SOQE 2017

Proceedings of the Workshop on Second-Order Quantifier Elimination and Related Topics, Dresden, Germany, December 6–8, 2017

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Preface

Second-order quantifier elimination (SOQE) is the problem of computing from a given logic formula involving quantifiers upon second-order objects such as predicates an equivalent first-order formula, or, in other words, an equivalent formula in which these quantified second-order objects do no longer occur. The problem can be studied for various logics, including classical propositional and first-order logic as well as modal and description logics. In slight variations SOQE is also known as forgetting, projection, predicate elimination and uniform interpolation.

SOQE bears strong relationships to Craig interpolation, definability and computation of definientia, the notion of conservative theory extension, abduction and notions of weakest sufficient and strongest necessary condition, to correspondence theory relationships, as well as to generalizations of Boolean unification to predicate logic.

Various important research subjects of current interest are based on SOQE and these related notions, as is reflected in the topics addressed in workshop program: In the area of knowledge representation they include forgetting, uniform interpolation and abduction in description logics, modularization, reuse, versioning and summarization of ontologies, forgetting in variants of logic programming that are relevant for ontology reasoning, and query reformulation on the basis of interpolation. The *unified correspondence* research program, which recently emerged from the study of algorithmic correspondence and canonicity, now by itself reaches into further areas such as proof theory. SOQE has applications in the verification of distributed systems. The investigation of SOQE with respect to specific fragments of first-order logic is – much less researched than decidability – an area with open challenges, where, however, ways of progress can be indicated. For Boolean unification on the basis of predicate logic, like SOQE an operation with formulas as output, various relationships to SOQE can be shown. In the *Algebra of Logic* program of the 19th century SOQE was identified as an important operation, which makes the study of historical aspects and the passage of SOQE to modern logic particularly interesting. Special forms of SOQE are essential components of state-of-the-art SAT-solvers. SOQE provides an exemplary framework for studying the dichotomy of expressivity versus complexity.

The first *Workshop on Second-order Quantifier Elimination and Related Topics (SOQE 2017)* was held in the International Center for Computational Logic (ICCL) at Technische Universität Dresden in Dresden, Germany, during 6-8 December 2017. The workshop aimed at bringing together researchers working on SOQE and related topics in a dedicated event. Its program includes nine invited talks, two tutorials and nine research talks, acquired with an open call for submissions of original research, adaptions of relevant research published elsewhere and discussions of research in progress.

We would like to thank all those involved for their enthusiasm and high-quality contributions, in particular, the invited speakers, the authors of tutorials and research presentations, the members of the program committee, and Romy Thieme who assisted with the local organization.

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Organization

SOQE 2017 was organized by the International Center for Computational Logic of Technische Universität Dresden, Germany.

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