Location Based Services accessed via PDA and Wireless Networks

F. Undre

Roadmap

- Project Objectives
- LBS
- Motivation
- Agent technology
- Suitability of agents for LBS
- System overview
  - Client side agents
  - Middle agent
  - GIS-based agents
  - Service Provider agents
- Implementation
- Evaluation
- Achievements
- Conclusion and Future Work
**Specification**

- Evaluating and Testing a Wireless Agent Infrastructure for Mobile Systems based upon the JADE/LEAP Agent Platform.
- Analysis of State of the Art LBS.
- Analysis of Alternative Ways of Delivering LBS using Agent Technology.
- Design / Implementation of a J2ME Application for Religious Services on the PDA.

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Location Based Services

In recent years the computing world has changed dramatically with the need for services designed for mobile users. This is due to the ever changing size of portable devices and improved communication infrastructure. With this, content adaptation of services onto mobile devices depending upon location of the user has become a key challenge.

“Push” Services
“Pull” Services

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**Motivation**

- To locate the religious domain to provide auspicious LBS for followers/non-followers of the three Abrahamic faiths
- Implement using pioneering agent technology at the forefront of LBSs

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**Agent Technology**

<table>
<thead>
<tr>
<th>“Weak” Notion</th>
<th>“Strong” Notion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social ability</td>
<td>Mobility</td>
</tr>
<tr>
<td>Reactive</td>
<td>Benevolence</td>
</tr>
<tr>
<td>Proactive</td>
<td>Rationality</td>
</tr>
<tr>
<td>Temporal Continuity</td>
<td>Adaptivity</td>
</tr>
<tr>
<td>Goal-oriented</td>
<td>Collaboration</td>
</tr>
</tbody>
</table>

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Suitability of Agents for LBS (1)

- **Transparency in Service Discovery**
  Seamless connection to new broker when entering another area.

- **Distributed information sharing**
  User profile should be retained in new surroundings.

- **Service composition**
  Mechanism to combine all services.

- **Interoperability between different service providers**

Suitability of Agents for LBS (2)

- **Session disconnection**
  Saved session mode that can be resumed later.

- **Content adaptation**
  Digest and display required information that can be handled due to mobile device constraints.

- **Personalisation**
  Filter unwanted information to specifics.
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System Overview
Client-side Agents

- “split” execution mode
  - Lightweight Front-end.
  - Less bytes are transmitted over the wireless link
- IA → responsible for GUI
- Client → responsible for reading coordinates x and y

Middle Agent

Taken from "ELEM007 part 5.3: Interactions Protocols", lecture slide 33
GIS-based Agents

- Service agent acting as interface for service dealing with locating service providers depending upon service type.
- Service agent acting as interface for spatial service finding shortest route to location, within given area.
- Service agent acting as interface for map rendering service.

RSAs (Service Providers)

- To act as a “Service Provider” attached to a religious institution
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Implementation in Action (1)
Implementation in Action (4)

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“There was a clear like in favour of the evaluation release application, and a clear expression of favour for the goal of usability, and the style of the application. However there was clear dislike of the performance of the system, which in a lab test users expected to be stable, and the GUI was clearly disliked more than liked. Other criteria such as content and other features were pretty evenly decided.”

HCI Group 10.

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**Achievements**

- Sophisticated Agent Programming using the JADE-LEAP agent platform and building ontologies using Protégé 2000.
- A diverse range of programming skills from web-based to hardware serial port programming.
- Database programming with more orientation towards GISs.
- Come to know about complex issues faced with mobilising LBSs and agent solutions.
- The foundations required to deploy a LBS, possibly becoming the next “Killer” application.

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Conclusions & Future Work

1. Successful integration of agent technology for delivering a LBS using Reactive & Proactive, “Push” and “Pull” technology.
2. Successful evaluation

- Applying routing algorithms to determine shortest path between points on the map, taking into account natural features, such as roads, bridges, waterways
- Including support for public transport infrastructure into route finding process
- Improving personalisation aspect of the system
- Investigating other types of adaptation such as bandwidth adaptation or device adaptation
- Exploiting other wireless technologies and location determining techniques.

Video Shoot