Editorial

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Modelling – the construction of a virtual representation of a physical situation or process – is now an essential component of most projects. Models allow engineers to forecast likely outcomes based on past experience, and then design appropriate mitigating measures. Just as importantly, models allow engineers to experiment in a ‘risk-free’ environment. Of course, in order for engineers to have confidence in a model it is essential that the output is validated to ensure that it correlates with the observed physical outcomes.

Modelling is the common theme running through all the papers in this issue of *Transport*. Applications range from a high-speed rail network in Spain, by way of highways in Brazil to internal air routes in Iran.

The first two papers provide examples of the use of models for road traffic accident forecasting. A recent themed issue of the journal on transport safety and assessment presented a literature review of road traffic accident prediction modelling (Yannis *et al.*, 2017), which was based largely on European experience. Ahmadinejad *et al.* (2018) have addressed accident prediction modelling on rural roads in Iran and examined whether deceleration records for vehicles are a surrogate for accident data.

Deceleration records (i.e., instances of braking) were collected using smartphones and global positioning system (GPS) technology. The use of smartphone technology, rather than instrumenting individual vehicles, allows data to be collected quickly and cheaply. The deceleration records were compared with accident data for the same stretch of road and the conclusion of the study is that there is a high degree of correlation. The proposed approach improves the identification of potential road traffic accident hotspots and offers the opportunity to design in mitigation measures.

A support vector machine (SVM) is a technique for machine learning; it has been used previously for, among other applications, predicting the probability of pavement failure (Schlotjes *et al.*, 2015). Singh *et al.* (2018) use the same technique for predicting road traffic accidents. Data were collected on accidents on non-urban roads in the state of Haranya, India, together

with traffic volumes, speeds and road geometry. Two-thirds of the data were used to train the model and the remaining third used to validate the trained model. Use of the SVM was found to give better forecasts than conventional techniques, and it helped to identify significant contributory factors to accidents.

Previous research on high-speed rail networks has examined network topology, using examples from France, Japan and Spain (Canizares *et al.*, 2015). In the third paper, Moyano and Coronado (2018) focus on the typology of the city-to-city links offered by the Spanish high-speed rail network. At 3240 km in length the Spanish network is the biggest in Europe, and worldwide is second only to China (Wikipedia, 2018). The paper identifies clusters of city-to-city links with similar characteristics, including population served, distance and speed. Definition of types of city-to-city link could be useful in the planning of future high-speed rail networks.

In a model for incorporating robustness in flight planning, Khaksar and Sheikholeslami (2018) use an approach based on the Dantzig–Wolfe decomposition to address problems caused by delay in commercial passenger flights. When applied to a case study of an Iranian airline, the model reduced delay by 23%.

Our fifth paper returns to railways with a very specific track-maintenance application. The effect on vehicle ride of settlement of the ballast and formation beneath railway sleepers is familiar to anyone who has travelled by train. Sadeghi *et al.* (2018) investigate the effect of unsupported sleepers on track dynamic behaviour. A finite-element model was developed which incorporated sleeper prestress forces, variation in sleeper cross-section and loss of contact between the sleeper and the ballast. The model was tested against field data from the Tehran-to-Karaj line in Iran, and from a high-speed line in Portugal. Displacements predicted by the model differed by only 5% from the measured results.

Finally, in their paper ‘Horizontal highway segmentation optimisation using genetic algorithms’, Borges *et al.* (2018) look at determining highway alignment information for the Brazilian road network to support the installation of automated weigh

bridges for heavy goods vehicles. Like Ahmadinejad *et al.* (2018), Borges *et al.* propose the use of GPS data collected by vehicles travelling on the road network, in this case to record the alignment. The paper describes the use of genetic algorithms to optimise the process of extracting the horizontal alignment from the collected data. The effectiveness of two optimised algorithms was then tested using a set of synthetic polygons and a significant improvement was observed over the un-optimised techniques.

Transport welcomes high-quality papers on subjects relevant to both practitioners and academics. In addition to issues such as this one, which contain papers on a range of subjects, the editorial panel intends to offer a number of themed issues each year, for which calls for papers will be made.

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