Unveiling Tourist Experiences through Cognitive Mapping and the Explorer Quotient

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Motivation

Real-time Recommender Systems improve tourist experiences and promote cultural heritage.

Data sources:

- Location data (e.g. beacons, GPS)
- Retail data (e.g. transactions)
- Contextual data (e.g. sensor data)
- Social values (e.g., Twitter, Facebook, Instagram)
- Travel values (e.g. surveys, interviews)
What does a Recommender System look like?
Research Goal:

Explore a number of data sources in order to build a predictive model for the next generation of Recommender System.
Methodology

**Input**

Points of Interest
Cognitive Maps
Interviews

**Model**

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Values</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attribute 1</td>
<td>Y, N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
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</tr>
<tr>
<td>Attribute 2</td>
<td>Y, N</td>
<td>Y</td>
<td>Y</td>
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<td>N</td>
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<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Attribute 3</td>
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<td>N</td>
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**Output**

<table>
<thead>
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<th>Output</th>
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<th>X</th>
<th>X</th>
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<th>X</th>
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<tbody>
<tr>
<td>Output 1</td>
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</tr>
<tr>
<td>Output 2</td>
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</table>

**Guided Explorer**

Motivation > Methods: Input > Methods: Model > Methods: Output > Conclusions
Points of Interest Data Set

(Image: A. Respaldiza)
Cognitive Maps: Traveled Together
Attributes used as input for the Decision Table

- Primitive type (i.e., point, line, polygon, icon, text)
- Primitive graphical component (e.g., position, size, page orientation)
- Spatial reference system structure (e.g., reference artifact, dimensionality)
- Temporal reference system
- Type of point of interest(s) featured (i.e., nature, cultural, entertainment)
Interviews

- Recorded
- 5 to 30 minutes
- Positive engagement with the tourists
- Small data set yet representative of the expected population
- Provides a first glimpse of tourists’ experiences
Attributes used as input for the Decision Table

- Purpose
- Points of Interest
- Travel values
- Social values
Methodology

Input

Points of Interest
Cognitive Maps
Interviews

Model

Attribute | Values | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8
---|---|---|---|---|---|---|---|---|---
Attribute 1 | Y, N | Y | Y | Y | Y | N | N | N | N
Attribute 2 | Y, N | Y | Y | N | N | Y | Y | N | N
Attribute 3 | Y, N | Y | N | Y | N | Y | N | Y | N

Output

| Output | 1 | 2 | 3 | 4 |
---|---|---|---|---|
Output 1 | X | X |
Output 2 | X | X |

Guided Explorer

Conclusions
Building our Decision Table

- Predictive model aimed to classify each tourist as either Guided or Explorer
- 31 attributes extracted from the interviews and the cognitive maps
- Implemented using WEKA machine learning software
- Tested using 10-fold stratified cross-validation
Methodology

Input

Points of Interest

Cognitive Maps

Interviews

Model

Combinations

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</table>

Output

<table>
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<th></th>
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</thead>
<tbody>
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<td>Output 1</td>
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</tr>
<tr>
<td>Output 2</td>
<td>X</td>
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Guided Explorer

Output
Comparison between Interviews and Cognitive Maps

Motivation > Methods: Input > Methods: Model > Methods: Output > Conclusions

Nature | Culture | Entertainment

- Interview
- Cognitive Map Only

(n = 35)
Results from the Predictive Model: Overall Statistics

Correctly Classified Instances: 71.43%
Incorrectly Classified Instances: 28.57%

Confusion Matrix

<table>
<thead>
<tr>
<th></th>
<th>Predicted: Guided</th>
<th>Predicted: Explorer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual: Guided</td>
<td>19</td>
<td>3</td>
</tr>
<tr>
<td>Actual: Explorer</td>
<td>7</td>
<td>6</td>
</tr>
</tbody>
</table>
Most Significant Attributes for the Predictive Model

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Cognitive Map</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cruise</td>
<td>No</td>
<td>Guided</td>
</tr>
<tr>
<td>Business</td>
<td>No</td>
<td>Guided</td>
</tr>
<tr>
<td>Vacation</td>
<td>No</td>
<td>Guided</td>
</tr>
<tr>
<td>Vacation</td>
<td>Yes</td>
<td>Explorer</td>
</tr>
<tr>
<td>Stopover</td>
<td>Yes</td>
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Conclusions

- Improve the training data input

- Explore other predictive models
  - Random Forest
  - Support Vector Machine (SVM)

- How to automate data collection?

- How to integrate the survey function with the Recommender System?
Thank you from:

People in Motion

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