


lurking Privacy Web 2.0 folksonomies
Recommender system content management systems economics
History of social web Social networks
content tagging online communities Education and the Social Web
social navigation technology
participation
wikis Art and the Social Web social search
Political Activism & the Social Web social capital blogs relationships
Ethics of participation AJAX
community awareness and visualization Trust and reputation

Social Navigation

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University of Pittsburgh
<http://www.sis.pitt.edu/~peterb>

Where we are?

	Search	Navigation	Recommendation
Content-based			
Semantics / Metadata			
Social			

Social Navigation in Real World



“...without knowing much, we joined the longest existing queue formed for a sushi restaurant. looking at faces of people (both young and old) filled with expectations despite the long wait in the cold weather, we were sure that the food would be worth every minute of waiting time. well, it was”. (A comment on Flickr image, used in Rosta Farzan’s Thesis)

Social Navigation in Real Life

What would you do...?

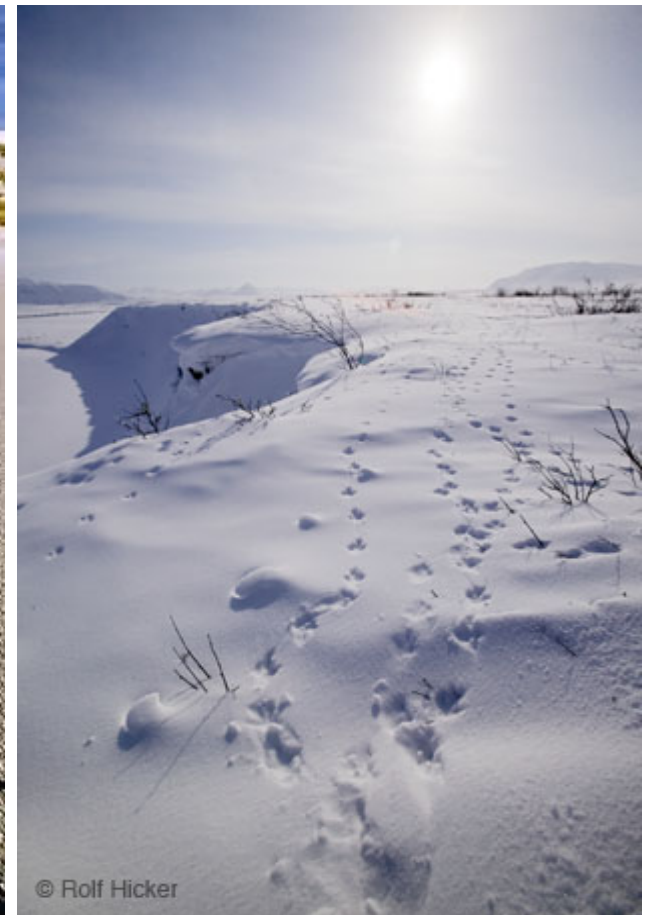
- Walking by the cinema you feel like watching a movie, but none of the movies seems familiar
- You missed a lecture and want to do your readings. You have a textbook and 100 assigned pages to read, but do not know what was most important in the lecture and what can be skipped
- You are hiking along a trail to a famous waterfall. You reached an unmarked road split and you have no map

Social Navigation

- Natural tendency of people to follow each other
 - Making use of “direct” and “indirect cues about the activities of others
 - Following trails
 - Footsteps in sand or snow
 - Worn-out carpet
 - Using dogears and annotations
 - Giving direction or guidance
- Navigation that is conceptually understood as driven by the actions from one or more advice provider



What do you do?



Social Navigation vs. General Navigation

Walking down a path in forest

Walking down a road in a city

Reading a sign at the airport to find the
baggage claim

Talking to a person at the airport help desk
to find the baggage claim

The Lost Interaction History

What is the difference between walking in a real world and browsing the Web?

- Footprints
- Worn-out carpet
- People presence

What is the difference between buying and borrowing a book?

- Notes in the margins
- Highlights & underlines
- Dog-eared pages
- Opens more easily to more used places

EDUCO: Synchronous, Indirect SN

File Edit View Go Communicator Help

Back Forward Reload Home Search Print Security Stop

Bookmarks Location: <http://educocn.cs.helsinki.fi/educoc/deno/>

Welcome to EDUCO

Virtual Learning Environments

EDUCO

Course Sequencing for Static Courses? Applying ITS Techniques in Large-Scale Web-based Education

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Abstract. We argue that traditional sequencing technology developed in the field of intelligent tutoring systems could find an immediate place in large-scale Web-based education as a core technology for concept-based course maintenance. This paper describes a concept-based course maintenance system that we have developed for Carnegie Technology Education. The system can check the consistency and quality of a course at any moment of its life and also assist course developers in some routine operations. The core of this system is a refined approach to indexing the course material and a set of "scripts" for performing different operations.

