Representing and Quering Moving Objects

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Abstract

Every physical object can be described with some position and extent in certain area. The basic abstractions of spatial objects are a point and a region. In some cases, we are interested in the position of physical object at any point in time, for example in surveillance systems. For this purpose we must extend spatial attributes of objects in database by another dimension, which is the time dimension. Spatial objects with time dimension describe moving objects, specifically moving points and moving regions. We distinguish two types of moving objects, namely discretely moving objects and continuously moving objects.

Changes in position and extent information of discretely moving objects, for example land use plan, can be relatively easy stored in the database. This can be accomplished by database updates. Storing and quering spatial positions and extents which are changed discretely can be accomplished by using separate spatial column and separate temporal column in relational database. The temporal column describes a time interval in which the spatial value is valid. This technique can be used only for stepwise strategy.

Changes in position and extent information of continuously moving objects are much more difficult to store in the database. It is not possible to store these changes with separate spatial values and separate temporal values in relational database, because we do not have stepwise constant functions any more.

This work deals with abstract data types for spatial objects (specifically types *point*, *points*, *line*, *region*) and abstract data types for spatio-temporal objects which are derived from the base types and spatial types (specifically type constructor *moving*, *intime*). Abstract data types consist of data types and operations which encapsulate data types. Abstract data types form an algebra. This work deals also embedding of this algebra into a query language.

Note

This work is based on an article „A Foundation for Representing and Quering Moving Objects" by R. H. Güting at al.