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دانشکده‌ی مهندسی کامپیوتر

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Kinetic KD-Tree and Longest-Side KD-Tree

Abstract

In this talk I propose a simple variant of kd-trees, called rank-based kd-trees, for sets of points in R^d . I show that a rank-based kd-tree, like an ordinary kd-tree, supports range search queries in $O(n^{1-1/d} + k)$ time, where k is the output size. The main advantage of rank-based kd-trees is that they can be efficiently kinetized: the KDS processes $O(n^2)$ events in the worst case, assuming that the points follow constant-degree algebraic trajectories, each event can be handled in $O(\log n)$ time, and each point is involved in $O(1)$ certificates. I also propose a variant of longest-side kd-trees, called rank-based longest-side kd-trees (RBLS kd-trees, for short), for sets of points in R^2 . RBLS kd-trees can be kinetized efficiently as well and like longest-side kd-trees, RBLS kd-trees support nearest-neighbor, farthest-neighbor, and approximate range search queries in $O((1/\epsilon) \log^2 n)$ time. The KDS processes $O(n^3 \log n)$ events in the worst case, assuming that the points follow constant-degree algebraic trajectories; each event can be handled in $O(\log^2 n)$ time, and each point is involved in $O(\log n)$ certificates.

Biography

Mohammad Ali Abam is a PhD student in Computer Science Department at Eindhoven University of Technology and working in Algorithms Group under supervision of Prof. Mark De Berg. He received a BS and MS degree in Computer Engineering from Sharif University of Technology. His research interest is discrete and computational geometry and he is now working on kinetic data structure.