



香港中文大學
The Chinese University of Hong Kong

Institute of Theoretical Computer Science and Communications

ITCSC- CSE Joint Seminar

**A New Regularity Lemma and Faster Approximation Algorithms for
Low Threshold Rank Graphs**

By

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2:30pm – 4:30pm

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Abstract:

Kolla and Tulsiani (2007, 2011) and Arora, Barak and Steurer (2010) introduced the technique of subspace enumeration, which gives approximation algorithms for graph problems such as unique games and small set expansion; the running time of such algorithms is exponential in the threshold-rank of the graph.

Guruswami and Sinop (2011, 2012), and Barak, Raghavendra, and Steurer (2011) developed an alternative approach to the design of approximation algorithms for graphs of bounded threshold-rank, based on semidefinite programming relaxations in the Lasserre hierarchy and on novel rounding techniques. These algorithms are faster than the ones based on subspace enumeration and work on a broad class of problems.

In this paper we develop a third approach to the design of such algorithms. We show, constructively, that graphs of bounded threshold-rank satisfy a weak Szemerédi regularity lemma analogous to the one proved by Frieze and Kannan (1999) for dense graphs. The existence of efficient approximation algorithms is then a consequence of the regularity lemma, as shown by Frieze and Kannan. Applying our method to the Max Cut problem, we devise an algorithm that is faster than all previous algorithms, and is easier to describe and analyze.

This is joint work with Shayan Oveis Gharan

***** ALL ARE WELCOME *****