Lecture - 18

Conversational Recommendations

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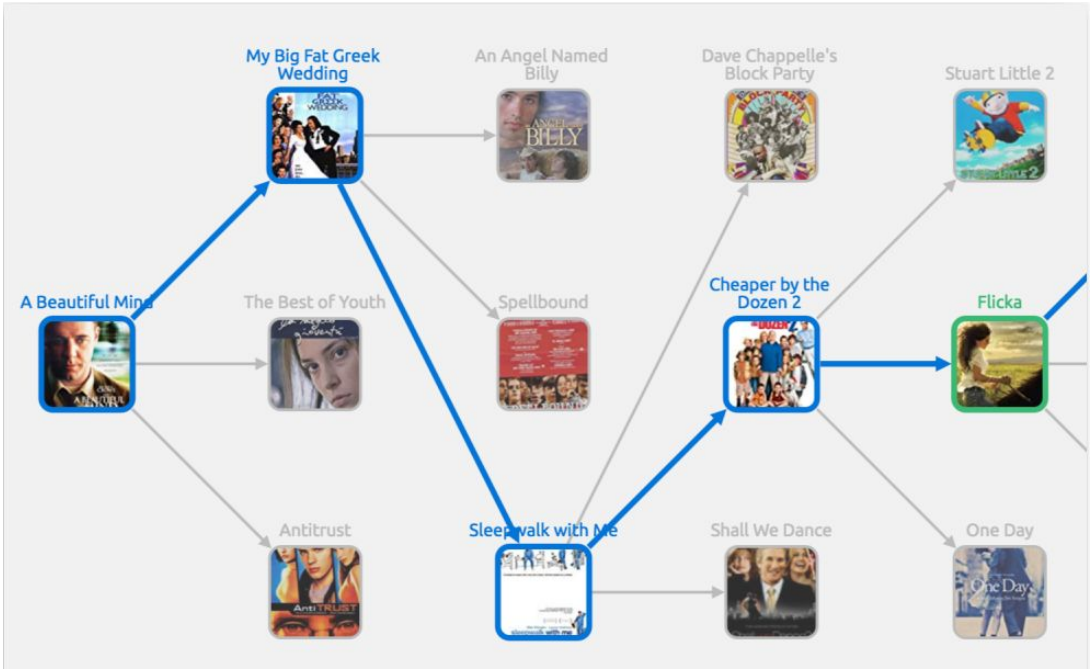
Conversational Recommendations

