

01/02/2024

InterCity - seminar

Neuchâtel - Bern - Konstanz - Lugano

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Time	Speaker	Talk
13:30-14:30	<b>Monaldo Mastrolilli (IDSIA USI/SUPSI)</b>	<p><b>Ideal Membership and the Bit Complexity of Sum of Squares Proofs</b></p> <p>Given an ideal <math>I</math> and a polynomial <math>f</math> the Ideal Membership Problem (IMP) is to test if <math>f</math> belongs to <math>I</math>. This problem is a fundamental algorithmic problem with important applications and notoriously intractable. We study the complexity of the IMP for combinatorial ideals that arise from constrained problems over the Boolean domain. As our main result, we identify the borderline of tractability. By using Gröbner bases techniques, we extend Schaefer's dichotomy theorem [STOC, 1978] which classifies all Constraint Satisfaction Problems over the Boolean domain to be either in P or NP-hard. These results are motivated by the pursuit of understanding the recently raised issue of bit complexity of Sum-of-Squares (SoS) proofs [O'Donnell, ITCS, 2017]. Raghavendra and Weitz [ICALP, 2017] show how the IMP tractability for combinatorial ideals implies bounded coefficients in SoS proofs. This research links together techniques from different areas such as Gröbner bases, universal algebra, combinatorial optimization, and SDP. In this talk we provide an overview of the various connections between these different areas, the techniques used, and the results obtained.</p>
14:30-15:00	<i>break and informal discussion</i>	
15:00-16:00	<b>Alessio D'Alì (Politecnico di Milano)</b>	<p><b>On a generalization of symmetric edge polytopes to regular matroids</b></p> <p>Symmetric edge polytopes are a class of reflexive lattice polytopes depending on the combinatorial data of a graph. Such objects arise in many different contexts, including finite metric space theory, physics and optimal transport, and have been studied extensively in the last few years. The aim of this talk is to show that symmetric edge polytopes are special instances of a more general construction that associates a reflexive lattice polytope with every regular matroid. A matroid is called regular if it can be represented over every field; by work of Tutte, a matroid is regular if and only if it can be represented by a totally unimodular matrix, i.e. a matrix whose square submatrices of any size all have determinant equal to -1, 0 or 1. We will show that regular matroids are a natural framework for studying symmetric edge polytopes, as two (classical) symmetric edge polytopes turn out to be unimodularly equivalent precisely when the two associated graphs give rise to the same graphic matroid up to isomorphism. This is joint work with Martina Juhnke-Kubitzke and Melissa Koch.</p> <p>(This talk does NOT assume any prior knowledge of matroids)</p>
16:00-17:00	<i>break and informal discussion</i>	

For further informations please refer to the seminar's webpage

<https://mathsites.unibe.ch/intercity-seminar/>

or contact the organisers:

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