

# An index for moving objects with constant-time access to their compressed trajectories

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## Abstract

As the number of vehicles and devices equipped with GPS technology has grown explosively, an urgent need has arisen for time- and space-efficient data structures to represent their trajectories. The most commonly desired queries are the following: queries about an object's trajectory, range queries, and nearest neighbor queries. In this paper, we consider that the objects can move freely and we present a new compressed data structure for storing their trajectories, based on a combination of logs and snapshots, with the logs storing sequences of the objects' relative movements and the snapshots storing their absolute positions sampled at regular time intervals. We call our data structure ContaCT because it provides Constant-time access to Compressed Trajectories. Its logs are based on a compact partial-sums data structure that returns cumulative displacement in constant time, and allows us to compute in constant time any object's position at any instant, enabling a speedup when processing several other queries. We have compared ContaCT experimentally with another compact data structure for trajectories, called GraCT, and with a classic spatio-temporal index, the MVR-tree. Our results show that ContaCT outperforms the MVR-tree by orders of magnitude in space and also outperforms the compressed representation in time performance.

## Palabras clave

Palabras clave de autor: [Moving objects](#); [Trajectories representation](#); [Spatio-temporal query](#)

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