Kinetic Data Structures Project Proposal

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Overview

When modeling the interactions of continuously-moving objects in a physical scene it is useful to keep track of certain attributes. These include the closest pair of objects in the scene, the convex hull of all objects, the minimum spanning tree of the objects, and so on. Data structures for computing and maintaining such attributes are well known, however they are generally designed with the assumption that the configuration of each item in the scene is immutable. The use of these structures for representing scenes which change over time often results in inefficient computations. To handle scenes which change over time, a specialized category of structures known as *kinetc data structures* (KDEs) have been developed.
The purpose of this project is to conduct a survey of common kinetic data structures and to develop software that uses visualizations to demonstrate and describe the structures and their inner workings.

Deliverables

A graphical software that calculates and displays common attributes (e.g. closest pair or convex hull) in a continuously-changing system using kinetic data structures, and that also allows a user to see a visualization of the underlying data structure and the intermediate steps involved in computing the attributes.

Tentative Bibliography

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