Overcoming Information Overload: Interfaces for Making Abundance Easier

Joseph A. Konstan
Department of Computer Science and Engineering
University of Minnesota
konstan@cs.umn.edu
http://www.cs.umn.edu/~konstan

Overview
Four Thrusts
• Recommender Systems
• Web-Based Interaction
• Visualization
• Multimedia Authoring

Recommenders
Tools to help identify worthwhile stuff
• Filtering interfaces
  • E-mail filters, clipping services
• Recommendation interfaces
  • Suggestion lists, “top-n,” offers and promotions
• Prediction interfaces
  • Evaluate candidates, predicted ratings

Automated CF
The GroupLens Project
(Resnick et al. CSCW ’94)
• ACF for UserNet News
  • users rate items
  • users are correlated with other users
  • personal predictions for unrated items
• Nearest-Neighbor Approach
  • find people with history of agreement
  • assume stable tastes

Recommender Systems
The GroupLens Research Project
• http://www.grouplens.org/
• http://www.movielens.org/
  with John Riedl et al.
How It Works

C.F. Engine

Ratings

Correlations
C.F. Engine
Ratings
Correlations

C.F. Engine
Ratings
Correlations

GroupLens Model of Information Filtering

- Users rate items.
- Users are correlated with other users.
- Predictions made for an item’s value to a particular user by combining ratings of highly correlated users who rated it.
- Recommendations for items for a particular user by identifying popular items among correlated users.

Understanding the Computation

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Interfaces and User Experience

Explaining Recommendations

Ephemeral Recommendations

**PolyLens: Multi-User Recommendations**

**MetaLens: Multi-Source Recommendations**

**Goals**

Explore group recommender design space

See if users would want and use a group recommender, at least for movies

Study behavior changes in group members

• group vs. other users

• new users via groups vs. other new users

Learn lessons about group recommenders

**Design Issues**

Characteristics of groups

• public or private

• many or few

• permanent or ephemeral

Formation and evolution of groups

• joining policy

• administration and rights

**PolyLens: A Group Recommender**

*(O’Connor et al. ECSCW 2001)*

Challenge: People watch movies together

Solution: A recommender for groups

**Issues**

• Group formation, rules, composition

• Recommender algorithm for groups

• User interface

**Other Research (not covered in this talk)**

Algorithm Performance and Metrics (Herlocker)

Dimensionality Reduction Algorithms (Sarwar)

Filterbots (Sarwar, Good)

Distributed Recommenders (Sarwar)

E-Commerce Recommender Applications (Schafer)

Start-up Problem
**PolyLens**

Design choices
- private, small, administered, invited groups
- combine individual recs with minimum misery
- high-information interface with opt-out

External invitations added by popular demand

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**Field Testing PolyLens**

**PolyLens Field Trial Timeline**

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**Survey and Usage Results**

Satisfaction (95% like, 77% more useful)
Privacy not an issue (94% see, 93% share)
- individual recommendations “essential”
Groups reflect “real life” groups
New users via groups stayed 1.5x as often
- group vs. other users a wash
Many stillborn groups

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**MetaLens: A Meta-Recommender**

(Schafer)

Integrating multiple sources of information into a single recommendation list

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**What is the problem?**

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**One solution**

Meta-recommendation system
- MetaLens
Sources of Data

- Genre
- MPAA ratings
- Film length
- Objectionable Content
- Distributor
- Release Date
- Start/End Time
- Critical Reviews
- Average User Rating
- User's personalized MovieLens prediction
- Distance to the Theater
- Special Accommodations
- Discounted Shows

What Have We Learned?

- Meta-recommenders can be built.
- Anecdotally, users like them.
- Some users make heavy use of them, and heavy users are most likely to make some use of them.

Web-Based Interaction

Web Macros

- with Alex Safonov
  - HFWeb '99, HFWeb '01, Webnet '01

Intrusion/Awareness Studies

- with Brian Bailey

Web Macros

Client-side programs that:

- Automate user actions on the Web
- Can be created by end users

Requirements for Web Macros

- infer navigation and control
- support parameters
- deal with dynamic, unstructured data
- maintain the browsing context
**Related Work**

Internet Scrapbook
- Sugiura and Koseki, UIST 98

InfoBeans
- Bauer and Dengler, IUI 99

AgentSoft’s LiveAgent
WebL
- Kistler and Marais, WWW7

**Proxy-based Prototype**

Special URLs http://macros/...

