A Cross Domain Lyrics Recommendation from Tourist Spots Reviews with Distributed Representation of Words

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• The listening style has changed a lot during the past decades
  • Subscription service is providing a "unlimited" music access
  • "Do something while listening music" become a ordinary style for us
• What will happen when MUSIC meets TOURISM?
  • It is fantastic for tourists to enjoy music that is similar to the atmosphere of tourist spot they are visiting
  • A method for evaluating the similarity between music and tourist spot is needed
Method Concept

• The GOAL: To recommend the music which is similar to the atmosphere of tourist spot.
  • Personality of Spots: Reviews on tourism website
  • Personality of Songs: Lyrics of the song
• Swift from reviews to (pseudo) lyric using distributed representation of words
  • The directly comparison between is difficult
  • Distributed representation model is built from lyric corpus
• Review vectors generated from review texts but using distributed representation model built from lyrics corpus: An idea to deal reviews as PSEUDO LYRICS
  • The similarity calculation between lyrics and pseudo lyrics is theoretically possible
• The lyric with the highest similarity to the spot reviews become the recommendation result
Proposed Method

• NEXT→Word Distributed Representations Model
• Quantifying Lyrics and Tourist Spot Reviews to Vectors
• Merging Review Vectors to Spot Vectors
• Lyrics Recommendation Based on Similarity Between Lyrics and Spots
Word Distributed Representations Model

- Words Distributed Representation: convert words to vectors with vector calculation supported
  - Article vector can be built from word vectors by vector calculation.
  - It is possible to build lyric vectors & review vectors using word distributed representation.
- Word distributed representations model built by Word2vec framework
  - Lyrics corpus of 94451 English songs fetched from AZlyrics.com
  - Word2vec training parameters: size=300, window=10, min count=2, iter=10
Proposed Method ②

- Word Distributed Representations Model
- NEXT→Quantifying Lyrics and Tourist Spot Reviews to Vectors
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Quantifying Lyrics and Tourists Spots Reviews to Vectors

- Fetch word vector from word distributed representations model
- Lyric/Review vector is the mean of all word vectors in its text.

\[ \bar{V} = \frac{\vec{v}_1 + \cdots + \vec{v}_n}{n} \]

- \( \bar{V} \) is the vector of a lyric or a spot review
- \( \vec{v}_n \) is the vector of each word
- \( n \) is the number of words in a lyric or a spot review
Proposed Method ③

- Word Distributed Representations Model
- Quantifying Lyrics and Tourist Spot Reviews to Vectors
- NEXT→Merging Review Vectors to Spot Vectors
- Lyrics Recommendation Based on Similarity Between Lyrics and Spots
Merging Review Vectors to Spot Vectors

- The individuality and general property of each spot can be extracted by gathering the reviews from each visitor.
- Review vectors is merged with a weighted arithmetic mean.
- The more words, the more information, the more contribution, the more weight.

\[
\overline{X} = \frac{\omega_1 \vec{x}_1 + \cdots + \omega_n \vec{x}_n}{\omega_1 + \cdots + \omega_n}
\]

- \(\overline{X}\) is the vector of each spot.
- \(\omega_n\) is the word number of the \(n\)th review.
- \(\vec{x}_n\) is the vector of the \(n\)th review.
Proposed Method

- Word Distributed Representations Model
- Quantifying Lyrics and Tourist Spot Reviews to Vectors
- Merging Review Vectors to Spot Vectors
- NEXT→Lyrics Recommendation Based on Similarity Between Lyrics and Spots
Lyrics Retrieval Based on Similarity Between Lyrics and Spots

- For one spot, calculate the cosine similarity between this spot vector and every lyric vectors, then find the lyric vector with highest similarity.
- The cosine similarity between spot vector and lyric vector is considered to be the emotional distance of the spot and the lyric.
- The lyric with the highest cosine similarity to the spot will be the system output as the recommendation lyric for the spot.

\[
\cos(\vec{X}, \vec{V}) = \frac{\vec{X} \cdot \vec{V}}{|\vec{X}| \times |\vec{V}|}
\]

- \(\vec{X}\) is the vector of spot
- \(\vec{V}\) is the vector of lyric
• Each lyric has a lyrics ID
• Each tourist spot is matched to the lyric with the highest similarity to the spot
• Several tourist spots correspond to the same lyrics (over corresponding issue)
A part of the lyric:
When I saw my reflection in her eyes
That's when I knew that it was time
I leaned over and kissed her cheek
And softly said goodbye
Against the glass I heaved a sigh
Followed the fading of it's lights
Watched the plane begin it's flight
With my eyes into the night
And I know that I'm a coward
Who couldn't even tell her
As she begged me with those eyes
Give her a reason not to fly
And it haunts me on the highway
Headin back to my place
Why oh why oh why oh why oh why
......

Long Beach → Miles Between Us (Airplane Song)
Outline of All System Outputs

How many times a lyric is recommended

Recommendation Frequency

Lyric ID

over corresponding issue 1
Discussing about Over Corresponding Issue
See Through to ID 39663 & 59978

<table>
<thead>
<tr>
<th>Tourist Spots</th>
<th>Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roosevelt Island</td>
<td>State of New York, America</td>
</tr>
<tr>
<td>Bowling Green</td>
<td>Commonwealth of Kentucky, America</td>
</tr>
<tr>
<td>Governors Island National Monument</td>
<td>State of New York, America</td>
</tr>
<tr>
<td>SoHo</td>
<td>State of New York, America</td>
</tr>
<tr>
<td>West Village</td>
<td>State of New York, America</td>
</tr>
<tr>
<td>Meatpacking District</td>
<td>State of New York, America</td>
</tr>
<tr>
<td>Twin Peaks</td>
<td>State of California, America</td>
</tr>
<tr>
<td>Lincoln Park Conservatory</td>
<td>State of Illinois, America</td>
</tr>
<tr>
<td>Greenwich</td>
<td>London, England</td>
</tr>
<tr>
<td>Greenwich Park</td>
<td>London, England</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Tourist Spots</th>
<th>Genre of Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neue Galerie</td>
<td>Museum</td>
</tr>
<tr>
<td>Solomon R Guggenheim Museum</td>
<td>Museum</td>
</tr>
<tr>
<td>New York Historical Society Museum Library</td>
<td>Museum</td>
</tr>
<tr>
<td>Museum of Arts and Design</td>
<td>Museum</td>
</tr>
<tr>
<td>United Nations Headquarters</td>
<td>Organization</td>
</tr>
<tr>
<td>Broadway</td>
<td>Street</td>
</tr>
<tr>
<td>Radio City Music Hall</td>
<td>Theater</td>
</tr>
<tr>
<td>Le Puy du Fou</td>
<td>Theme Park</td>
</tr>
<tr>
<td>Westminster</td>
<td>Street</td>
</tr>
</tbody>
</table>
Discussing about Over Corresponding Issue

Common Features Between Over Corresponding Locations

• For tourist spots matched with song ID 39663:
  • The common feature maybe the LOCATION
  • There are many spots located in the USA, especially in the State of New York
  • “Greenwich” and “Greenwich Park” should be dealt as the same spot
• For tourist spots matched with song ID 59978:
  • The common feature maybe HISTORICAL
  • There are many museum in the spots list
  • Radio City Music Hall is a old theater hall with long history
  • Le Puy du Fou is a theme park focus on France history
  • Westminster’s history starts from 16th century