Group Recommendation

Peter Brusilovsky
with slides of Danielle Lee

IS2480 Adaptive Information Systems

Existing group recommenders (P. 598)

- Recommendation domains
  - Web/News Pages
  - Tourist Attractions
  - Music Tracks
  - Television Programs and Movies
- Media to deliver recommendations
  - Web-based system
  - Information Kiosk
  - TV/Audio Players
- However, compared with the recommenders for individual users, the number is limited.

Main Steps of Group Recommendation

- Acquiring preferences of group members
- Generating recommendations
- Presenting and explaining recommendations to the members
- Helping the members' consensus about recommendations

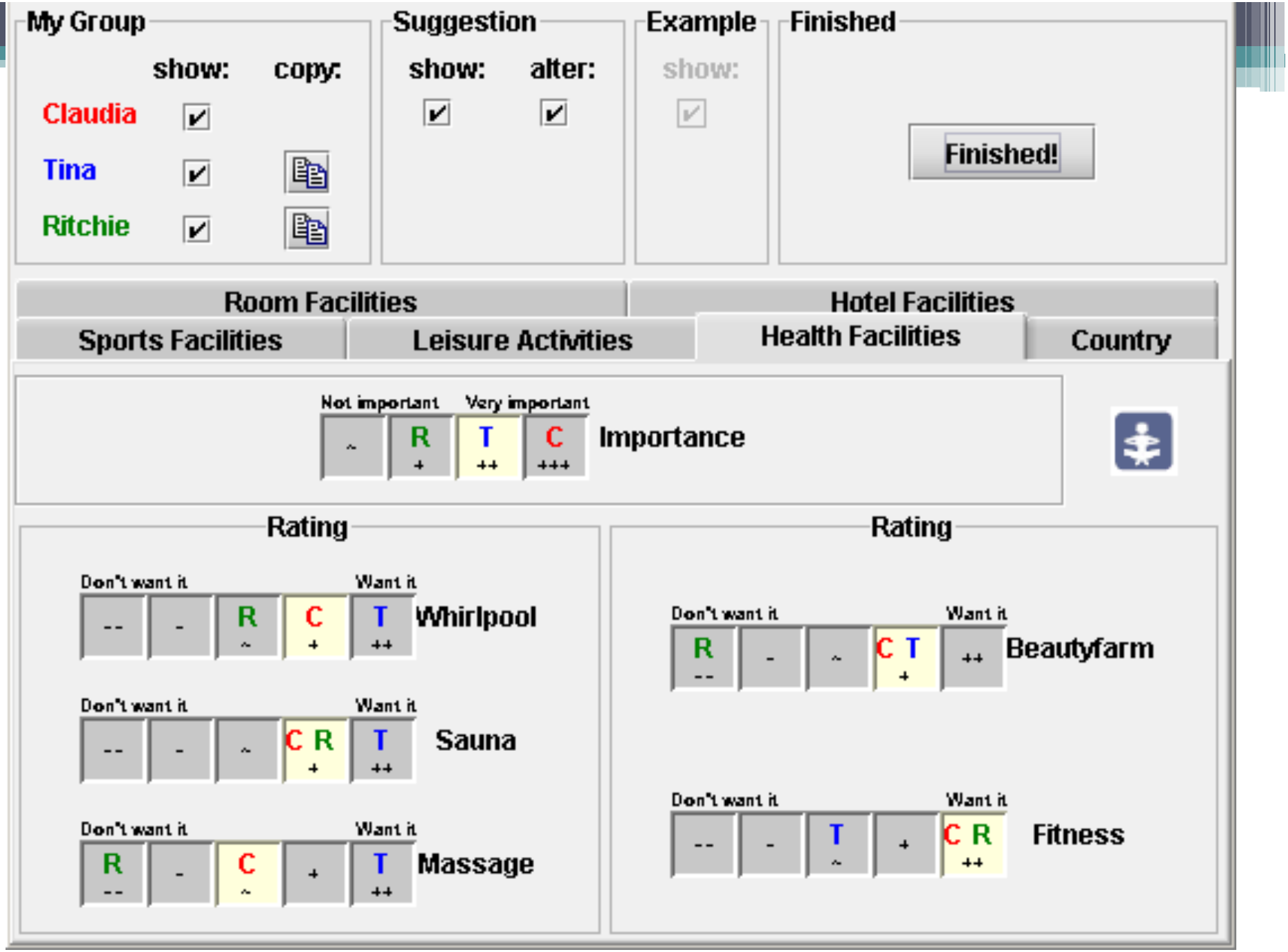
Acquiring information about Group members' preferences

