Web Montage: A Dynamic, Personalized Start Page

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Today’s personalized portals

• Make routine tasks easier
• Users configure and maintain
• Content biased by sponsor site
• Display insensitive to browsing context
Our conjectures

1. Users want one-click access to routine destinations

2. Conditioning on browsing context will increase the value of personalization

3. Past web access patterns can predict future browsing destinations
The Web Montage system

• Builds dynamic, personalized portals
• Embeds and links to content from many sites
  – Builds montages of information
• Montages are dynamic, depend on user’s browsing context
A web montage

- Groups by topic
- Embeds content from many sites in content lenses
- Links to other content
- Links to topic-specific montages
Content lenses
Links-only montage

• Display only links
  – No content lenses
• Only one montage
  – No topic-specific pages
• Loads quickly
• Displays more links
The Montage system

• Two-step approach
  – Step 1: model the user
  – Step 2: assemble the montage

• Condition the personalized portal on the context of web browsing
  – Time/date of session
  – Topic of recent browsing
Step 1: model the user

- User directs browsing through a proxy
- Montage collects context of each request
  - Topics are drawn from Open Directory
    - Computers & Internet; Sports & Recreation; etc.
  - Topics are assigned using content classifier
- Learns 5 aspects about the user…
User model: candidate pages

1. Candidate pages to include on montage
   - Can’t consider all pages on web
   - Can’t consider all pages ever viewed

   - Consider pages that have been revisited
User model: interest

2. User interest in page
   – Would the user want to return to this page?
   – We use:
     • Links followed from page
     • Time spent in sessions starting w/ page

3. User interest in topic
   – Which topics to display in Main Montage?
   – Sum of interest in pages belonging to topic
User model: navigation savings

4. Probability of revisiting page

$$\text{Pr}(\rho) = \frac{\# \text{ sessions containing } \rho}{\# \text{ sessions total}}$$

5. Savings possible

- How many steps would a link on the montage save?
Step 2: assembling the montage

• Collect the context of the current session
• Estimate expected utility of pages & topics
  \[ E[U(p)] = Pr(p \mid C) \times (I(p) \times S(p)) \]

• Pack content and links into window
  – Fill exactly one browser window – no scrolling
  – Knapsack packing problem
A Montage user study

- Tested for two variables
  - Model: Complex vs. simple
    - Simple model: suggest most frequented links
  - View: Links-only vs. embedded-content
- Three study groups of 6 people each
- Each group saw complex/embedded and
  - Simple / links-only
  - Complex / links-only
  - Simple / embedded-content
Study procedure

• Users directed all browsing through proxy
• Users set montage as their start page
  – Users rate opinion of montage each visit

• First 7 days: collect data exclusively
• Next 4 days: we present first view
• Next 4 days: we present second view
  – Models rebuilt nightly; montages hourly
Scores for Montage styles

<table>
<thead>
<tr>
<th>Model</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple</td>
<td>2.64</td>
</tr>
<tr>
<td>Complex</td>
<td>3.79</td>
</tr>
</tbody>
</table>

• Complex model best
  – Context-sensitive & expected utility

<table>
<thead>
<tr>
<th>View</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Links-only</td>
<td>4.40</td>
</tr>
<tr>
<td>Embedded-content</td>
<td>2.98</td>
</tr>
</tbody>
</table>

1 = Not pleased
7 = Very pleased
Lessons learned (1 of 3)

• **Users want one-click info access**
  – Users appreciated automatic display of links
  – But links-only (two clicks) preferred over embedded-content (one click)

• Montage load time important
  – Portal/home page must load quickly

• Variety in displayed content better
  – More links displayed on links-only montage
Lessons learned (2 of 3)

- **Context enhances personalization**
  - Complex model preferred over simple

- **What context is best?**
  - Time/date & topic of recent browsing
  - Other applications running on computer
  - User demographics
Lessons learned (3 of 3)

• *Past accesses predict future browsing*
  – Montage often displayed appropriate content

• Longer-lived history would help
  – Many revisited pages too infrequent in study

• Collaborative filtering would, too
  – Montage could display content other, similar users have viewed recently
Related work

• Personalized portals
  – MyOwnWeb [Anupam, et. al., 1999]
  – Web Object-Oriented Desktop [Chan, 2001]

• Automated bookmark systems
  – PowerBookmarks [Li, et. al., 1999]
  – Bookmark Organizer [Maarek & Ben-Shaul, 1996]
Summary

• Montage improves routine web browsing
• Montage follows two-step approach
  – Learns context-based user model
  – Builds dynamic, personalized web portals
• Study results show Montage strengths & suggest future research
Future work

• More user control over utility evaluation
  – User sets trade-offs in utility model
• Dynamic topic leveling
  – More detail only in topics of interest
• Mixed-initiative montage
  – User can directly add & delete candidates
  – Montage automatically selects best candidates and formats page