MemoryLane

Leveraging user context for better organization and retrieval of bookmarks

The Web – Source of Knowledge

- Knowledge searching – average 40,000 Google search for each second (Internet Live Stats)
- People consider Internet an important primary information source thanks to accessibility, currency, interactivity, broad repertoire of information

- Observed web user behavior: Users have the need to keep information for re-use at a later time

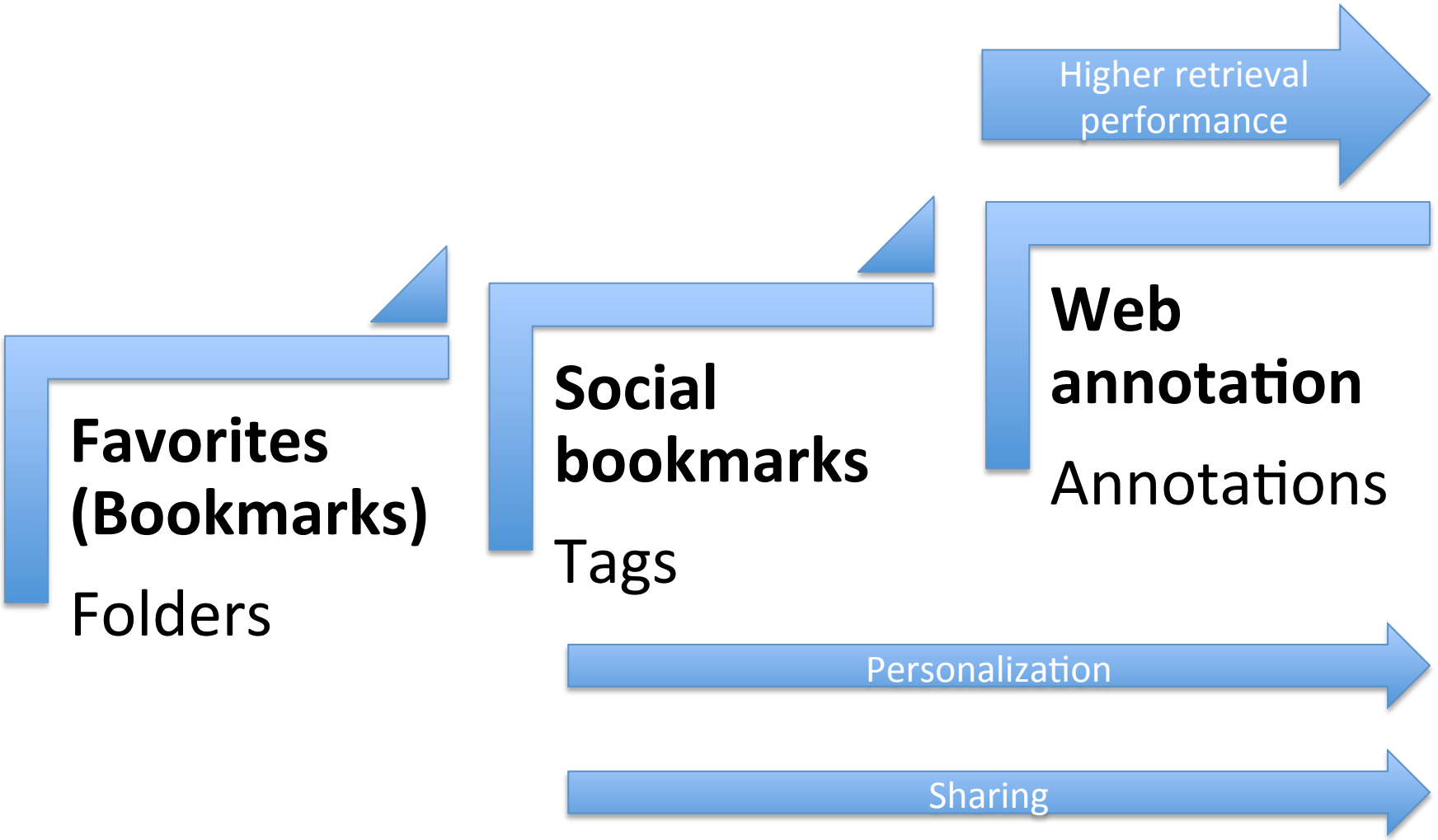
1) Herder's survey: 51% of web pages were re-accessed on average
2) Teevan et al.: 40% of Yahoo's query of 1 year was re-visitation

How are we dealing with managing web resources today?

