Mathematics, Statistics, and Computer Science **@ UIC**

Computer Science Seminar

Approximating the rectilinear crossing number

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Abstract: A straight-line drawing of a graph G is a mapping which assigns to each vertex a point in the plane and to each edge a straight-line segment connecting the corresponding two points. The rectilinear crossing number of a graph G, $\overline{cr}(G)$, is the minimum number of pairs of crossing edges in any straight-line drawing of G. Determining or estimating $\overline{cr}(G)$ appears to be a difficult problem, and deciding if $\overline{cr}(G) \leq k$ is known to be NP-hard. In fact, the asymptotic behavior of $\overline{cr}(K_n)$ is still unknown.

In this talk, we present a deterministic $n^{2+o(1)}$-time algorithm that finds a straight-line drawing of any n-vertex graph G with $\overline{cr}(G) + o(n^4)$ pairs of crossing edges. Together with the well-known Crossing Lemma due to Ajtai et al.~and Leighton, this result implies that for any dense n-vertex graph G, one can efficiently find a straight-line drawing of G with $(1+o(1))\overline{cr}(G)$ pairs of crossing edges. This is joint work with Jacob Fox and Janos Pach.

Monday, October 3 at 2:00 PM in SEO 612