Location-Aware Recommender System

Non-Spatial Ratings for spatial Items

<table>
<thead>
<tr>
<th>User</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alice</td>
<td>4.3</td>
</tr>
<tr>
<td>Bob</td>
<td>4.5</td>
</tr>
</tbody>
</table>

Spatial Ratings for Non-spatial Items

<table>
<thead>
<tr>
<th>Item</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Movie</td>
<td>3.5</td>
</tr>
<tr>
<td>Restaurant</td>
<td>4.0</td>
</tr>
</tbody>
</table>

E.g.: Bob rating restaurant X located at Brooklyn Park, MN

Recommend me a nearby restaurant

Location matters in Recommender Systems

- Preference Locality
- Travel Locality

System Architecture

New Message
- Message ID, Content, TimeStamp, Spatial
- Relevant to user’s current location
- New Rating
- Incorporate User Location
- Incorporate Item Location
- Location-based News Feed Query
- Retrieves messages posted by users that have spatial extents covering the location of the requesting user.
- Location-based Recommendation Query
- Suggests a set of items based on the user location, item location, and user/item ratings.

Location-Aware News Feed System

Location-based News Feed
- At most k messages from each friend
- Relevant to user’s current location
- GeoFeed Abstraction
- Multiple location queries to each friend
- Return the answer in a time constrain

Three Approaches

Spatial Pull approach

1. Location-based query
2. Alice’s location
3. Get cell
4. Messages in the cell
5. Retrieve Messages
- Advantages: No overhead during offline period.
- Disadvantages: Bad response time, inefficient for frequently users.

Spatial Push approach

1. Location-based query
2. Other Users
3. Relevant Messages
- Advantages: Good response time
- Disadvantages: Significant overhead to maintain the view

Shared Push approach

1. Location-based query
2. Relevant Messages
3. Other Materialized views
4. New message
5. Other Users
- Advantages: Good response time, reduced overhead
- Disadvantages: Need to check if views can be shared

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J. Bao, M. Mokbel, C. Chow. “GeoFeed: A Location Aware News Feed System”, ICDE 2012