The most common way used to manage web resources is via:

BOOKMARKS

Bookmarking in Web 2.0 era



Bookmarking – a popular way of keeping web resources BUT…

- Majority of web users use bookmarks in their web browsers and the number of bookmarks increase over time

- But most users **do not use bookmarks** to retrieve web resources

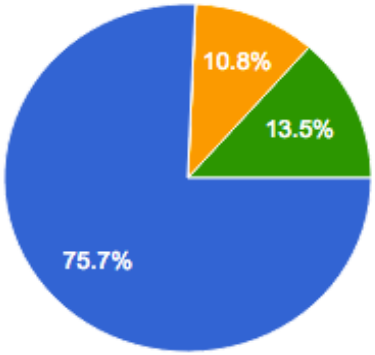
WHY?

- **Difficulty in re-finding resources**

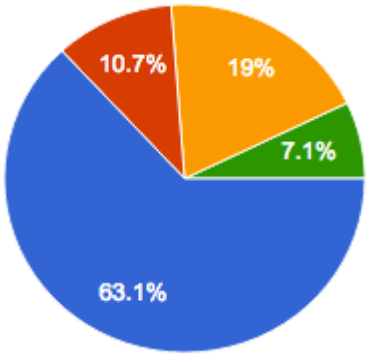
1) Folders – obscure contents. Assumes one-to-many relationship. Need organization efforts.
2) Tags – allows many-to-many relationship but causes confusion, redundancy, inefficiency.

Let's see what users say (Methods of keeping information)

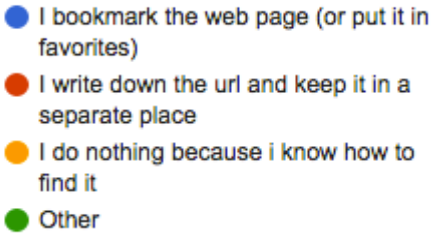
- Most users use bookmarks to save web pages



Group A (30 to 49)



Group B (18 to 39)

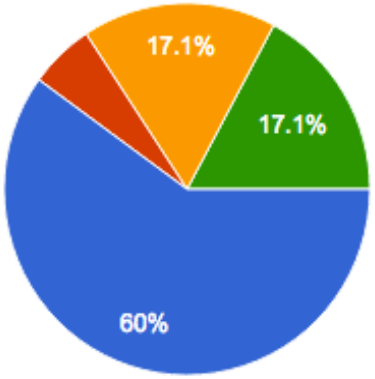


* Alternative way of keeping web pages: writing down urls, saving web pages into hard disk, Keeping tabs open until not needed

* Do nothing: the users rely on search engines and url auto-completion. The younger generation showed more confidence in re-finding web pages using such methods

Let's see what users say (Bookmark organization & size)

- Most users prefer FOLDERS over TAGS



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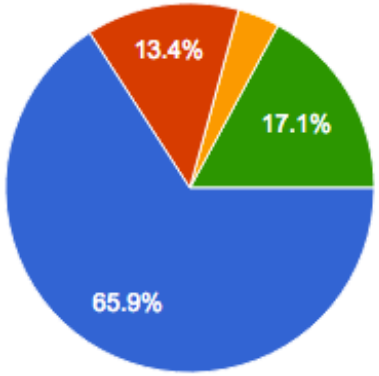

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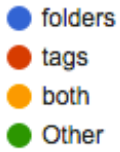
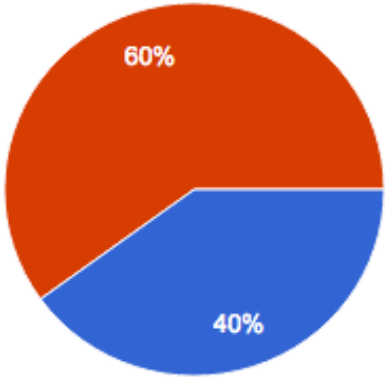


* Older generation had a much larger size of bookmark collection (55.6% more than 50 bookmarks) than the younger one (32.2% more than 50 bookmarks)

