Graph transformation based simulation model generation

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Abstract

The graph transformation based method presented in this paper can automatically generate simulation models assuming that the models are intended for a certain domain. The method differs from other methods in that: the data used for model generation does not contain specifications of the model structures to be generated; the generated simulation models have structures that are dynamically constructed during the model generation process. Existing data typically has quality issues and does not contain all types of information, particularly in terms of model structure, that are required for modelling. To solve the problem, transformation rules are designed to infer the required model selection and structure information from the data. The rules are specified on meta-models of the original data structure, of intermediate structures and of the simulation model. Graph patterns, pattern composites and graph pattern matching algorithms are used to define and identify potential model components. Model composite structures are represented by hypergraphs according to which simulation models are generated using model components as building blocks. The method has been applied practically in the domain of light-rail transport.

simulation model generation graph transformation hypergraph model component

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