**Status and Key Challenges**

Currently support:
- Navigation, form-filling
- Checks for page fingerprints during replay
- Variety of recording/playback modes
- User studies show benefits for repeated actions!

Key challenges
- Non-linear navigation, inference of intent
- Replay when page or context change
- Parameterization, protect private data

**Intrusion/Awareness Studies**

Asynchronous Information Events
- News, E-mail, stock alerts, sports, etc.

Awareness
- Latency before user can process/react to an asynchronous event

Intrusion
- Effect of asynchronous event on performance of current task, or on user annoyance and stress

**Effects of Interruption and Timing**

Manipulate
- Interruption timing (between/during)
- Main task (reading, counting, registration, etc.)
- Interruption (news/finance)

Measure
- Anxiety
- Task performance time
- User Annoyance

**Results**

Significant increase in annoyance and anxiety when interrupted during tasks

Significant increase in task time when interrupted during task

Task nature interacts with interruption (high-load tasks are worse to interrupt)
Adjusting Windows Experiment

Three interruption interfaces
- Dialog box
- Background window
- Adjusting window

Measure
- Preference
- Interruption-handling strategy
- Performance

Serial-Periodic Data

- Two Views of Same Dimension
  - serial view: continuous
  - periodic view: cycles, seasons

- Examples
  - time
  - musical notes
  - tasks
  - race laps

Adjusting Windows

Higher awareness than background window
- More Read Now response behaviors
- Information available "at a glance"
- Informs without requiring user action

Less Intrusive than dialog window
- Rated as less distracting
- More Read Later response behaviors
- Does not demand user attention or supplant task

Preferred by many of the subjects

Visualization

- Spiral Visualization of Serial Periodic Data
  (with John Carlis, UIST ’98)

- Brain Neighborhood Viewer (with Alex Safonov, John Carlis, et al.)

- JaViz profiler / performance visualizer
  (with Pen Yew, David Lilja, et al.)

Current Tools Hide Aspects of S-P Data

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Current Tools Hide Aspects of S-P Data

S-P Data
Chord:

Closed C  Open C
Closed D  minor

Tighten the Spiral

Junk  Aaahh ...  Yeah!

Brain Neighborhood Viewer

Coordinated views into a database with “stacks” of 2D images of rat brains

Interaction can link many views together to view the “neighborhood” of a point in the brain

JaViz

Tool for tracing execution of distributed Java applications, and exploring the results.

Three key parts:
- Gathering the trace data
- Merging the data from multiple processes
- Displaying the data for interactive exploration
DEMAIS – A Design Tool for Interactive Multimedia

with Brian Bailey
(Proc. ACM Multimedia ’01)

Design vs. Development

Designers tend not to be implementers

Need to explore and communicate ideas quickly

Need to explore interaction!

Key Ideas

Sketching

Stroke language to add event/temporal meaning

Storyboard and multi-board views

Incorporate or record media where needed

Layers to disambiguate when needed
**Status**

Version available for experimentation at: http://www.cs.umn.edu/~bailey

First round (formative) user testing completed

Second round (comparative) to begin soon

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**DEMAIS – A Design Tool for Interactive Multimedia**

with Brian Bailey

*(Proc. ACM Multimedia ’01)*

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**DEMAIS – Tool Components**

Storyboard editor

Narration editor

Multi-view editor

Sketch temporal and interactive behavior

Explain in context of design example

- Lewis and Clark expedition of the early 1800s

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**Design vs. Development**

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Need to explore and communicate ideas quickly

Need to explore interaction!
Implementation

Hardware
- Wacom display tablet with stylus

Software
- Written in Java, uses JMF and Java Speech
- Recognizing rectangle and gesture strokes
- Mahalanobis distance classifier
- Runtime engine
- Adapted NSync toolkit

Status

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First round (formative) user testing completed

Second round (comparative) completed and being analyzed

Acknowledgements

The work reported on here has been supported by several different grants from the National Science Foundation and by grants from private companies. Many colleagues have contributed to the success of this work.