

## Distributed Real-Time Range Query Approximation in a Streaming Environment

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**Abstract :** Continuous range queries are a common means to handle mobile clients in high-density areas. Most existing approaches focus on settings in which the range queries for location-based services are more or less static, whereas the mobile clients in the ranges move. We focus on a category called dynamic real-time range queries (DRRQ), assuming that both, clients requested by the query and the inquirers, are mobile. In consequence, the query parameters and the query results continuously change. This leads to two requirements: the ability to deal with an arbitrarily high number of mobile nodes (scalability) and the real-time delivery of range query results. In this paper, we present the highly decentralized solution adaptive quad streaming (AQS) for the requirements of DRRQs. AQS approximates the query results in favor of a controlled real-time delivery and guaranteed scalability. While prior works commonly optimize data structures on the involved servers, we use AQS to focus on a highly distributed cell structure without data structures automatically adapting to changing client distributions. Instead of the commonly used request-response approach, we apply a lightweight streaming method in which no bidirectional communication and no storage or maintenance of queries are required at all.

**Keywords :** approximation of client distributions, continuous spatial range queries, mobile objects, streaming-based decentralization in spatial mobile environments

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