VERTEX SPARSIFICATION FOR EDGE CONNECTIVITY

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Time: Thursday, Apr. 1st, 14:00 - 15:00
Zoom meeting ID: 868 9550 6919 Password: 121323
Link: https://zoom.com.cn/j/86895506919

Abstract: Graph compression or sparsification is a basic information-theoretic and computational question. A major open problem in this research area is whether $(1+\epsilon)$-approximate cut-preserving vertex sparsifiers with size close to the number of terminals exist. As a step towards this goal, we study a thresholded version of the problem: for a given parameter c, find a smaller graph, which we call connectivity-c mimicking network, which preserves connectivity among k terminals exactly up to the value of c. We show that connectivity-c mimicking networks with $O(kc^4)$ edges exist and can be found in time $m(c\log n)O(c)$. We also give a separate algorithm that constructs such graphs with $kO(c)^{2c}$ edges in time $mc^{O(c)}\text{polylog}(n)$. These results lead to the first data structures for answering fully dynamic offline c-edge-connectivity queries for $c \geq 4$ in polylogarithmic time per query, as well as more efficient algorithms for survivable network design on bounded treewidth graphs.

This is a joint work with Parinya Chalermsook, Syamantak Das, Yunbum Kook, Yang P. Liu, Richard Peng, Mark Sellke and Daniel Vaz.