Contextual Recommendations: Extensions

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**Beyond the Representational View**

What a recommender system knows about context, according to Adomavicius et al:

<table>
<thead>
<tr>
<th>How Contextual Factors Change</th>
<th>Knowledge of the RS about the Contextual Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Static</td>
<td>Fully Observable</td>
</tr>
<tr>
<td>Everything Known about Context</td>
<td>Partial and Static Context Knowledge</td>
</tr>
<tr>
<td>Context Relevance Is Dynamic</td>
<td>Partial and Dynamic Context Knowledge</td>
</tr>
</tbody>
</table>

Most prior research concerned with the static, fully observable (“representational”) case.
Partially Observable Contextual Factors

Partially observable contextual factors:

- This could mean, for example, that not all values are known at the recommendation time
- e.g. time and weather are known, but whether the user is alone is not
- This could be predicted using other contextual factors
- For example, the user is often with friends on weekends + it is weekend → assume the user is with friends
- Bayesian networks could be used to achieve this
User Experience as a Contextual Factor

- It is possible that users’ tastes evolve over time, and that these changes follow similar tendencies
- Using the number of rated (or purchased) items as a way to measure user experience, and using that as a contextual factor
- While this could work for some services, probably not suited for many others
Context and Collaborative Filtering

- User-based collaborative filtering can be used as the 2D recommender system with pre- or post-filtering

- Context could be utilized in finding similar users

- k most similar users under similar contexts
  - contextual modeling
Context and Group Recommendations

- Recommendations for a group of users
- Use disagreement and relevance to estimate how well an item satisfies the group as a whole
- Group recommender system with pre- or post-filtering methods
- Contextual information can be used in clustering users
- Contextual modeling
Group Recommendations

1. Use clustering to find similar users
2. Calculate the relevance of unrated items for each user in the group based on the ratings of similar users
3. Aggregate personal scores of group members to get group recommendation scores
   a. least misery
   b. most optimistic
   c. fair design
Context and Group Recommendations

contextual pre-filtering

1. Use clustering to find similar users
2. Calculate the relevance of unrated items for each user in the group based on the ratings of similar users
3. Aggregate personal scores of group members to get group recommendation scores: top-k group recommendations
   a. least misery
   b. most optimistic
   c. fair design

contextual modeling

contextual post-filtering
Context combinations in contextual recommendation

- An idea about creating certain combinations of contexts that the contextual filtering method will look for.
- When a certain combination if found, it will be treated like a any other context.
  - If the user is searching for a movie and the contexts are “friday” and “night” they would create a context combination “friday night”
- These combinations could lead to more accurate results if the system has many different contexts.
- Depending on what the data is like the combination could lead to new recommendations or it could favour certain ones more.
The combinations could be created by hand, or they could be based on common sets of contexts based on user data.

A system using context combinations could have one of these two problems depending on how the contexts are used:

- If the data is required to match with all the used contexts, the combinations could lead to far fewer results.
- If the data is not required to match with all the used contexts, the combinations could cause far more data to pass the filtering. This could be relatively likely if combinations can be made from only a few contexts.