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Designing a location update strategy for free-moving and network-constrained objects with varying velocity

Key words: Spatio-temporal databases, Moving objects, Free-moving objects, Network-constrained objects

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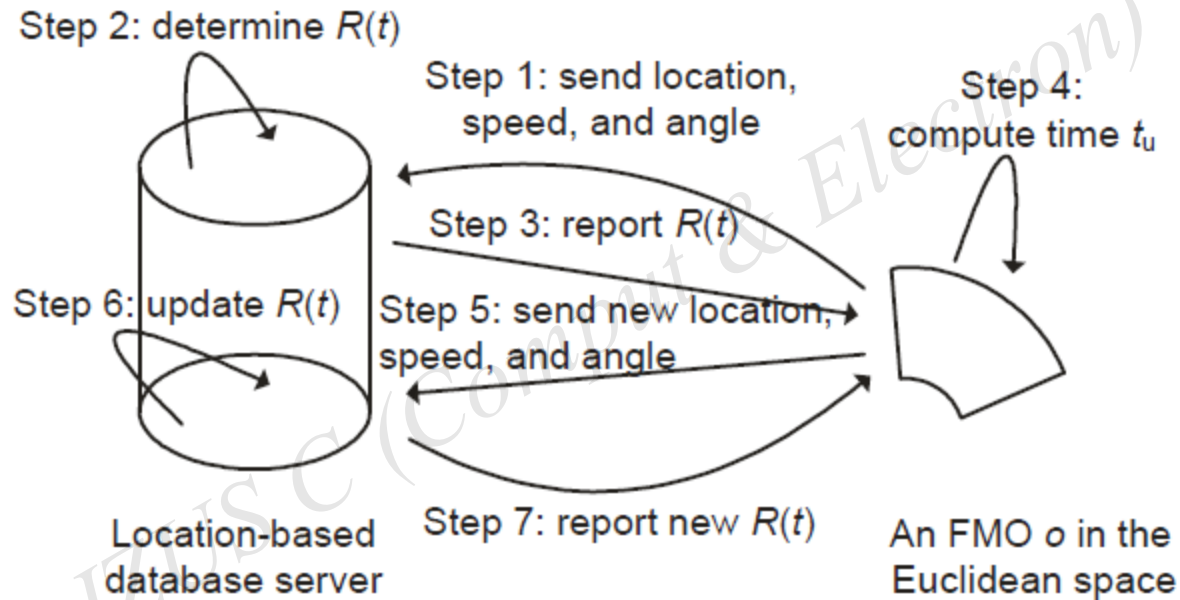
Introduction

- We focus on the issue of managing two important types of moving objects in spatio-temporal databases:
 - free-moving objects (FMOs)
 - network-constrained objects (NCOs)
- Two issues are needed to be addressed:
 - when to update object information
 - how to update of object information

What we do

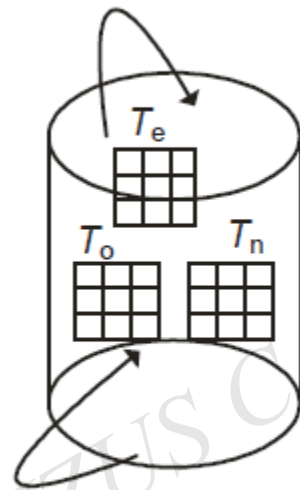
- Manage not only free-moving objects but also network-constrained objects
- Design update strategies to give each object a time point at which to update its location
- Develop update procedures to process object location update.
- Conduct extensive experiments to demonstrate the efficiency of the proposed methods.

Update procedure for FMOs



Update procedure for NCOs

Step 2: determine s_o and S_o
to construct $R(t)$



Step 6: update $R(t)$

Location-based
database server

Step 1: send (e, dist, s, t_0)

Step 3: report $R(t)$
and $L_{\max}$

Step 5: send new
 $(e, \text{dist}_u, s_u, t_u)$

Step 7: report new $R(t)$

Step 4:
compute time t_u



An NCO o in the
transportation network

Performance evaluation

- Evaluate the number of object updates and the processing overhead
- Varying P_o and T_o
 - P_o : a percentage of objects changing speed and direction
 - T_o : the time points at which object updates its location
- Competitors:
 - FMOUS
 - NCOUS
 - CRUS
 - FIUS

Future directions

- Efficiently answer the spatio-temporal queries on FMOs and NCOs.
- Develop a specialized index structure to manage FMOs and NCOs.