- The younger generation appears more open to the organization by "only tags" than the older one
- Others: no organization of bookmarks. They rely on the titles and time-based default order to find their bookmarks

Let's see what users say (Difficulty faced in retrieval)

- The older generation experienced more difficulty



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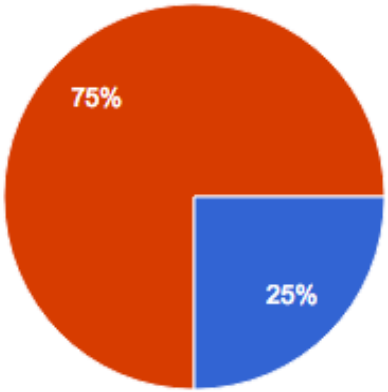


Group B (18 to 39)

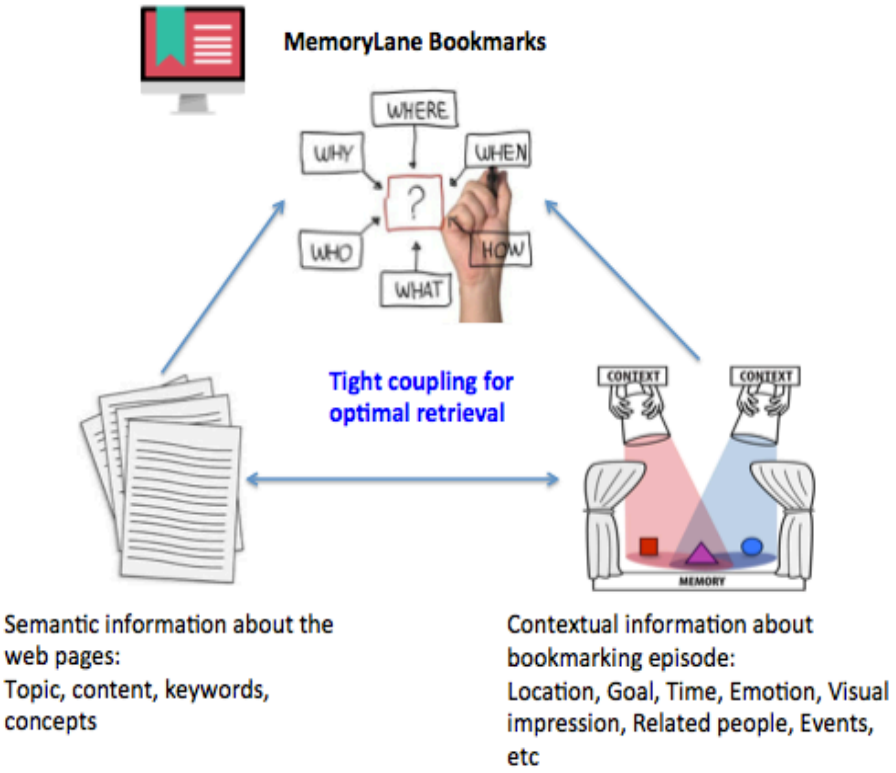
- The younger generation experienced less difficulty in retrieving bookmarks. This may be caused by the fact that the younger generation seemed to have more confidence in re-finding information using search engines and url auto completion or simply that they have better memory.
- Both of the groups said the cause for difficulty was due to "Memory problem" (60% and 54.8% respectively)

Let's see what users say (Perception of importance for retrieval)