Acquiring Preferences

- Implicitly acquired preferences
  - *Flytrap*: noticing what MP3 files each user plays on his/her own computer
  - *Let's Browse*: analyzing the words that occur in each user's homepages
- Explicitly acquiring preferences
  - *PocketRestaurantFinder*: asking each user's restaurant preferences by cuisine, price, amenity, location, etc.
  - *Travel Decision Forum*: asking each user preferences about travel attributes
  - *PolyLens*: each user does rate individual movies
  - *I-Spy*: the selections of query results are perceived as their preference and query relevancy.
- Negative Preferences
  - *Adaptive Radio*: focus on negative preferences for playing music for groups and avoid the playing of music disliked by any member.

Adapting Preference Acquisition

- In group recommenders, each member may have some interest in knowing the other members' preferences…
  - To save effort.
  - To learn from other members
- Collaborative preference specification
  - Taking into account attitudes and anticipated behavior of other members
  - Encouraging assimilation to facilitate the reaching of agreement.


My Group
show:
copy:
Claudia
Tina
Ritchie
Suggestion
show:
alter:
Example
show:
Finished
Finished!
Room Facilities
Hotel Facilities
Sports Facilities
Leisure Activities
Health Facilities
Country
Not important
Very important
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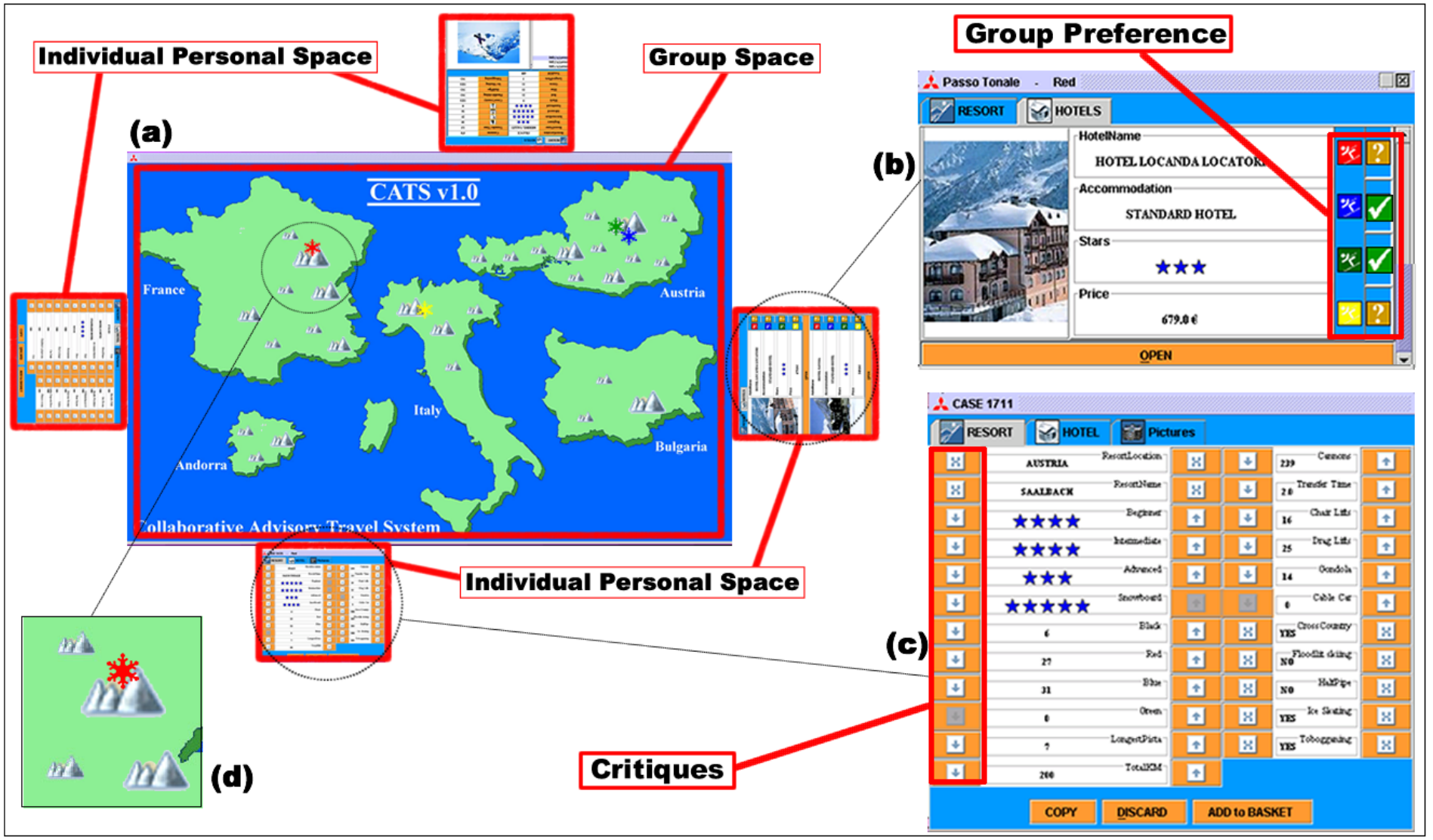

