Beyond Basic Search

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Outline

• Information retrieval R&D has stimulated a multi-billion dollar industry
• The challenges of information seeking and exploratory search that get searcher(s) more actively involved
• Some early examples: faceted search, dynamic queries and agile views
• Evaluation challenges
Content-Centered Retrieval as Matching Document Representations to Query Representations

A powerful paradigm that has driven IR R&D for half a century. Evaluation metric is effectiveness of the match. (e.g., recall and precision). A half duplex process that is strongly dependent on pre-processing.

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Information Seeking Goals: Focus on Exploratory Search

- **Lookup**
  - Fact retrieval
  - Known item search
  - Navigation
  - Verification
  - Question answering

- **Learn**
  - Knowledge acquisition
  - Comprehend/Interpret
  - Compare
  - Aggregate/Integrate
  - Socialize

- **Investigate**
  - Accrete
  - Analysis
  - Exclude
  - Synthesis
  - Evaluation
  - Discovery
  - Plan/Forecast
  - Transform

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Characteristics of the Exploratory Search Process

- Multiple sessions
- Multiple queries
- Recall important
- Collaborative
- Substantial time spent in results
- Coordinate with other tools
- Relevance judging more difficult (subjective, domain dependent, nuanced)
- Objects of interest tend toward abstract and complex
Dynamic Queries

• Direct manipulation (e.g., slider move, hover) defines and executes query with immediate feedback (see http://www.cs.umd.edu/hcil/spotfire/ for history)

• An alternative to text query forms
Faceted Search

- Combine text search with category selection
- Many E-commerce sites
- Metadata critical (database backends loved)
- Examples:
  - Flamenco  http://flamenco.berkeley.edu/
  - mSpace  http://www.mspace.fm/
  - Endeca  http://endeca.com/  also see http://www.lib.ncsu.edu/endeca/
  - Relation Browser  http://idl.iils.unc.edu/rave
AgileViews

- A view is a partition of an information space
  - There are many possible partitions for any space since many attributes may be used to ‘slice and dice’ the space
- People should be able to **effortlessly** change views
  - Focus can change based on granularity
  - Focus can change based on attribute
AgileViews Framework
What are we trying to support and evaluate?

Active humans with information needs, information skills, powerful IR resources (that include other humans), and situated in global and local connected communities, all of which evolve over time

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Relation Browser Example with all EIA pages [RB demo here]
RB Goals

• Facilitate exploration of the relationships between (among) different data facets
• Display alternative partitions of the database with mouse actions
• Support string search within partitions
• Serve as an alternative to existing search and navigation tools
Relation Browser Principles

• Architectural Principle: Juxtapose facets
  – Two or more with 5-15 categories per facet
  – Topic is one important facet for most applications

• Interaction Principle: Dynamic exploration of relationships between facets and categories

• Database driven to promote flexible applications (requires systematic metadata)
Key Challenges

• Technical evolutions (Java, metadata to client side)
• User expectations and preparations
• Getting metadata and mapping to RB scheme
  – Given the cost and difficulty with hundreds of thousands of web pages, can we automate this process?
Recent User Studies

• Facets (ACM/IEEE JCDL 2007; DL 05):
  – Relation Browser, Vanilla Facet, BLS website
  – Known item and exploratory tasks in BLS data
  – Between and within subject designs
  – Results
    • NSR differences
    • familiarity influences expectations—installed base syndrome
    • Automatically generated categorization comparable to carefully crafted website layouts

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Open Video Example

www.open-video.org

- Open access digital library of digital video for education and research
- 4000+ video segments: MPEG1, MPEG-2, MPEG-4, QuickTime
- Multiple visual surrogates
- Agile Views Design Framework
  - Facet partitions (collections, genre, length, etc.)
  - Different types of views
    - Overviews, previews, shared views
  - Multiple examples of views: Surrogates as previews (textual metadata, storyboard, except, fast forward, spoken descriptions/keywords)
  - Dynamic control mechanisms
- Basic search (MySQL indexes)
Alternative Previews for a Specific Video Segment  [OV demo here]
User Study Framework

GOALS
learning, work, entertainment

Tasks

Mental Load
perceptual load
cognitive load

Physical Load
amount of muscle movement

Time
time spent searching and viewing results

Effort

Video Characteristics
genre: documentary, narrative
topic: literal, figurative
style: visual, audio, textual, place

Surrogates, Agile Views
display controls
keywords
storyboard w/ text, audio
slide show w/ text, audio
fast forward w/ audio
poster frames

Individual Characteristics
domain experience
video experience
cultural experience
computer experience
info seeking experience
metacognitive abilities
demographics

Performance
retrieval (precision, recall)
recognition (objects, action)
gist comprehension
(linguistic, visual)

Satisfaction
perceived usefulness
perceived ease of use
flow
user satisfaction

Outcomes

Domain experience
Video experience
Cultural experience
Computer experience
Info seeking experience
Metacognitive abilities
Demographics

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Video Surrogate Studies

• A dozen studies over 6 years (ACM CHI 07, JCDL 04, ASIST, AVI, MM 06, others)
  – Story boards, slide shows, fast forwards, excerpts, spoken keywords, spoken descriptions, combinations
  – Multiple tasks (gist, vist)
  – Multiple measures (accuracy, time, satisfaction)
  – Within, between, ethnographic

• Results
  – Words matter
  – Visual adds value (conceptual and affective)
  – People able to infer from few cues, tolerate high rates
  – Coordination of multiple channels?

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Thank You!

Questions and Discussion

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