

Maximum Flow and Minimum-Cost Flows in Almost-Linear Time

Peng, Richard
University of Waterloo

Time: August 26th, 10:00 - 11:00

Zoom meeting ID: 833 7224 9065 Password: 121323

Link: <https://zoom.us/j/83372249065>

Abstract:

We give an algorithm that computes exact maximum flows and minimum-cost flows on directed graphs with m edges and polynomially bounded integral demands, costs, and capacities in $m^{1+o(1)}$ time. Our algorithm builds the flow through a sequence of $m^{1+o(1)}$ approximate undirected minimum-ratio cycles, each of which is computed and processed in amortized $m^{o(1)}$ time using a new dynamic graph data structure. Our framework extends to algorithms running in $m^{1+o(1)}$ time for computing flows that minimize general edge-separable convex functions to high accuracy. This gives almost-linear time algorithms for several problems including entropy-regularized optimal transport, matrix scaling, p -norm flows, and p -norm isotonic regression on arbitrary directed acyclic graphs.