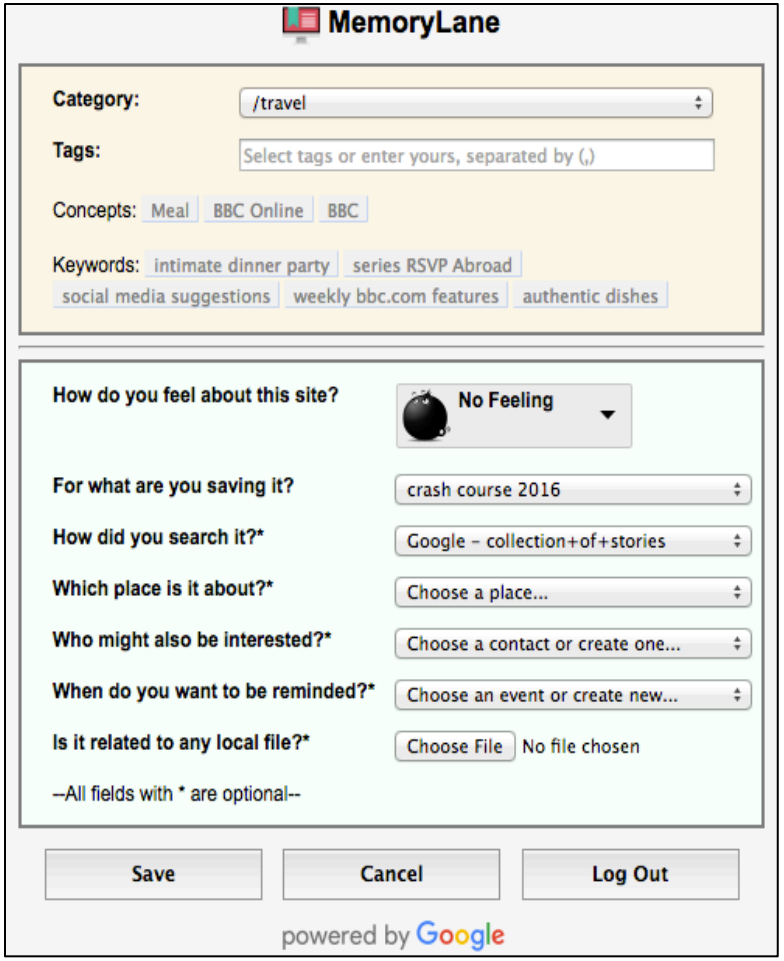
Type of information	Group A (%)	Group B (%)	Avg.
Topic	65.7	72.6	69.15
Goal	62.9	65.5	64.2
Source (query, people, events)	36.1	33.3	34.7
Emotions	5.6	11.9	8.75
When needed to retrieve	13.9	19	16.45
Place	8.3	4.8	6.55
Time	5.6	1.2	3.4

MemoryLane - Concept

- MemoryLane is a Chrome extension built using HTML5 and JavaScript with communication with server over HTTP that encourages users to provide additional contextual information valuable for search and retrieval. By treating each bookmark as a memory episode, users are provided with multiple and inter-connected pathways to retrieve their bookmarks just as how memory is retrieved in human brains.



