

GraCT: A Grammar-based Compressed Index for Trajectory Data

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We introduce a compressed data structure for the storage of free trajectories of moving objects that efficiently supports various spatio-temporal queries. Our structure, dubbed GraCT, stores the absolute positions of all the objects at regular time intervals (snapshots) using a k^2 -tree, which is a space- and time-efficient region quadtree. Positions between snapshots are represented as logs of relative movements and compressed using a grammar-based compressor. The non-terminals of this grammar are enhanced with MBR information to enable fast queries. The GraCT structure of a dataset occupies less than the raw data compressed with a powerful traditional compressor. Further, instead of requiring full decompression to access the data like a traditional compressor, GraCT supports direct access to object trajectories or to their position at specific time instants, as well as spatial range and nearest-neighbor queries on time instants and/or time intervals. Compared to