Validation of Well-formedness Constraints on Uncertain Models

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In Model Driven Development (MDD) models are the main design artifacts, from which documentation, system configuration, or even source code can be automatically generated. As a result, MDD is widely used in industry in various domains including business modeling, avionics or automotive. However, the developement of large models is still a challenging task, as multiple design rules have to be satisfied simultaneously. Additionally, several design decisions have to be made in an early stage of the model developement in order to create valid models, even if the developer is uncertain about which possibility is the most favorable (e.g. which class should contain a particular attribute). This problem makes the developement of initial prototype models difficult, and hides possible valid design options in complex models.

The goal of our research is to create new validation technique which supports the developement of uncertain models by checking the well-formedness constraints. Existing partial modeling techniques like [1] allows a modeler to explicitly express model uncertainty, or concertize possible design candidate [2], but does not support well-formedness constraints. On the other hand, there is efficient tool support for defining and checking well-formedness constraints and design rules over (fully specified) model instances using graph pattern matching [3]. Our technique combines these two approach by transforming graph queries of the target modeling language to graph queries for partial models, in order to match on malformed, possibly malformed or correct model partitions. Our technique uses the partial snapshot formalism of [4], the pattern language of VIATRA [3], and is compatible with EMF [5], which is the de facto modeling standard in MDD.

Therefore, design rules specified for concrete models can be automatically checked for uncertain models to (i) detect invalid elements, (ii) filter invalid design options. Additionally, (iii) model generation techniques [4, 2] can be supported by efficiently evaluating several predicates with a query engine.

References

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