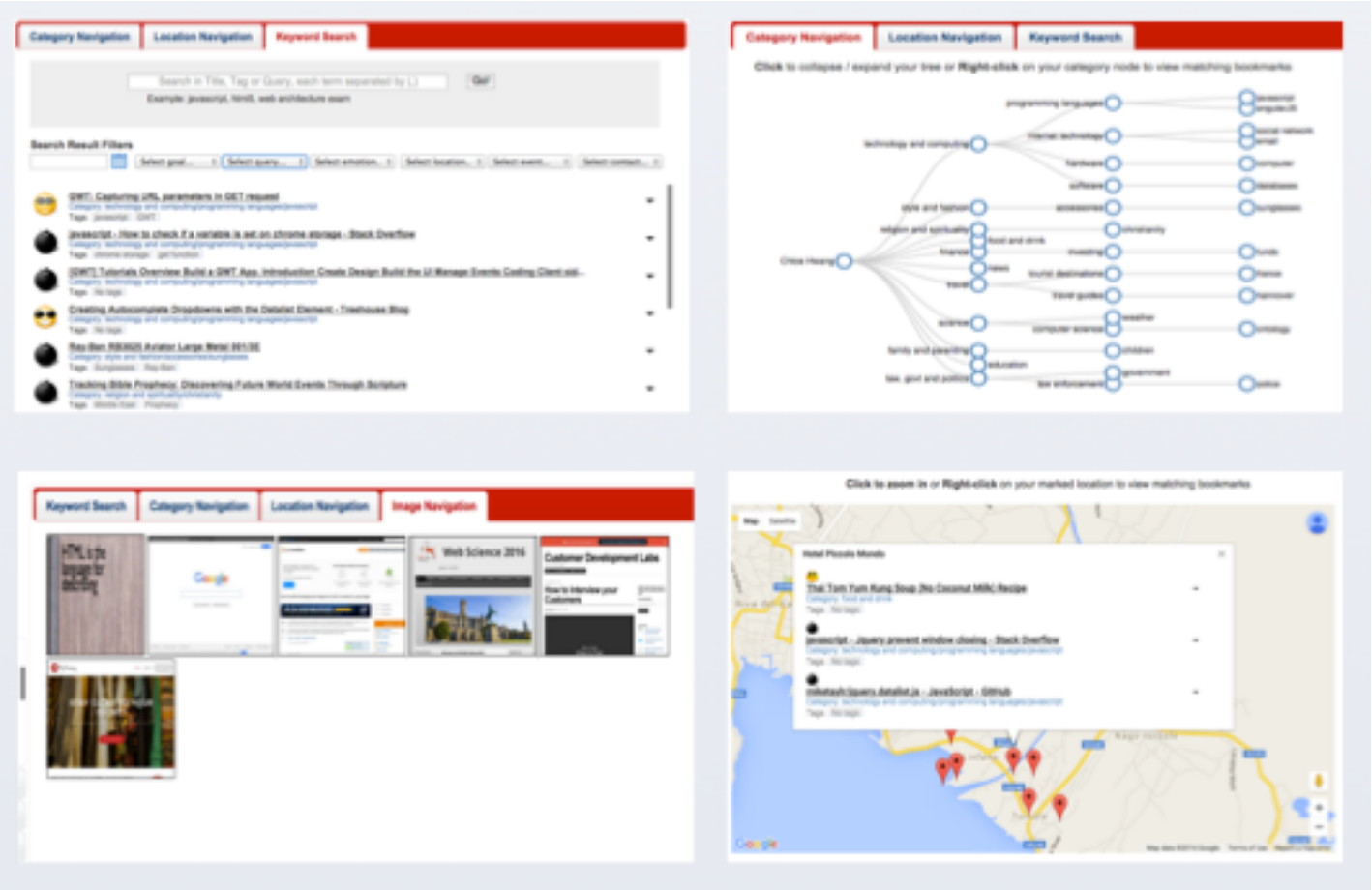
MemoryLane – Chrome extension



- Each bookmark is comprised of its “semantic” and “contextual” parts. Semantic part deals with elements semantically related to the content of the web page and includes title, search query and category. On the other hand, contextual part is made up of emotion, goal, event, location, contacts and related file.

MemoryLane – Home page

- MemoryLane can provide users with powerful browsing-oriented search. It creates a personalized taxonomy tree diagram that allows users to view, browse and discern his or her domain-based dynamics of saved knowledge resources. Furthermore, users can browse their bookmarks based on locations marked in Google map, by visual screenshots of web pages or simply typing in keywords



User Experiment

- Purpose: measure quantitatively the performance of bookmark retrieval of MemoryLane vs. Chrome bookmarking tool
- Participants: 6 users (3 male, 3 female between 25 to 35)
- Method of testing

1) Users were given 10 questions for which they were to find 2 answers each using search engines
2) Then users were asked to bookmark the answers using both MemoryLane and Chrome bookmarks
3) Three weeks after, users were asked to a) recall the details of the answers they bookmarked b) retrieve the answer using MemoryLane and Chrome bookmarks

Quality of recall & retrieval success

- Finding: There is a direct relationship between the quality of recall and retrieval success

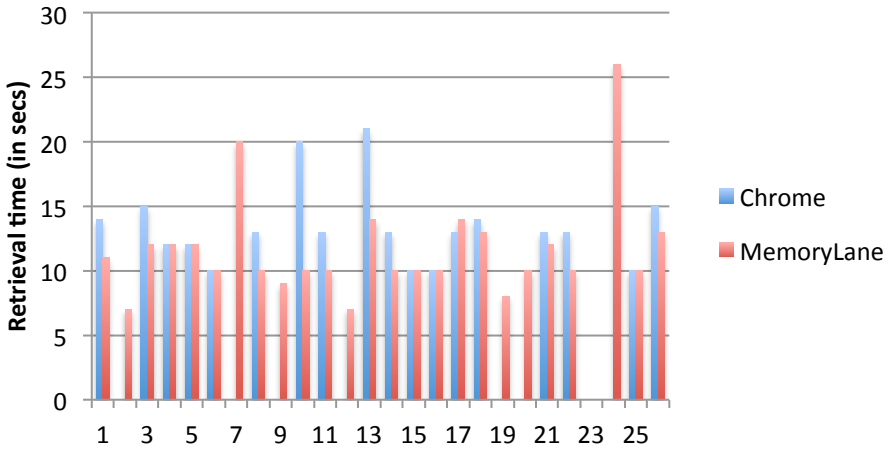
Users were asked to recall anything about the bookmarks before the attempt at retrieval. The quality of recall was measured based on their specificity and accuracy. If users recalled nothing, it was recorded as "None". We can see that there is a direct relationship between the quantity and accuracy of information recalled and the successful retrieval of bookmarks.

