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MADALGO seminar by Mohammad Ali Abam, Aarhus University

Kinetic spanner

Abstract:

We present a new $(1+\eps)$-spanner for sets of n points in $\Reals^d$. Our spanner has size $O(n/\eps^{d-1})$ and maximum degree $O(\log^d n)$.

The main advantage of our spanner is that it can be maintained efficiently as the points move: Assuming the trajectories of the points can be described by bounded-degree polynomials, the number of topological changes to the spanner is $O(n^2/\eps^{d-1})$, and using a supporting data structure of size $O(n\log^{d}n)$ we can handle events in time $O(\log^{d+1} n)$. Moreover, the spanner can be updated in time $O(\log n)$ if the flight plan of a point changes.

This is the first kinetic spanner for points in $\Reals^d$ whose performance does not depend on the spread of the point set.