

Managing the Trajectories of Moving Objects

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Moving Objects Environment: Data and Queries

We live in dynamic world, where almost everything is moving. New advances in the technologies of mobile phones and GPS services create environment where almost all mobile objects aware of their locations and asking about the others locations, which led to the challenge of managing huge amount of continuously moving objects. The main factors in this challenge are: the continuously changing moving objects locations, continuous queries about them and between the both relies the accessing methods. In this work we introduce a set of queries on moving objects and an indexing method which efficiently index the trajectories of moving objects and support different type of queries.

Research Results

We extended the R-Tree into Trajectory R-Tree (TR-Tree) to efficiently index the trajectories of moving objects and our results until now were the following:

- Research the MO environment to define the requirements of access method for MO;
- Construct the segments of trajectories of moving objects from their discrete location points;
- Extend the R-Tree with new structures and algorithms to index the trajectories of moving objects;
- Novel types of queries are introduced and be processed using the TR-Tree;
- Although the TR-Tree is designed as 3D access method, it's possible to lower its dimension from 3D to 2D. That is the trajectories of moving objects can be indexed using 2D TR-Tree and objects moving on these trajectories can be indexed using 1D R-Tree, this will make it efficiently suits applications with constrained trajectories like intelligent transportation applications. This specialization of the R-Tree for transportation systems will be introduced in the next work.

Applications of the research results

In the next step of research, we intend to apply all the results of the research in real life applications, namely, we will develop all the necessary programs on the top of real database management system; to manage real data which coming from different moving objects through different wireless connections to support real life applications as shown in the figure 1:



Fig. 1. Applications of Moving Objects Data Bases