Quality of recall							Total	Retrieval success	Success rate (%)
Specific and accurate	0	1	3	6	1	6	17	17	100
Vague (non-specific, unsure)	6	4	5	4	6	3	28	20	71
None	4	5	2	0	3	1	15	8	53

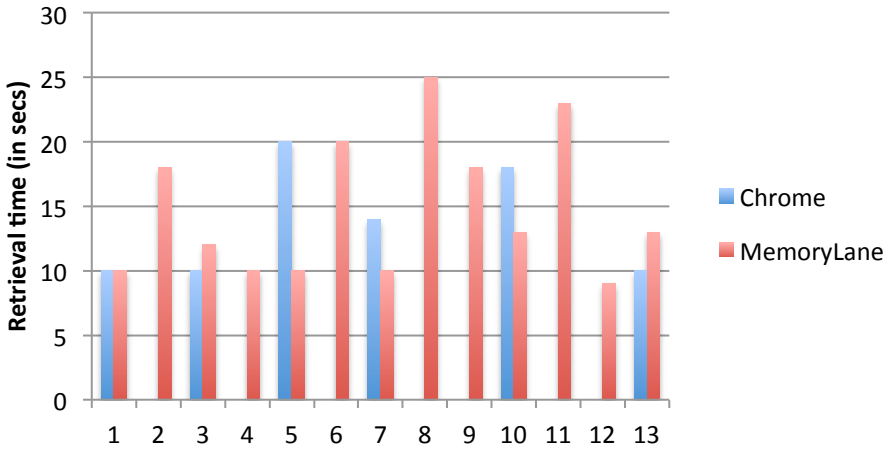
MemoryLane retrieval performance

- Finding: The retrieval performance difference between MemoryLane and Chrome bookmarks is not significant but there is a notable difference when it comes to retrieval success rate when users cannot recall accurately