Conversational Recommender System: *Recommend* → *Review* → *Refine*



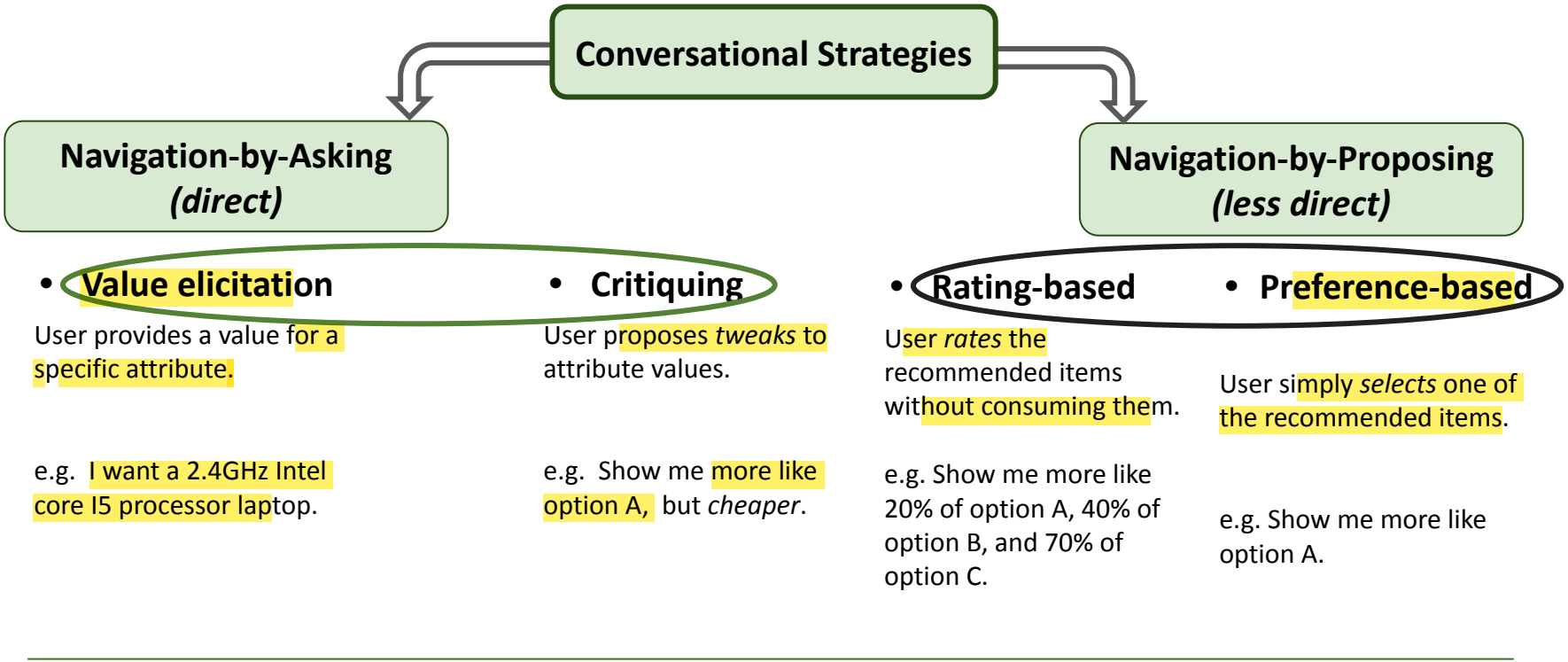
Conversational Recommendations

Conversational Recommender System: *Recommend* → *Review* → *Refine*

- When users are not satisfied with initial top-n recommendations
- When users have ephemeral goals different from their usual tastes
- When user requirements are uncertain or are not fully observable (e.g. context, the user's mood, her companions, etc.) [Pu & Chen 2008]
- Achieves higher level of trust and transparency, and greater acceptance by enabling users to steer the recommendation [He et al. 2016]

- Pearl Pu and Li Chen. User-involved preference elicitation for product search and recommender systems. AI magazine, 29(4):93, 2008.
- Chen He, Denis Parra, and Katrien Verbert. Interactive recommender systems: A survey of the state of the art and future research challenges and opportunities. Expert Systems with Applications, 56:9–27, 2016.

User Feedback in GUI-based Conversational Recommendations



- Hideo Shimazu. ExpertClerk: A conversational case-based reasoning tool for developing salesclerk agents in e-commerce webshops, Artificial Intelligence Review, 18(3-4):223–244, 2002.
- Lorraine Mcginty and Barry Smyth. Adaptive selection: An analysis of critiquing and preference-based feedback in conversational recommender systems. International Journal of Electronic Commerce, 11(2):35–57, 2006.

User Feedback Forms: Facts and Challenges

Value elicitation

- Optimal set of attributes and the logical order
- High level of domain knowledge
- Users' willingness to answer direct and specialized questions

Critiquing

- Handling preference conflicts
- Helping users to perform trade-off analysis

Rating-based

- Level of efforts increases as the number of recommended items increases

Preference-based

- Usually leads to longer dialogs

- Li Chen and Pearl Pu. Interaction design guidelines on critiquing-based recommender systems. User Modeling and User-Adapted Interaction, 19(3):167, 2009.

User Feedback: Influencing Factors

	Value elicitation	*Critiquing*	*Rating -based*	*Preference -based*
• **Cost** (effort required by the user)	**xxx**	**xx**	**xx**	**x**
• **Ambiguity** (ability to guide the recommender)	**x**	**xx**	**xx**	**xxx**
• **Expertise** (domain knowledge required)	**xxx**	**xx**	**xx**	**x**
• **Interface** (type of interface required)	**xxx**	**xx**	**x**	**x**

- Barry Smyth and Lorraine McGinty. An analysis of feedback strategies in conversational recommenders. In Proceedings of the 14th Irish Artificial Intelligence and Cognitive Science Conference, 2003.

