



香港中文大學
The Chinese University of Hong Kong

Institute of Theoretical Computer Science and Communications
ITCSC-CSE Joint Seminars

24 December 2019, Tuesday

10:00 am – 12:00 nn

Room 121, 1/F, Ho Sin Hang Engineering Building, CUHK

1) Max Cut is Approximated by Subexponential-Size Linear Programs

By

Prof. Luca Trevisan

Professor, Bocconi University

Abstract: We show that, for every $\varepsilon > 0$, there is a linear programming relaxation of the Max Cut problem with at most $\exp(n^\varepsilon)$ variables and constraints that achieves approximation ratio at least $1/2 + \delta$, for some $\delta(\varepsilon) > 0$. Specifically, this is achieved by linear programming relaxations in the Sherali-Adams hierarchy.

Previously, the only sub-exponential time algorithms known to approximate Max Cut with an approximation ratio better than $1/2$ were based on semidefinite programming or spectral methods.

We also provide subexponential time approximation algorithms based on linear programming for Khot's Unique Games problem, which have a qualitatively similar performance to previously known subexponential time algorithms based on spectral methods and on semidefinite programming.

Joint work with Sam Hopkins and Tselil Schramm.

Biography: Luca Trevisan is a professor of Computer Science at Bocconi University. Luca studied at the Sapienza University of Rome, he was a post-doc at MIT and at DIMACS, and he was on the faculty of Columbia University, U.C. Berkeley, and Stanford, before returning to Berkeley in 2014 and, at long last, moving back to Italy in 2019.

Luca's research is focused on computational complexity, on analysis of algorithms, and on problems at the intersection of pure mathematics and theoretical computer science.

Luca received the STOC'97 Danny Lewin (best student paper) award, the 2000 Oberwolfach Prize, and the 2000 Sloan Fellowship. He was an invited speaker at the 2006 International Congress of Mathematicians. He is a recipient of a 2019 ERC Advanced Grant.

2) Improved analysis of higher order random walks and applications

By

Prof. Lap Chi Lau

Associate Professor, University of Waterloo

Abstract: The motivation of this work is to extend the techniques of higher order random walks on simplicial complexes to analyze mixing times of Markov chains for combinatorial problems. Our main result is a sharp upper bound on the second eigenvalue of the down-up walk on a pure simplicial complex, in terms of the second eigenvalues of its links. We show some applications of this result in analyzing mixing times of Markov chains, including sampling independent sets of a graph and sampling common independent sets of two partition matroids. Joint work with Vedat Alev.

Biography: Lap Chi Lau is an associate professor in the School of Computer Science at University of Waterloo. Before joining Waterloo, he was a faculty member in CSE CUHK from 2007 to 2014. He did his PhD in University of Toronto and his BSc in CUHK. His research interests are in spectral graph theory and combinatorial optimization.

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

Hosted & Enquiries : Prof Andrej Bogdanov / Institute of Theoretical Computer Science and Communications Tel: 3943 4261/3943 3452