Retrieval time: Vague recall



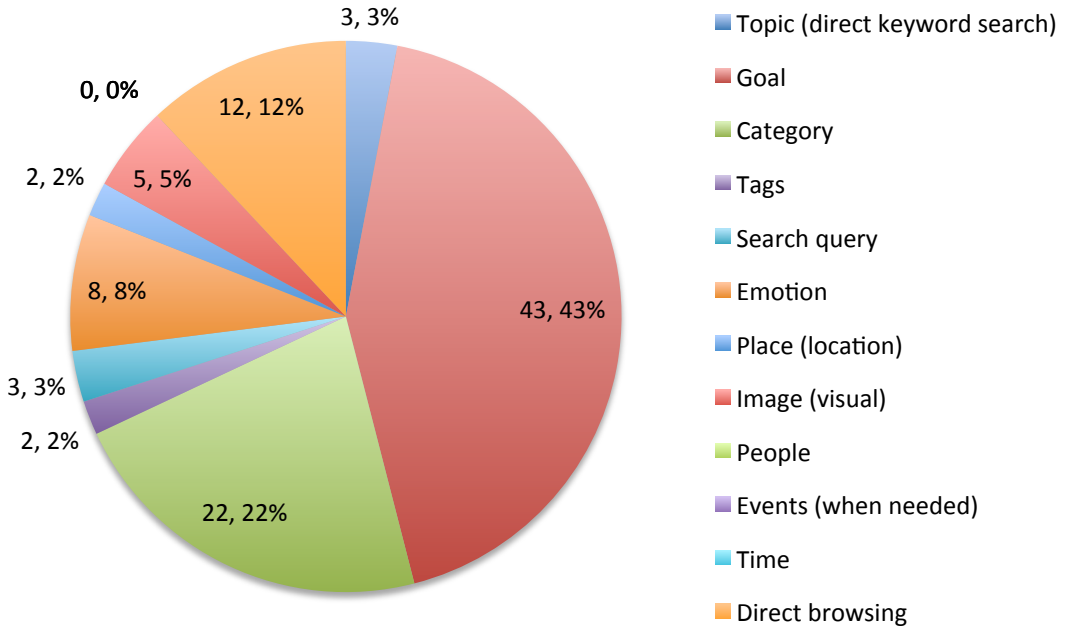
Retrieval time: No recall



	Chrome		MemoryLane	
Quality of recall	Retrieval success rate (%)	Avg. time for retrieval (seconds)	Retrieval success rate(%)	Avg. time for retrieval (seconds)
Specific and accurate	100	11	100	11
Vague (non-specific, unsure)	69	13	96	12
None	46	14	100	15

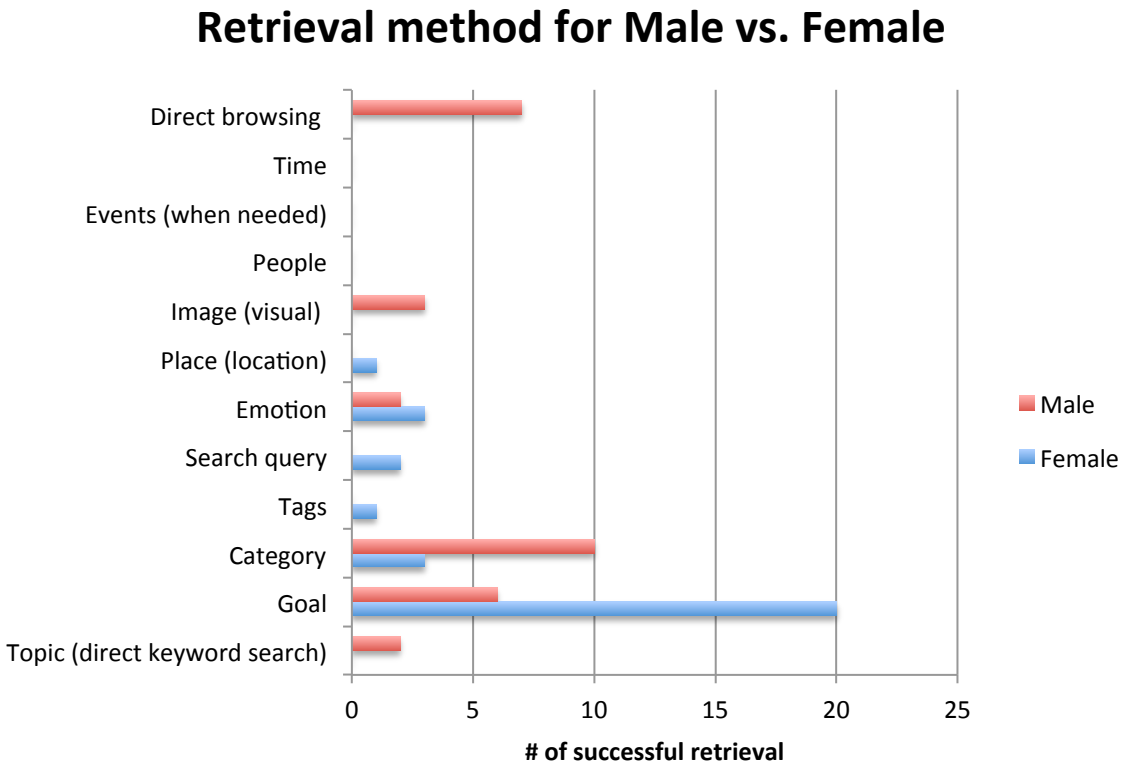
Retrieval cues used with MemoryLane

- Finding: The most commonly used cues were Goals and Category, followed by Emotion



Gender-specific preferences

- Finding: Female users showed distinct preference for goal and emotion whereas male users for category and direct browsing of titles. This may imply that female tend to remember more of the contextual information while male focuses on the semantic information.



Further challenges

- User interface

- Allow user preference settings to choose which context information to be saved per bookmark

- Increase discoverability of various features without giving up simplicity of U.I.

- Collaboration

- Innovative ways to share bookmarks using existing contextual and semantic information

- Increased visibility of popular bookmarks on search engine results

THANK YOU!

- **Questions?**

- For more information or questions,
  hyeonkyeong.hwang(at)unitn.it