Model Transformation by Example

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In the field of software engineering, model transformation has become increasingly important. A really good example is MDA (Model-driven architecture), because it depends on the transformation of various models on different abstraction levels. Thus the efficient design of automated model transformation languages has become a major challenge to model-driven engineering by now.

For the specification of a model transformation, source and target languages describing the models need to be given, as well as the source model and the transformation rules. As a consequence, the transformation designer not only needs to understand the transformation problem, i.e. how to map source models to target models, but also significant knowledge is required in the transformation language itself to formalize the solution. To bridge this conceptual gap, a novel approach is proposed: Model Transformation by Example (MTBE). The essence of the approach is to derive model transformation rules fully or semi-automatically from an initial prototypical set of interrelated source and target models, which describe critical cases of the transformation.

The transformation designer usually holds some coherent source and target models, so only the interrelation between these models need to be specified manually by the MTBE approach. Thus, the transformation generation process becomes more efficient by giving support for the designer for the creation of interrelation semi-automatically.

In this work, I introduce an automated process for MTBE using Inductive Logic Programming (ILP). ILP can be defined as an intersection of inductive learning and logic programming. It aims at the inductive construction of first-order clausal theories from examples and background knowledge, thus using induction instead of deduction as the basic mode of inference.

Next, I extend the main approach with another semi-automatic process. By this technique, a proposal for matched elements is automatically derived, based on similarities in the source and target models. My approach makes use of the correlation of certain attributes (e.g. the name of model elements) and propagates them using pattern matching, thus deducing an initial interrelation between the source and the target models. Finally, I describe a case study proving the practical usage of the approach and discuss conceptual and practical limitations.