Geometry Seminar
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Room 1013, Courant Institute
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Noncrossing configurations in geometric graphs

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Abstract

We survey some old and present some new results on the noncrossing P-subgraph decision problem, introduced by Kratochvíl, Lubiw and Nešetřil in late 80s: Given P, a graph property (e.g., that the graph has a spanning tree, a k-factor, a hamiltonian cycle), and a topological graph G (i.e., a graph drawn in the plane with possibly crossing edges), one asks for the existence of a noncrossing subgraph H of G with property P. Among other results, it is known that the problem above is NP-complete, if P is a spanning tree or a 1-factor.

We concentrate on the complexity of this problem when the instances are limited to geometric graphs, that is, topological graphs with edges being straight-line segments. Some previous work was done by Jansen and Woeginger.

We prove that detecting a noncrossing 1-factor or a noncrossing spanning tree in a given geometric graph is NP-complete. All the reductions are from the 3-SAT problem. We also state several problems whose complexity is still unknown. This is a joint work with Géza Tóth.

For further information contact Janos Pach at pachcims.nyu.edu, or visit our website: http://www.math.nyu.edu/seminars/geometry_seminar.html