Sensitivity analysis of driving behaviors to emissions at signalized intersections
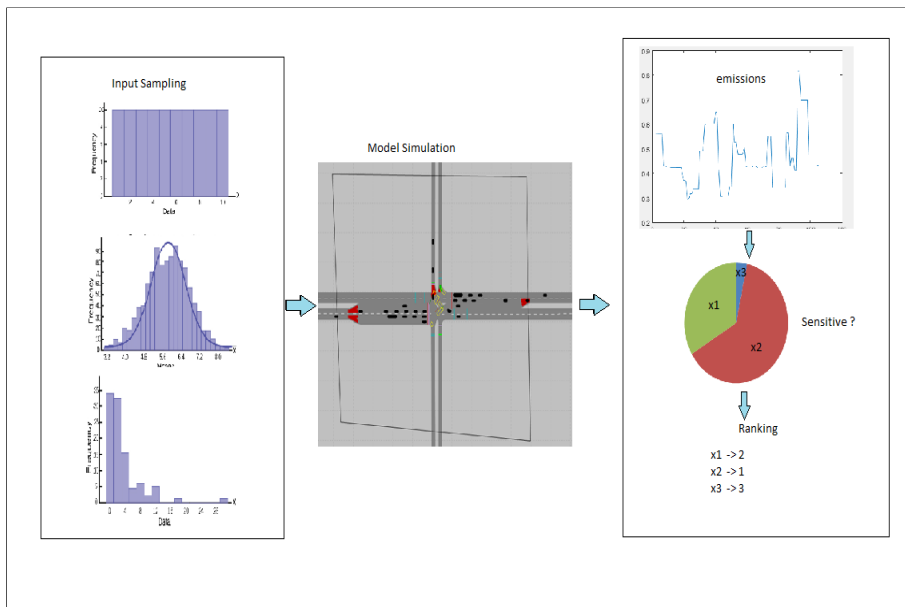
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Sensitivity of a model can be defined as how much the variation of an input variable affects the output data. The key motivation for performing a sensitivity analysis is to identify most important sources of variability and uncertainty in order to facilitate model development, verification, and validation; prioritization of key sources of variability and uncertainty in order to prioritize additional data collection and research; and general model refinement .This research identifies the influence of Driving behavior parameters of microscopic Simulation tools like VISSIM and SUMO on the emission factors for an Urban Signalized Intersection.

Application of Morris Method based on Elementary Effects

The Elementary Effects (EE) method is a qualitative and stochastic approach developed by Morris.

The average and standard deviations of elementary effects enable negligible and influencing variables to be sorted and linear and non-linear influences to be distinguished
- If μ_i is low, then i is a negligible parameter.
- If μ_i is high and σ_i is low, i has linear and additive effects but no interactions with others.
- If μ_i and σ_i are both high, i has non-linear effects and/or strong interactions with others.
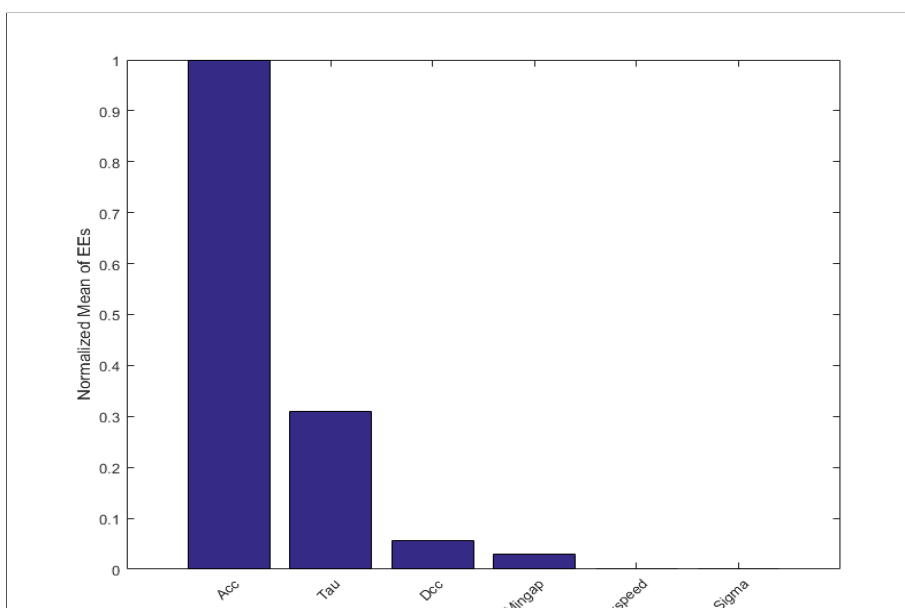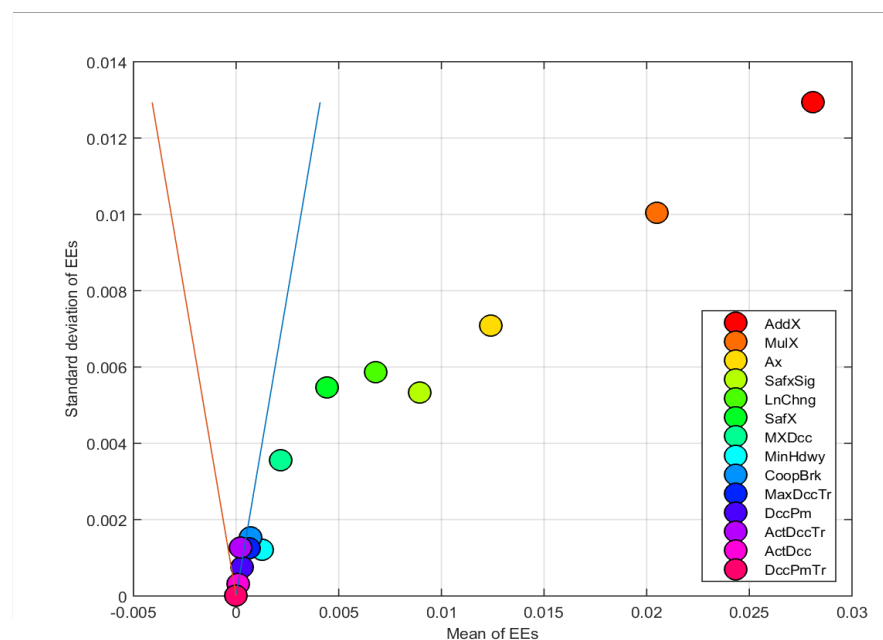
By ranking of the sensitivity index of the parameters, the next level of Quantitative analysis will have fewer parameters to analyze. This can save a lot of computation time and much sophisticated methods can be applied for further calibration. In the field of ITS, the sensitive parameters which are bound to cause an increase in emission can be brought under control are put under driver assistance systems either within the car or utilising the urban infrastructure design .For example when we notice that acceleration is the main cause of emissions from the SUMO simulation, the acceleration at Signalised intersections could be autonomously controlled by the Driver assistance systems

August 2016

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