

Road traffic flow prediction for noise modelling

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ABSTRACT

A major challenge in road traffic noise modelling is obtaining good coverage of traffic flows (i.e., counts and speeds). Government/local authority traffic counting is generally sparse, and modelling omits most residential roads because traffic data are otherwise unavailable. This paper reports on the development and validation of statistical modelling to predict road traffic counts for the entire connected road network within cities/regions. The method applied uses Multivariate Adaptive Regression Splines (MARS). This allows the modelling of non-linearities and interactions between variables. In simple terms, rather than a single linear regression, MARS applies pseudo-curve fitting to data by allowing for multiple linear equations within an overall function. Withing the EU-funded Equal-Life project, we have successfully developed a model by combining data from three cities (Bristol, Leeds, Norwich), using 75% of the data to train models whilst retaining 25% of data to test model performance internal to the datasets. Model training R^2 was in the region 0.80 and model testing R^2 was in the region 0.65-0.70. Furthermore, we developed two-city models (e.g., Bristol and Norwich) to test to the transferability of models to each held-out city, in turn (e.g., Leeds). Hold-out R^2 was ~ 0.50 . OSM road feature classes (i.e., road type) and network distance to the nearest major road junction were consistently the strongest variables. This method is promising and requires further development and testing, including application to locations outside of the UK.

Keywords (3-6): Road-traffic noise, traffic counts, modelling, exposure assessment