CONTRIBUTED TALK ABSTRACTS 1.2

JAKUB BULÍN
Charles University in Prague

Absorption in finitely related $SD(\wedge)$ algebras has bounded arity

The notion of absorbing subuniverse plays an important role in the recent development of the algebraic approach to CSP and finite universal algebra in general. Our result addresses absorption in finitely related $SD(\wedge)$ algebras. Let $\mathbf{A}$ be a finite finitely related algebra in a congruence meet-semidistributive variety. Assume that the relational clone corresponding to $\mathbf{A}$ is generated by at most n-ary relations. We prove that whenever B is an absorbing subuniverse of $\mathbf{A}$, there exists $t \in Clo(\mathbf{A})$ of arity $4^{8^{|A|^n}} + 1$ such that B absorbs $\mathbf{A}$ with respect to t. As a consequence, we obtain a partial answer to a question by Barto: Given a finite relational structure $\mathbb{A}$, and a subset $B \subseteq A$, is it decidable if B is an absorbing subuniverse? Our result yields a positive answer in the case when the algebra of polymorphisms of $\mathbb{A}$ is an $SD(\wedge)$ algebra.

HUBIE CHEN
Univ. Pompeu Fabra

Generic Expression Hardness Results for Primitive Positive Formula Comparison

This is joint work with S. Bova and M. Valeriote.

We study the expression complexity of two basic problems involving the comparison of primitive positive formulas: equivalence and containment. In particular, we study the complexity of these problems relative to finite relational structures. We present two generic hardness results for the studied problems. First, we show that on a structure B whose algebra's variety admits the unary type, the two problems are Π_2-hard. Second, we show that on a structure B whose variety is not congruence modular, the two problems are coNP-hard. As we will discuss, the first result is optimal and yields a coNP/Π_2-hard dichotomy under the CSP G-set conjecture, and the second result is optimal and yields a P/coNP-hard dichotomy under the Edinburgh conjecture. Under both of the conjectures, our results thus completely resolve the complexity of the two studied problems on all finite structures, yielding a P/coNP-complete/Π_2-complete trichotomy.

As far as we know, this is the first time that computational hardness results have been presented based on either of the two algebraic conditions treatment. We plan to discuss the possibility of applying our techniques to other computational problems.

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ALEXANDR KAZDA
Charles University in Prague

Dichotomy for conservative digraphs

We present an elementary proof that whenever G is a conservative digraphs such that CSP(G) is not NP-complete then CSP(G) can be solved by local consistency checking, ie. G has bounded width.

LASZLO ZADORI
University of Szeged

Near unanimity operations and totally symmetric idempotent operations on reflexive digraphs

I sketch the proof of the following theorem: if a finite reflexive digraph admits a near unanimity operation (or equivalently Gumm operations), then it also admits a totally symmetric idempotent operation of every arity. This result has recently been obtained in a joint research with Miklos Maroti and is a common generalization of earlier results on posets and reflexive symmetric digraphs.

YUAN ZHOU
Carnegie Mellon University

Robust satisfiable algorithms and bounded width CSPs

This is based on a joint work with Venkatesan Guruswami, Gabor Kun, Ryan ODonnell, Suguru Tamaki, and Yuichi Yoshida."

In the world of approximation algorithms, we say that an algorithm robustly decides a constraint satisfaction problem Π if it distinguishes at-least-(1-ε)-satisfiable instances from less-than-$(1 - r(\varepsilon))$-satisfiable instances for some function $r(\varepsilon)$ with $r(\varepsilon) \to 0$ as $\varepsilon \to 0$. In this talk, we consider the question how to characterize the CSPs that admit robust satisfiable algorithms.

We relate this question to the world of algebraic CSP dichotomy theory, by proposing the following conjecture: a CSP admits robust satisfiable algorithms if and only if it has bounded width. Note that the "only if" direction is true by Barto-Kozik and Bulatov who showed that tractable CSPs that cannot encode linear equations are bounded-width, together with Hastad's strong inapproximability result for near-satisfiable linear equations over abelian groups.

We also initiate the research on this conjecture. We show that the "if" direction is true for width-1 CSPs, i.e. width-1 CSPs have robust satisfiable algorithms. Also, we further explore the relations between the approximation world and the algebraic world,

showing that the class of width-1 CSPs coincides with the class of CSPs decided by the basic linear programming relaxation.