LFE Medieninformatik

MusicTrends:
Visualization of User-Generated-Content in last.fm

Project Thesis
October 27, 2009
Michael Schmidt
Supervisor: Yaxi Chen
Introduction

- Application: MusicTrends
- User Study
- Conclusion
- Demonstration
Last.fm provides diverse information, but specialized visualizations

- Listening to last.fm music (audioscrobbler) produces implicit User-Generated-Content
- Available visualizations for particular data (charts, listening histories, national comparison)

➤ MusicTrends was designed to gain insights from aggregated information about users, artists and tags

Sources: www.last.fm; build.last.fm/item/377 ;build.last.fm/item/340
MusicTrends: Visualization of User-Generated-Content in last.fm

- Introduction
- Application: MusicTrends
- User Study
- Conclusion
- Demonstration
Separation of data aggregation and visualization

fetch data from last.fm

Database

data aggregation

Interface

visualization

Fig. 5.1: Basic design of MusicTrends
Use of a database provides flexibility for complex data

<table>
<thead>
<tr>
<th>Use</th>
<th>User</th>
<th>Artist</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Name</td>
<td>Name</td>
<td>Name</td>
</tr>
<tr>
<td>Country</td>
<td></td>
<td></td>
<td>ISO Code</td>
</tr>
<tr>
<td>Next_Chart</td>
<td>[...]</td>
<td>[...]</td>
<td>X Position</td>
</tr>
<tr>
<td>[...]</td>
<td></td>
<td>Y Position</td>
<td></td>
</tr>
</tbody>
</table>

Collecting data from different sources
- last.fm web services/java bindings
- ISO 1366 country information
- World map coordinates

Data Aggregation
**Aggregated data** is driven, based on the basic data

Example
Country similarity is calculated based on
- Number of artists contained in both lists
- Ranks of common artists in both lists

\[
\sum_{i=0}^{n-1} \frac{1}{|p_i - q_i| + 1}
\]

- \( n \) = number of artists in common
- \( p \) = artist rank in user list
- \( q \) = artist rank in country list

Fig. 6.1: Part of the data model
Several views for different characteristics of data

Visualization

- 3 different categories
  - user/artist/tag
- 2 different views
  - map-view and abstract-view

Interaction

- Navigation within interconnected views
- Timeslider
- Detailed information/settings in sub-windows

Fig. 7.1: Examples for map-view and abstract-view
Introduction

Application: MusicTrends

User Study

Conclusion

Demonstration
User study designed to gain information about insights and usability

- **Questions**
  I. Is the application helpful to gain new insights?
  II. What kind of insights can be found?

- **Procedure**
  I. Pre-questionnaire: Demographic data and experience with last.fm
  II. Exploratory Browsing: Users were asked to browse the content in a free manor, while they should think aloud about new insights
  III. Post-Questionnaire: Overall impression about MusicTrends

- **Participants**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>male</td>
<td>5</td>
</tr>
<tr>
<td>female</td>
<td>6</td>
</tr>
<tr>
<td>age</td>
<td>22-34</td>
</tr>
</tbody>
</table>
Different aspects analysis afford individual forms of evaluation

- Qualitative analysis of participants’ overall impression of the system
- Insight evaluation:
  Separate schemes for quantitative evaluation (complexity) and insight clustering (classification)

Example: “Brasil has the highest similarity with the worldwide charts over the time”

<table>
<thead>
<tr>
<th>Category (weight 1/3)</th>
<th>Level (weight 1/3)</th>
<th>Information (weight 1/2)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>User</td>
<td>Artist</td>
<td>Tag</td>
<td>Overall</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Tab. 10.1: Quantitative insight evaluation scheme/Tab. 10.2: Insight clustering scheme
MusicTrends supports people to gain new insights

- Map-view outperforms abstract-view in general, especially in Enjoyment, Helpfulness and Learnability.

Fig. 11.1: Diagram of average user rating and corresponding P-Values
Users with last.fm experience tend to show higher performance

- Experienced users gain more insights
- Experienced users acquire insights faster
- Experienced users need less help
- Complexity shows no direct relation to users’ experience

Fig. 12.1: User data diagrams
Insights show constancy in taste and dynamics for artists

- Most findings for Artists/fewest for Users
- Same number for Point in Time over all categories
- Most Development insights for artists
- Most Constant State insights for tags

→ Point in Time statements often depict participants’ first assumption
→ general taste of last.fm users is rather constant over time
→ popularity of artists is influenced by temporal trends more than music genres

Fig. 13.1: Insights sorted by category and time
Most insights consider temporal information about multiple counties

- No insights for user **Development** on **World** level
- No insights for tag **Development** for **Single Countries**
- Mostly insights about **Multiple Countries**

➤ **Users are dedicated to one country**
➤ **Assumption**: map-view helps to derive worldwide information

![Bar chart showing insights sorted by category, time, and spatial information](image_url)

**Fig. 14.1**: Insights sorted by category, time, and spatial information
- Introduction
- Application: MusicTrends
- User Study
- Conclusion
- Demonstration
MusicTrends provides insights into UCG of last.fm

- **Application**
  - Source data: UGC grouped in 3 categories
  - Visualization: map-view and abstract-view
  - Interaction: timeslider, inter-connected views

- **Insight-based Evaluation**
  - Positive feedback for map-view
  - Correlation between user experience and user performance
  - Most insights could cover both temporal and spatial information
MusicTrends: Visualization of User-Generated-Content in last.fm

- Introduction
- Application: MusicTrends
- User Study
- Conclusion

Demonstration