Smart Space-Based Intelligent Mobile Tourist Guide: Service-Based Implementation

Alexander Smirnov, Alexey Kashevnik, Andrew Ponomarev, Nikolay Shilov, Maksim Shchekotov, Nikolay Teslya

St. Petersburg Institute for Informatics and Automation of the Russian Academy of Sciences (SPIIRAS)
Table of Contents

- Motivation
- Mobile Tourist Guide Service Overview
- Architecture of Mobile Tourist Guide Service
- Smart Space Communication
- Recommendation Service
- Video
- Conclusion
Motivation

- The tourism business has become more and more popular.
- More and more tourists prefer to use the Internet for studying information about interesting places in the world and transport situation in interested region.
- Mobile Tourist Guide – TAIS is a complex solution that
  - Works on Android-based devices.
  - Finds in the Internet attractions nearby the tourist and provides recommendations which attractions which is better to attend.
  - Provides pictures and descriptions of these attractions acquired from different Internet Sources.
  - Takes into account tourist preferences and current situation in the region.
  - Shows the tourist weather in the location region.
  - Provides interactive map of the region.
  - Provides pedestrian and car routing information for the tourist.
Intelligent Mobile Tourist Guide - TAIS

Context Service → Attraction Information Service → Recommendation Service

Location Preferences → Mobile Tourist Guide - TAIS → Search → Recommended Attractions

Wikipedia, Geo2Tag, Wikivoyage, flickr, Panoramio, wikimapia
Intelligent Mobile Tourist Guide Architecture

Client Application

Tourist Context

Behavior model

Attraction Information Service

Recommendation Service

Region Context Service

Public Transport Service

Ridesharing Service

Other Devices in Smart Space

Smart Space-Based Interaction
UML Sequence Diagram For Getting List of Recommended Attractions

Client App.

SS

AIS

RS

Go2Tag

External Sources

Images Database

Context Service

Sharing tourist context information (location, preferences, ...)

Notifcation about changes in the tourist context

Loop: for each external source

Query attraction list nearby the tourist in radius R

List of attractions nearby the tourist

Loop: for each attraction

Query internal identifier for an attraction and insert new one

Attraction identifier

Query default image

Default image

List of attractions with identifiers and default images from internal DB

Notification about accessible list of attractions and region context

List of attractions ordered by recommendation service

Notification about ordered attraction accessible

List of attractions ordered by recommendation service with default images

Notification about ordered attractions with default images accessible

Context of the tourist location region

Notification about changes in the tourist context
UML Sequence Diagram for Getting Attraction Descriptions and Images

Client App.

SS

AIS

RS

External Sources

Internal Database

Query attraction description and images

Notification about attraction descriptions and images query

Try to find attraction descriptions and images in cache

Loop: for each external source

Query attraction descriptions

List of attraction descriptions and images

Notification that list of attraction descriptions and images is accessible

List of attraction descriptions

Get images ratings

Images ratings

Evaluate images scores

Get descriptions ratings

Descriptions ratings

Evaluate descriptions scores

Set / refresh default attraction image

List of ordered by score attraction descriptions and images

Notification about list of ordered by score attraction descriptions and images

List of ordered by score attraction descriptions and images

Notification about list of ordered by score attraction descriptions and images
Smart Space Communication Example

- **Client Module**
  - ([user_id], “http://cais.iias.spb.su/XML/tais:is_a”, “tourist”)
  - ([user_id], “http://www.w3.org/2003/01/geo/wgs84_pos:longitude”, “60.12”)
  - ([user_id], “http://www.w3.org/2003/01/geo/wgs84_pos:latitude”, “30.24”)
  - ([user_id], “http://cais.iias.spb.su/XML/tais:date_time”, “2014-04-21 10:00”)
  - ([user_id], “http://cais.iias.spb.su/XML/tais:role”, “traveler”)

- **Context Service**
  - ([user_id], “http://cais.iias.spb.su/XML/tais:weather”, “sunny”)
  - ([user_id], “http://cais.iias.spb.su/XML/tais:weather_icon”, “http://..”)
  - ([user_id], “http://cais.iias.spb.su/XML/tais:temperature”, “20”)
  - ([user_id], “http://cais.iias.spb.su/XML/tais:wind_speed”, “5”)
  - ([user_id], “http://cais.iias.spb.su/XML/tais:wind_direction”, “U+2199”)
  - ([user_id], “http://cais.iias.spb.su/XML/tais:traffic_jams”, “average”)

- **Attraction Information Service**

- **Recommendation KP**
  - ([user_id], “http://cais.iias.spb.su/XML/tais:recommended_attractions”, RecommendedAttractionsXML)
## Attractions Recommendation Based on Ratings

<table>
<thead>
<tr>
<th></th>
<th>Louvre</th>
<th>Eiffel Tower</th>
<th>Palace of Versailles</th>
<th>Notre Dame de Paris</th>
<th>Ile de la Cite</th>
<th>Museum of Electrical Transport</th>
<th>Imperial Academy of Arts</th>
<th>Krasin</th>
<th>Smolenka River</th>
<th>Saint Andrew’s Cathedral</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>John</strong></td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lisa</strong></td>
<td></td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td></td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td><strong>Alice</strong></td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td><strong>Bob</strong></td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td><strong>Patrick</strong></td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td><strong>Jack</strong></td>
<td>4</td>
<td>5</td>
<td></td>
<td>5</td>
<td></td>
<td>3</td>
<td>4</td>
<td>3</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

### Attractions

- **Attraction 1**
  - User 1: 2
  - User 2: 5
  - User 3: 4

- **Attraction 2**
  - User 1: 3
  - User 2: 4
  - User 3: 5

- **Attraction 3**
  - User 1: 2
  - User 2: ?
  - User 3: 5
Attraction Images and Descriptions Recommendation

- Internet services provide a big amount of images
- The system allows users to estimate every image (“like”, “dislike”)
- It is reasonable to show the user only the best images of the selected attraction
  - Show images that have the best score
  - Show new images (images without score)
  - Show small amount of images that have negative score (to exclude mistakes)

- Internet services provide several text blocks for an attraction
- It is needed to show the user the best text block and range other
  - User estimations («Like» / «Dislike»)
  - Text block characteristics: size, variety of vocabulary
  - Degree of similarity of a text block with the last shown
User Interface:
Intelligent Mobile Tourist Guide

The best attractions in the location:
- FRUCT 15th Conference
- Nokia Developers Trainings
- Saint Andrew's Cathedral (Saint Petersburg)
- Museum of Electrical Transport (Saint Petersburg)
- Russian State Hydrological Institute

The nearest attractions:
- FRUCT 15th Conference
  - Distance: 2.85 km
- Nokia Developers Trainings
  - Distance: 4.66 km
- Saint Andrew's Cathedral (Saint Petersburg)
  - Distance: 0.71 km
- Museum of Electrical Transport (Saint Petersburg)
  - Distance: 0.61 km
- Russian State Hydrological Institute
  - Distance: 0.92 km
Conclusion

- The service has been successfully tested in St. Petersburg and Leningradskaya region.
- The service can be overviewed during the DEMO section (today, April 25 from 18.00 till 20.30, Auditorium 103).
- The service can be used to find FRUCT conference location and build path to it.
- The count of downloads is more that 300.
Thank you for Attention

Questions are Welcome!

St. Petersburg, Russia, E-mail: alexey@iias.spb.su