CATS (Collaborative Advisory Travel System)

the smarter way to search

Communities | About I-Spy

ijcai Search PRIVATE SEARCH

changing worlds: Your Search for ijcai returned 37 Results | Displaying 1 - 20 | Result Page: 1 2 Next

Related Information

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IJCAI-99 Home page

IJCAI-99 Program. Program. (PDF version) Registration information. Related events. Other information. Organizers. Travel guide. City Conference Center, Stockholm, Sweden. July 31 - August 6, 1999 ... Updated

Generating recommendation

How to Recommend to a Group?

- Regular approaches will produce a set of independent recommendations for independent preferences
- How/where to merge?
- Three most typical ways are
  - Merging of recommendations made for individuals
  - Aggregating ratings for individuals
  - Constructing group preference models

Merging recommendations for individuals

- For each member *mj :*
  - For each candidate *ci*, predict the rating *rij* of *ci* by *mj*.
  - Select the set of candidates *Cj* with the highest predicted ratings *rij* for *mj*.
- Recommend U*j* *Cj* , the union of the set of candidates with the highest predicted ratings for each member.
- Easy extension of the recommendations for individual users.
- Example: one kind of recommendations in *PolyLens*
- The recommendations does not in itself indicate which solutions are best for the group as a whole.

Aggregating ratings for individuals

- For each candidate *ci:*
  - For each member *mj* predict the rating *rij* of *ci* by *mj*.
  - Compute an aggregate rating *Ri* from the set {*rij*}.
- Recommend the set of candidates with the highest predicted ratings *Ri*.

TITLE	GENRE	REVIEWS	GROUP	YOUR	cosley@cs.umn.edu	cosley@quasar
Pixote (1981)	Drama		★★★★★	★★★★★	★★★★★	★★★★★
Wrong Trousers, The (1993)	Animation, Comedy		★★★★★	★★★★★	★★★★★	★★★★★
After Life (1998)	Drama		★★★★½	★★★★½	★★★★½	★★★★★
King of Masks, The (Bian Lian) (1996)	Drama		★★★★½	★★★★★	★★★★½	★★★★★

Constructing group preference models

- Construct a preference model *M* that represents the preferences of the group as a whole.
  - *Let's Browse*: Forming a linear combination of individual user models which are sets of keyword/weight pairs
  - *Intrigue*: weighted average of subgroup preference models with the weights reflecting the importance of the subgroups.
  - *Travel Decision Forum*: preference specification form reflecting the group preference model as a whole
  - *I-Spy*: Individual group members' behaviors are directly modeling the preferences of the group without individual model.
- For each candidate *ci*, use *M* to predict the rating *Ri* for the group as a whole.
- Recommend the set of candidates with the highest predicted ratings *Ri*.

Goals to be considered in preference aggregation

- Maximizing average satisfaction
- Minimizing misery
- Ensuring some degree of fairness
- Treating group members differently where appropriate
- Discouraging manipulation of the recommendation mechanism
- Ensuring comprehensibility and acceptability
- Preference specifications that reflect more than the individual users' personal taste.

Possible Strategies I

- Plurality voting
  - Each voter votes for his or her most preferred alternative.
- Utilitarian Strategy
  - Utility values for each alternative, expressing the expected U instead of just using ranking information
- Borda Count (Borda, 1781).
  - Points are awarded to each alternative according to its position in the individual's preference list: the alternative at the bottom of the list gets zero points, the next one up one point, etc.

