their ingenuity to develop and widen analysis applications. This has obvious benefits for increased accuracy, efficiency and accessibility. For example, this can bring about material reduction and corresponding carbon dioxide emissions, allows increased accessibility of data such as in building information modelling (BIM) models and, as in the case of the papers showcased in this issue, bring about improvements in safety. As artificial intelligence and automation become the norm, the civil engineering profession is poised to embrace the opportunities this will afford.

The selected papers each showcase a different aspect of the potential of structured collation of big data, but all utilise modelling to enable efficiencies and directed improvements to highway applications that result in targeted funding that brings about safer outcomes.

The first paper, 'Detecting crash hotspots using grid and density-based spatial clustering' (Ganjali Khosrowshahi *et al.*, 2023), investigates different analysis methods and algorithms to examine the density and clustering of crashes in the cities of Gebze and Izmet in Turkey over a period of a year. Notes are provided on methods to enhance correlation and the authors advise the most effective tools for the identification of factors impacting on crash frequency and severity. Identification of crash hotspots is the first step towards reducing traffic accidents and to this end the paper proposes the application of the identified method to any city.

Road traffic accident reduction is the ultimate aim of 'Road safety resource allocation using the cost-effectiveness approach; case study in Iran' (Behnood and Pino, 2023). This paper looks at computational methods of analysing available road improvement options and identifying which provide the most cost-effective way of reducing accidents. This approach is compared to cost–benefit analysis, which distinguishes the monetary cost of accidents of differing severity. The paper looks at case studies in rural Iran and demonstrates the importance of data analysis to ensure the efficient investment of funds in road improvements when resourcing is limited.

In 'Predicting operating speed: comparison of linear regression and structural equation models' (Bamdad Mehrabani *et al.*, 2023) the influence of latent variables on operating speed of multi-lane highways was explored. The paper compares the more common approach of linear regression modelling, which considers observed variables such as road geometry, with structural equation modelling (SEM) that also considers influences such as adjacent land use. The paper found that the SEM provides a closer correlation.

The increasing sophistication of microsimulation models has made possible the wider application to traffic systems driving further development. This issue of *Transport* showcases two papers that use the power of microsimulation modelling to analyse the safety and efficiencies of highway intersections.

'Microsimulation-based framework to analyse urban signalised intersection in mixed traffic' (Mondal and Gupta, 2023) proposes a new method for calibrating microsimulation models to incorporate mixed vehicle flows. The paper demonstrates closer correlation with actual performance than traditional calibration methods based on homogenous traffic streams and points towards development of performance measurement for other scenarios.

'Critical gaps at three-legged unsignalised intersections using microsimulation' (Dutta and Ahmed, 2023) takes microsimulation to a new area by demonstrating that the Vissim software program can be used confidently to generate gap acceptance data without the need for field data. If implemented, this could save time and effort in the critical gap estimation.

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