Abstract

Recent technological advances have enabled generation of large volumes of spatiotemporal data from heterogeneous sources: from tracking sensors, through GPS devices, to satellite imagery. In addition to efficient storage and retrieval of such data when answering particular types of queries e.g., range, nearest-neighbor – the similarity of motions among mobile entities is a central problem in a plethora of applications, ranging from geographic and seismic processes and events, through categorization of the physical properties of movements of molecules/particles. Efficient and accurate techniques for assessing similarity are at the heart of the methodologies for indexing, approximation, classification, clustering and analysis of time series data. In the recent years, various aspects of the similarity of trajectories of moving objects have been extensively investigated in MOD (Moving Objects Databases) and GIS (Geographic Information Systems) settings. In this tutorial, we will present a comprehensive overview of different techniques for assessing the similarity in various dynamic settings and identify the impact that the semantics of the applications have on the specific approaches.

The first half of the tutorial will overview the role of the similarity of motion in different application domains, and will present some geometric foundations regarding the similarity of spatial objects under rigid transformations, while pointing out the importance of the distance functions in such settings. The second half of the tutorial will address the similarity in time-series domain, and, subsequently, focus on the similarity of moving objects trajectories in MOD and GIS settings. In addition, we will discuss issues related to clustering of trajectories data and outline directions for future work.

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