Goals of Conversational Recommender Systems

Effectiveness (*maximize*)

Effectiveness is the degree to which the system helps the user to accomplish her task.

e.g. finding a relevant recommendation or some broader measure of user satisfaction

Efficiency cost (*minimize*)

Efficiency cost is a measure of the effort involved in completing the task.

e.g. In terms of total time elapsed, total number of user actions with the system's user interface, number of interaction cycles, or cognitive load

- Daniel Jurafsky and James H. Martin. Speech and language processing. Available at https://web.stanford.edu/ ~ jurafsky/slp3/ ed3book.pdf (2020/03/26).

Evaluation Metrics

Effectiveness

- *Hit/ Rejection -rate* (on each interaction cycles)
- Similarity between the recommended item and the item of interest (on each interaction cycle)
- *Diversity* of Recommendations (in each interaction cycle)
- Average *Surprise* of Recommendations (in each interaction cycle)
- Overall task *success rate*
- *Decision accuracy, user's confidence and intention to return* (after task questionnaire)

Efficiency cost

- Number of recommendation cycles
- Number of items viewed before the accepted item
- *Ease of use, Cognitive load (after task questionnaire)*

Offline Trial (simulation) Protocols

- **Lorraine Mcginty and Barry Smyth. Adaptive selection: An analysis of critiquing and preference-based feedback in conversational recommender systems. International Journal of Electronic Commerce, 11(2):35–57, 2006.**

Leave-one-out Methodology
Critiquing and preference-based forms| content-based settings | structured item descriptions

- **Base query:** randomly picked item
- **Set of queries:** random subsets of Base query's features (easy, moderate, difficult)
- **Target:** most similar to the Base query
- **Selection criteria** (in each cycle): most similar to the target (critiques are the differences between the query and the selected item features)
- **End of conversation:** item of interest (Target) is found

Offline Trial (simulation) Protocols

- **Rana, Arpit, and Derek Bridge. "Navigation-by-preference: a new conversational recommender with preference-based feedback." Proceedings of the 25th International Conference on Intelligent User Interfaces. 2020.**

Simulation Methodology

Preference-based feedback | content-based settings | unstructured item descriptions

- **Base query:** randomly picked item from user's profile
- **Target:** an item, most similar (easy), least similar (difficult) or at random to the Base query
- **Selection criteria** (in each cycle): most similar to the target
- **End of conversation:** item of interest (Target) is found; otherwise, up to 15 cycles

Evaluation is Difficult

Challenges in Offline Trials:

- No generalized offline evaluation protocol exists
- Not easy to formulate users’ selection criteria

Online User Trial Protocols

- Pu, Pearl Huan Z., and Pratyush Kumar. "Evaluating example-based search tools." Proceedings of the 5th ACM conference on Electronic commerce. 2004.
- Chen, Li, and Pearl Pu. "Evaluating critiquing-based recommender agents." AAAI. 2006.

User-trial Protocol

Critiquing feedback | content-based settings | structured item descriptions

- **Scenario:** Find an item that you would purchase if given the opportunity
- **Base query:** An item that user likes the most (from given)
- **Critiquing criteria** (in each cycle): Apply critiques as per the given constraints
- **End of conversation:** as the given tasks are over

Online User Trial Protocols

- Rana, Arpit, and Derek Bridge. "Navigation-by-preference: a new conversational recommender with preference-based feedback." Proceedings of the 25th International Conference on Intelligent User Interfaces. 2020.

User-trial Protocol

Preference-based feedback | content-based settings | unstructured item descriptions

- **Scenario**: Find an item that you would enjoy watching with your putative companion
- **Base query:** Seed item from user's profile
- **Selection criteria** (in each cycle): the one which user finds closer to the item of her interest
- **End of conversation:** User has to interact with the system up to 8 cycles

Evaluation is Difficult

Challenges in Online Trials/ Studies

- Developing User Interface for Evaluation
- Recruiting participants for the trial
- Making sure that the results are not biased
- Getting approval from Ethics committee is usually a longer process

Next lecture -
Advanced Topic Presentations