Title: Dynamic nearest neighbor searching and its applications

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Abstract:

A core area of computer science is the study of data structures: an area in which we study how to store information such that we can quickly retrieve and update it. We consider a problem in this area, known as dynamic nearest neighbor searching. In this problem we are given a set P of points in the plane, and we wish to store them (as a data structure) such that when we get a query point q we can quickly report the point in P closest to q. Moreover, we wish to support inserting a new point in P and deleting an existing point from P. We show that having such a data structure is useful in many applications in fields such as Geographic Information Science, Robotics, and Ecology. Furthermore, we argue that it is important that we can guarantee that the data structure is correct and efficient. This typically requires rigorous mathematical proofs. The combination of these aspects makes designing good data structures an interesting and challenging task.