Recommendation System for Tourist Attraction Information Service

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Motivation

- The tourist business has become more and more popular.
- More and more tourists prefer to use Internet services to book hotels, buy flights, search attractions to see instead of booking complete tours.
- Mechanisms for providing the user information are needed.
- Tourist attraction information service
  - Finds attractions nearby the tourist.
  - Provides descriptions of attractions acquired from different Internet Sources.
  - Provides accessible in the Internet images of attractions.
Tourist Attraction Information Service

Saint Andrew's Cathedral was the last Baroque cathedral built in Saint Petersburg, Russia.

The cathedral was conceived at the time of Peter the Great as the chapter church of Russia's first chivalric order, that of Saint Andrew. The most famous architect of the Nordic countries, Nicodemus Tessin the Younger, was called upon to design a church resembling Saint Peter's Basilica in Rome and exceeding 430 feet in length.

By the time Tessin submitted his designs, the tsar had died and the costly project was suspended. Two years later, Giuseppe Trezzini, a city architect to St. Petersburg, had the territory behind the building of the Twelve Colleges cleared from wood and built a modest timber church, which was consecrated by Feofan Prokopovich in the name of Saint Andrew on 8 October 1731. It was an extermination...
Tourist Attraction Recommendation System (TARS)

- DEMO Section of FRUCT conference

Location Preferences

Tourist Attraction Recommendation System

Search

Recommended Attractions

WIKIPEDIA Geo2Tag wikivoyage
flickr Panoramio Wikimapia
TARS Services Interaction based on Smart-M3 Platform

Client KP

Smart Space

Recommendations
Tourist Context
Location Area Context
Attractions List

System KPs

Recommendation KP
Context KP
Attractions Information KP

External Services

Rating Service
Current Situation Description Services

Inserting information to the smart space
Reading information from smart space (subscribe for information)
Smart Space Communication

- **Client KP**
  ("alexey.kashevnik@gmail.com", "is_a", "tourist")
  ("alexey.kashevnik@gmail.com", "longitude", "60,12")
  ("alexey.kashevnik@gmail.com", "latitude", "30,24")
  ("alexey.kashevnik@gmail.com", "date_time", "2013-10-18 12:53")
  ("alexey.kashevnik@gmail.com", "language", "English")
  ("alexey.kashevnik@gmail.com", "company", "alone")
  ("alexey.kashevnik@gmail.com", "role", "traveler")

- **Context KP**
  ("alexey.kashevnik@gmail.com", "weather", "Sunny")

- **Attraction Information KP**
  ("alexey.kashevnik@gmail.com", "near_by", ListOfAttractionsXML)

- **Recommendation KP**
  ("alexey.kashevnik@gmail.com", "recommended_attractions", RecommendedAttractionsXML)
**Attractions Recommendation**

- Collaborative filtering systems make recommendations based on users' interests similarity.

<table>
<thead>
<tr>
<th></th>
<th>User 1</th>
<th>User 2</th>
<th>User 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attr 1</td>
<td>2</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Attr 2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Attr 3</td>
<td>2</td>
<td>?</td>
<td>5</td>
</tr>
</tbody>
</table>
Context for Attractions Recommendation

- Conditions in which a user rates an attraction (or gets recommendations) is called **context**.
  - Outside attractions will be rated better in sunny day then in rainy day
  - Zoological museum will be rated better if a user comes with children.
- The following context attributes have been identified for TARS:
  - Time
  - Weather
  - Company
- For taking context into account the **context generalization** method is used:

```
Time  -->  Season
    |    |    |
    V    V    V
Working day / weekend  -->  Any value
    |    |    |
    V    V    V
Time of day
```
Example of Applying Context Generalization Method

<table>
<thead>
<tr>
<th>Time: July 31, 2013 17:30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company: With family</td>
</tr>
<tr>
<td>Weather: Sunny</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time: Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company: With family</td>
</tr>
<tr>
<td>Weather: Any value</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>2</td>
</tr>
</tbody>
</table>

Context Generalization

<table>
<thead>
<tr>
<th>Time: Any value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company: Any value</td>
</tr>
<tr>
<td>Weather: Any value</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>3</td>
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<tr>
<td>2</td>
</tr>
</tbody>
</table>
Algorithm for Attractions Recommendation

- **Ratings normalization**

- **Definition group of users with similar interests**

- **Calculation attraction relevance based on other users ratings from the group**

- **Ranking attractions list based on the relevance and accessibility the attraction at the moment**

**Preliminary stage**

**Determination attraction relevance to the user**

**Attractions ranking**
Attraction Images and Descriptions Filtering

- 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
Conclusion

- Recommendation Scenarios for tourist attraction information service have been successfully implemented in special Recommendation KP.
- At the moment the tourist attraction information service has 50+ downloads in Google Play.
- The smart space based tourist attraction recommendation service can be overviewed during the DEMO section (Thursday, November 14 from 18.00 till 21.00, Seminar Hall A116).
Thank you for Attention
Questions are Welcome

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