Intelligent Interfaces for Preference-based Search

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What is Product Search

• Find the product that best fit your preferences
• An example
  • A user enters a set of initial preferences
  • A list of matching products are shown, often in a ranked list

How are products represented

• By a multiple set of attributes
• Attributes can be
  • Numerical (price, distance, size…)
  • Categorical (red, yellow, blue…)
  • Ordinal (Mon., tue., wed…)
• Most attributes are physical features of a product
• Attributes can be also criteria such as price
How do users search

- State preferences
- Size of an apartment
- Shared bathroom or not
- Get recommendations from an agent
- Form a short list
- Perform tradeoff analysis on short listed items to determine a winner

User analysis of recommendation systems

- User population analysis
- Establishing user segmentation chart
- Establishing user profile
- Interviewing potential users of their needs using the need assessment questionnaires; in addition, ask them to answer the following questions:
  - What kind of recommendation services do you expect to get out of the system?
  - How many preferences are you able to articulate in the beginning?
  - Counting the number of recommendation cycles they performed before selecting a final choice
  - Asking them “are you convinced of the recommendation results?”
  - Developing usage scenarios

How are products ranked by the agent?

- By multiple objective decision theory in a vector space model
- There can be different ranking strategies
  - Maximizing overall utilities (utilitarian strategy)
  - Minimizing any of the attribute values of a given product (egalitarian approach)
  - Maximizing values of prominent attributes (prominent factor approach)

How users process search results?

- Review all products, tradeoff the pros and cons of attribute values of all products (WADD, Payne et al 1993)
- Most people do not make decisions using WADD strategies (known as bounded rationality by H. Simon 1955, Nobel laureate)

What do people do?

- A range of heuristic decision strategies whose accuracy is not as high as WADD
- Elimination by aspect
- Lexicographical ordering
- These observations have been established in behavior decision theory
What would be desirable

• E-commerce systems that encourage users to apply more often the WADD strategy
• What has been done
  • Comparison matrix (references)