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Mohammad Abam and Mark de Berg

Kinetic Spanners in R^d

We present a new $(1 + \varepsilon)$-spanner for sets of n points in R^d. Our spanner has size $O(n / \varepsilon^{d-1})$ 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 $O(n^2 / \varepsilon^{d-1})$, and using a supporting data structure of size $O(n \log^d n)$ we can handle events in $O(\log^{d+1} n)$ time. Moreover, the spanner can be updated in $O(\log n)$ time if the flight plan of a point changes. This is the first kinetic spanner for points in R^d whose performance does not depend on the spread of the point set.