Masthoff, J. (2004). "Group modeling: Selecting a sequence of television items to suit a group of viewers." User Modeling and User Adapted Interaction **14**(1): 37-85.

Possible Strategies II

- Copeland Rule (Copeland, 1951).
  - A form of majority voting. It orders the alternatives according to the Copeland index: the number of times an alternative beats other alternatives minus the number of times it loses to other alternatives
- Approval Voting.
  - Voters are allowed to vote for as many alternatives as they wish. This is intended to promote the election of moderate alternatives: alternatives that are not strongly disliked.

Possible Strategies III

- Least Misery Strategy.
  - Make a new list of ratings with the minimum of the individual ratings. Items get selected based on their rating on that list, the higher the sooner. The idea behind this strategy is that a group is as happy as its least happy member.
- Most Pleasure Strategy.
  - Make a new list of ratings with the maximum of the individual ratings. Items get selected based on their rating on that list, the higher the sooner.

Possible Strategies IV

- Average Without Misery Strategy
  - Make a new list of ratings with the average of the individual ratings, but without items that score below a certain threshold (say 4) for individuals.
- Fairness Strategy
  - Top items from all individuals are selected. When items are rated equally, the others' opinions are taken into account.
- Most Respected Person Strategy (Dictatorship)
  - The ratings of the most respected person are used

Presenting and explaining recommendations to the members

The need for explanation in group recommendations

- Understand how other members opinions affect the suggested information
- Understand how the recommendation was derived

Let's Browse!

collaborative web browsing demo

Henry Lieberman, Neil W. Van Dyke, and Adriana Vivacqua

This page might interest Bill, George, and Nicholas because it concerns technology and travel.

Bill Gates

Microsoft Corp.

billg@microsoft.com

PROFILE BUILT FROM:

http://www.microsoft.com/billgates/

PROFILE KEYWORDS:

technology(56) internet(50) travel(48) windows(46) pc(43) subsidiary(39) investment(32) ceo(29) intellectual(20) property(20) ...

George Lucas

LucasArts Entertainment

PROFILE BUILT FROM:

http://members.tripod.com/~gnomebasher/lucas.htm

PROFILE KEYWORDS:

skywalker(52) business(42) travel(39) force(30) star(25) wars(24) internet(18) graffiti(14) technology(11) digital(10)

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back | Advanced Search | View Agenda | Separate listing by groups | Unique listing (method 1) | Unique listing (method 2)

"Separate listing by group": it shows separate lists, with items sorted on the basis of the different user's preferences
"Unique listing (method 1)": it shows a single list, taking into accout the needs of the whole group
"Unique listing (method 2)": it shows a single list, trying satisfy a little bit everybody

Suggestions for the whole group:

add to agenda Lingotto ★★★★ For children it is much eye-catching, it requires low background knowledge, it requires a
is quite short. For yourself it is much eye-catching and it has high historical value. For impaired it is much eye-catc
historical value.

add to agenda Palazzo Reale ★★★ For children it is much eye-catching. For yourself it is much eye-catching, it has high
high artistic value. For impaired it is much eye-catching and it has high artistic value.

add to agenda Palazzo Madama ★★★ For yourself it has high historical value.

add to agenda Palazzo Carignano ★★ For children the visit is quite short. For yourself it has high historical value.

add to agenda Palazzo Saluzzo di Paesana ★★ For children the visit is quite short.

Visualized explanation on the *Flytrap*

Helping the members to achieve consensus about recommendations

Ending up the recommendation with a consensus

- Unlikely with individual recommendation, extensive debate and negotiation may be required.
- Situation where explicit support for the final decision is unnecessary
  - The system simply translates the recommendation into action
    - *Adaptive Radio*, *Flytrap* and *MusicFX* play the recommended music automatically
  - One group member is responsible for making the final decision
    - Let's Browse and Intrigue have an assumption that one person is in charge of the selection
  - Group members will arrive the final decision through conversational discussion
    - CATS vacation recommender on DiamondTouch interactive table

Points to consider in designing group recommender

- Whether the group members should be allowed to see each other's votes
- How the votes should be counted and weighted
- How the results of voting should be presented
- How the final decisions ought to be made