Enabling Routes as Context in Mobile Services

Agne Brilingaite, Christian S. Jensen and Nora Zokaite

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Introduction

System Architecture

Map-matching

Database

Conclusion
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12th International Workshop on Geographic Information Systems (ACM-GIS04) in Washington, DC, USA

Add the concept of fixed routes to existing GPS technology

Assumptions

- Standard GPS receiver
- Data connection (i.e. GPRS)
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Main idea
Example

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System Architecture
Enabling Routes as Context in Mobile Services

(a) Users

(b) Destination Objects

(c) Routes

(d) Usages
Oracle Application Server
- Records and Analyses data sent from client
- Stores everything, including user information
- Should utilize encryption
Oracle Application Server
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- Records and Analyses data sent from client
- Stores everything, including user information
- Should utilize encryption
Client filters and buffers location/time information

Server receives GPS data as well as information about the user and the user’s destination objects.

When enough information has been collected, the server processes the data, stores it and sends the information retrieved back to the client.
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Data objects

- **User information**
  - **UserId**
  - **Undefined: User description**

- **Object information**
  - If known: Empty
  - If unknown: Description

- **Standard information**
  - Time and Date
  - GPS location

- **Final format**
  - `userId, startObjectId, endObjectId, routeId, (xStart, yStart, radiusStart), (xEnd, yEnd, radiusEnd)`
  - Only routeId is always included
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- Final format
  - \( userId, startObjectId, endObjectId, routeId, (xStart, yStart, radiusStart), (xEnd, yEnd, radiusEnd) \)
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Client/Server Interaction

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Enabling Routes as Context in Mobile Services
Map matching & Route construction
Map-matching
Route identification
Polyline

- A series of connected line segments treated as a single entity

Subpolyline

- \((pl, l_{\text{start}}, l_{\text{end}})\)

Route

- Subpolylines
- Start object \((\text{user}, \text{circle}_s, \text{spl}s_s)\)
- End object \((\text{user}, \text{circle}_e, \text{spl}s_e)\)
- Time
- **Polyline**
  - A series of connected line segments treated as a single entity

- **Subpolyline**
  - \((pl, l_{start}, l_{end})\)

- **Route**
  - Subpolylines
  - Start object \((user, circle_s, spls_s)\)
  - End object \((user, circle_e, spls_e)\)
  - Time
Polyline
  - A series of connected line segments treated as a single entity

Subpolyline
  - $(pl, l_{\text{start}}, l_{\text{end}})$

Route
  - Subpolylines
  - Start object $(\text{user}, \text{circle}_{s}, \text{spl}_{s})$
  - End object $(\text{user}, \text{circle}_{e}, \text{spl}_{e})$
  - Time
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Enabling Routes as Context in Mobile Services
Connection areas
Fill gap
End zones
Architecture & Functionality
Conclusion
- Routes
  - Map-matching
  - Data model
  - Depends on map
- Routes
- Map-matching
  - Data model
  - Depends on map
Routes

Map-matching

Data model

Depends on map
Routes
Map-matching
Data model
Depends on map
Well written
- Considers many problems
- Good documentation of implementation
- Concise related work section
- Great use of figures
- Well written
- Considers many problems
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Well written
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Great use of figures
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- Well written
- Considers many problems
- Good documentation of implementation
- Concise related work section
- Great use of figures
Well written

Considers many problems

Good documentation of implementation

Concise related work section

Great use of figures
Odd names for functions (i.e. UserObject about endpoints, spls)

Complicates things that are not particularly complicated - i.e. the architecture figures
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Complicates things that are not particularly complicated - i.e. the architecture figures