CURRENT VALIDATION OF TRAFFIC MODELS: ARE THEY CORRECT FOR UNCERTAINTY ANALYSIS?

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ABSTRACT

From a methodological point of view it is widely accepted that simulation is a useful technique to provide an experimental test bed to compare alternate system designs, replacing the experiments on the physical system by experiments on its formal representation in a computer in terms of a simulation model. Simulation may thus be seen as a sampling experiment on the real system through its model. The reliability of this decision making process depends on the ability to produce a simulation model representing the system behavior closely enough for the purpose of using the model as a substitute of the actual system for experimental purposes. This reliability is established in terms of validation of the model. Model validation is inherently a statistical process in which the uncertainty due to data and model errors should be account for. This paper review the current practice of traffic modelling validation methodology proposed by traffic simulation guidelines published by public administrations or organizations (FHWA, UKHigways, TfL, etc) and compares the statistic techniques used in other simulation fields. On the other hand, the paper describes techniques associated to uncertainty analysis and sensitivity analysis for understanding the nature of each input parameter of the traffic simulation model and

their contribution in the simulation outputs. The set of parameters of a traffic simulation could be partitioned into two independent sets, parameters related to the supply (topological information, speed limits, traffic control, etc) and demand (vehicle types and OD matrices). This paper is focused on apply the uncertainty analysis on the demand side because it is an unobservable parameter and normally is estimated using undirected methods.

All cases are illustrated numerically with examples from real life simulation projects with the Aimsun simulator.

Key words: Traffic simulation models, Guidelines, Validation, Calibration, Aimsun