

Geometry Seminar
April 8, 2008, Tuesday, 6:00 p.m.
Room 613, Courant Institute
251 Mercer Street, New York

Approximation algorithms for relay placement in the plane

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Abstract

Given a set S of n points in the plane, representing a set of *sensors*, and given a communication range $r \geq 1$, we are interested in the relay placement problem: Determine a minimum-cardinality set R of *relays* so that between every pair of sensors there exists a path of communication through sensors and/or relays. Two relays can communicate if they are within distance r of each other; two sensors, or a relay and a sensor, can communicate if they are within distance 1 of each other. In the one-tier version of the problem the objective is to place a minimum number of relays so that between every pair of sensors there exists a path that is allowed to use both sensors and relays. The two-tier version adds the restriction that the path between two sensors must go through only relays, without using sensors as intermediate nodes. We present improved constant-factor approximation algorithms for the one-tier version and a PTAS for the two-tier version. Further, we show that there is no PTAS for the one-tier version (for general r), assuming $P \neq NP$.

Joint work with Alon Efrat, Sandor Fekete, Valentin Polishchuk, G. R. Poornananda, and Jukka Suomela.

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