Personalized, interactive explanations of recommendations in eTourism

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Recommender Systems

- Automated recommendations
  - A pervasive part of our online user experience
  - Explicitly recommend us shopping items, movies, music, news, friends, jobs, groups or people to follow, restaurants, hotels...

![Customers Who Bought This Item Also Bought](image)
Recommender Systems

Once you see them, they are everywhere
Recommender Systems

- Automated recommendations
  - Less obvious: Silently select and rank the items
    - News feeds, ads (in some sense)
Because of your interest in Trump
Recommender Systems in e-Tourism

- Potential value for different stakeholders

- For tourists, e.g.,
  - Pre-trip information gathering and decision making
  - Add-on service during the trip (e.g., POI recommendation)

- For service providers, e.g.,
  - Differentiation from the competition
  - Influencing user behavior
  - Means for information gathering (user preferences)

Penalty-Reward Models

Particularities in e-Tourism

- “Customers who bought ... also bought”
  - Can only be applied for some e-Tourism scenarios
    - E.g., “People who visited the Eiffel Tower, ....”
  - Recommendations often based on complex machine learning models and monitoring user behavior

- In many other scenarios, more fine-grained and interactive approaches are required
  - Need to understand the detailed customer preferences, e.g., regarding the desired amenities of a hotel
  - Need to explain the recommendations to the tourist to be adopted (trusted)

Ultimately ...

- Interactive recommendation and advisory as part of future tourism experience
- Services during different phases, e.g.,
  - Pre-trip decision making
  - POI selection and tour planning during the trip
  - Activity recommendation (e.g., sports, restaurants)
  - Location-based services
  - Proactive notifications
- Explicit preferences and context are relevant
- Requires more elaborate interaction mechanisms
- Side effect also:
  - New opportunities for analytics
An interactive recommender

An interactive recommender
An interactive recommender

I am happy to have found autumn packages for you, as you wished. If you want more suggestions for a specific date, you’ll have to use the detailed advice option (more questions).

- We have a whole range at the Warmbad-Villach spa resort to suit your request Leisure and activities programme & Long walks. Ask about them.

- Our comprehensive supporting programme of cultural events (Carinthian Summer Music Festival, Villach Carnival, exhibitions at the Warmbad culture club, Jazz Over Villach, etc.) all year round and attractions in the vicinity will round off your stay at the

- Do you want to feel fit and healthy? Our sports and activities programmes respond to your wishes.
Everything solved?

- Just add some speech recognition, natural language understanding, and language generation features
- And (deep) machine learning, to avoid knowledge engineering bottlenecks

- Probably not

- Interacting is not only asking for preferences
  - How to help the user understand the range of options?
  - How to determine what to ask in which way?
  - How to help the user express the preferences?
  - How to convince or persuade the user or make them trust in the recommendations?
User interaction in recommenders

- In Computer Science, at least, a niche topic
  - Complex machine learning models dominate
  - Research is very scattered

- A number of dimensions discussed in the literature
  - Dialog aspects - Critiquing: Present an option and let user give feedback (e.g., “less expensive”)
  - User modeling - Personality-based approaches: Try to find destinations that match the tourists personality (e.g., work at TU Wien)
  - Visualization: Use 2D or 3D landscape to help users understand the range of options
  - Explanations: e.g., to persuade a user

Customers who bought ...
Explaining Recommendations

- Explanations can serve various purposes, e.g., (Tintarev and Masthoff)
  - Increase the (perceived) transparency of the recommendations, help users develop trust, increase their satisfaction
  - Justify the recommendations, and thereby increase the persuasiveness of the system
  - Help users make better decisions (effectiveness)
  - Help users make decision faster (efficiency)

- What we consider particularly important here:
  - Explanations as a starting point to user control
  - Generally important for future applications

User Control

- Let users influence the recommendations
  - Explicitly define their preferences, e.g., on Google News
  - Giving feedback to recommendations, as is possible, e.g., on Spotify
  - Let users choose the recommendation strategy (only in academia)
  - Explain the user the recommendation rationale and let users correct assumptions
    - Complex visualizations in academia
    - More simple approaches in industry

Why this is challenging

- At Amazon

![Amazon recommendation for Tosca Women's Dual Strap Fashion Handbag Style 9200](https://images-na.ssl-images-amazon.com/images/I/419N83fZLRL.jpg)

**Recommended for You**

**Tosca Women's Dual Strap Fashion Handbag Style 9200**

Tosca (November 15, 2012)

**Price:** $23.50 - $36.95

Rate this item

I own it

Not interested

**Because you said you owned...**

**NNEE® Water Resistance Nylon Tote Bag & Multiple Pocket Design**

NNEE Inc

Don’t use for recommendations
More research is required

- Preliminary survey among CS students
- Research questions:
  - Do people know about the feedback and control functionality?
  - Do they use it?
  - If not, why not?

- Two-stage study based on questionnaire
  - 75/26 participants
  - 1st stage: “Do you know/use it?”
  - 2nd stage: “Why do you not use it?” (Free-text answers)
Outcomes

- 93% say they know there are possibilities to influence recommendations
- 16% are aware of the special page with feedback/control functionality
- 8% have ever used the feedback/control functionality

Even though
- 53% said the functionality was clear or very clear, and
- 24% said it could be guessed
But why not using it?

- 31% No interest in recommendations
- 27% Too much effort from the user’s side
- 27% Fear of bad consequences
- 19% Privacy concerns
Opportunities and Challenges

- Interactive and context-aware recommendation helpful in various tourism scenarios
  - Hotel search, itinerary planning, POI selection, in-trip proactive recommendations
  - Can improve the tourism experience in general

- Huge potential in two ways:
  - Allows for better, personalized services in the future based on tourism analytics.
  - Much more fine-grained knowledge about the user becomes available for analytics
    - E.g., unknown or unexpected preference patterns
Opportunities and Challenges

But:
- Appropriate user interface mechanisms required
- Usability on mobile devices
- Perhaps the UI has to be adapted to the individual users (beyond “basic” and “expert” modes)

In the future:
- Better integration of various information sources, including social ones
- Usage of capabilities of modern smartphones
  - Various sensors
Summary

- RS as a means to enhance the tourism experience
- Next generation of interactive recommenders (in tourism) should address the open issues
  - Needs interdisciplinary approach
  - And the user in the loop

- Thank you - Questions?

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References / Sources


