Position Paper:
Term Schematizations and their Applications

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Although I am not actively working in the field of term schematizations, I am interested in their application from a machine learning perspective:

In joint work with Christoph Walther we investigate the application of machine learning paradigms in automated reasoning, viz. the improvement of theorem provers by reusing previously computed proofs [1, 2, 3]. In our approach, a successfully computed a proof of a conjecture is analyzed yielding a *catch* of the proof which provides the features which are relevant for reusing the proof in subsequent verification tasks. Generalizing a catch by replacing function symbols with function variables yields a *schematic* proof of a *schematic* conjecture which can be instantiated subsequently for obtaining proofs of new, similar conjectures. Our reuse method can be applied recursively since useful lemmata might be speculated by instantiating the catch, and we have developed a termination requirement for controlling this recursion without spoiling the reusability of proofs.

My interest in term schematizations is twofold, viz. with respect to our reuse procedure as well as with respect to machine learning techniques in general: First, as the similarity criterion we use is based on structural comparisons (via second-order matching), our schematic conjectures might be regarded as term schematizations. Therefore some of the investigations and developments in this field might also apply for our approach. Secondly term schematizations seem appropriate for expressing some applications of machine learning in formal reasoning and automated deduction. For instance, learning from examples and inductive logic programming use related concepts for representing structural similarities.

References

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2. T. Kolbe and C. Walther. Second-Order Matching modulo Evaluation — A Technique for Reusing Proofs. In *Proceedings of the 14th International Joint Conference on Artificial Intelligence (IJCAI-95),* Montreal, Canada, 1995.
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