1 Introduction

Course sequencing is one of the oldest technology in the field of intelligent tutoring systems (ITS). The idea of course sequencing is to generate an individualized course for each student by dynamically selecting the most optimal teaching operation (presentation, example, question, or problem) at any moment of education. An ITS with course sequencing represents knowledge about the subject as a network of concepts where each concept represents a small piece of subject knowledge. The learning material is stored in a database of teaching operations. Each teaching operation is indexed by concepts it deals with. The driving force behind any sequencing mechanism is a student model that is a weighed overlay of the domain model - for every domain model concept it reflects the current level of student knowledge about it. Using this model and some teaching strategy a sequencing engine can decide which one of the many teaching operations stored in the data base is the best for the student given his or her level of knowledge and educational goal.

Various approaches to sequencing were explored in numerous ITS projects. The majority of existing ITS can sequence only one kind of teaching operations. For example, a number of sequencing systems including the oldest sequencing systems [2, 14] and some others [8, 12, 15] can only manipulate the

Comments:

Tästä aiheesta ajankohtainen esinehdä:
www.hiidenportti.com

- michael zeller (20.1.14:22)

Joe oppimiselin tekee hyvin, on taloudellman penos varmasti suurempi kuin mitä hyvän oppikijan tekeminen

Add comment

Direct Asynchronous SN

Asynchronous discussion forums

Recommending information to friends and
community

Directly asking questions for getting
information

Sharing bookmarks with others

Umtella: Direct Asynchronous SN

Umtella The Social Web at Pitt [Logout](#)  [Peter](#)

[Welcome](#) [Select Community](#) [Search](#) [Create Community](#) [Share Link](#) [Share File](#) [Discussion](#) [Community](#)

Current Community: [The Social Web at Pitt](#) [Favorites](#) [Add to My Communities](#) [Help](#)

Keyword: Global Search:

Start Time: End Time:

Tags:

Result: [<<Previous](#) [Next>>](#) Total: 12 Page(s) Current Page: 1

Resource	Shared by	Earned Ratings	View Times	Reviews	Favorite?	Info
 PHD Comics: Facebook	Hoyt	3	6	1	+	Detail Remark
 Web 2.0 ... The Machine is Us/ing Us	John Harkins	3	6	1	+	Detail Remark
 Chris Anderson discusses the long tail	Savinell	2	2	1	+	Detail Remark
 Social Navigation	Hoyt	2	8	1	+	Detail Remark
 Social Networking in Plain English	John Harkins	2	3	1	+	Detail Remark
 Top Ten Second Life Tutorial Videos	Hoyt	2	3	1	+	Detail Remark
 Teach Yourself Programming in Ten Years	Rosta	1	1	1	+	Detail Remark
 Mashup on digg	Rosta	1	1	1	+	Detail Remark
 100 Funnest Web 2.0 Words to Say (YouTube)	Peter	1	5	Delete Edit	+	Detail Remark
 Flock: A Social Web Browser	Matthew Wood	1	5	1	+	Detail Remark
 Page Rank Checker	Savinell	1	7	<input type="text"/> Rate	+	Detail Remark
 Finding A Site's Search Page Rank	Savinell	1	5	<input type="text"/> Rate	+	Detail Remark

CoMeT: Indirect, Asynchronous



Collaborative Management of Talks

Bookmark Talks, Share with Friends, and We Recommend More!

Welcome peterb [Log out](#)

ALL

Search

[Advanced Search](#)

[Post New Talk](#)

[Home](#)

Calendar

[Series](#)

[Groups](#)

[My Account](#)

«

[Day](#)

Week

[Month](#)

»

< **March 2012** >

S	M	T	W	T	F	S	W
26	27	28	29	1	2	3	W1
4	5	6	7	8	9	10	W2
11	12	13	14	15	16	17	W3
18	19	20	21	22	23	24	W4
25	26	27	28	29	30	31	W5
1 - 5 6 - 10							11 - 21+

Week 4 of March: March 18 - 24, 2012

Monday, Mar 19

- 1** bookmark
[Crowd-Powered Systems](#) [Bookmark](#)
By: **Michael Bernstein**, Computer Science and Artificial Intelligence Lab, Massachusetts Institute of Technology on: 10:00 AM - 11:00 AM
Location: **6115 Gates and Hillman Centers**
Posted to groups: [Human-Computer Interaction](#) [Social Web](#)
Bookmarked by: [chirayu](#)
- 2** emails
23 views
- 9** views
[Common Sense, Uncommon Practice: A Socio-Structural View of Resistance to Interorganizational Collaboration](#) [Bookmark](#)
By: **Stanley E. Fawcett**, Air Force Institute of Technology on: 10:30 AM - 12:00 PM
Location: **115 Mervis Hall, Katz Graduate School of Business**
Series: [Supply Chain Management Seminar Series](#) [Subscribe](#)
- 3** emails
[SafeSlinger: Applied Ad-hoc Smartphone Trust Establishment](#) [Bookmark](#)
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Location: **Distributed Education Center 1201 Lobby Level Collaborative Innovation Center**
Series: [CyLab Seminars](#) [Subscribe](#)
- 5** views
- 18** views
[Trade with China and Job Displacement in US Manufacturing](#) **Recommended** [Bookmark](#)
By: **Gordon Hanson**, University of California, San Diego on: 12:00 PM - 1:20 PM
Location: **Hamburg Hall 1502**
- 17** views
[Thesis Oral: Learning Generative Models of Microtubule Distributions](#) [Bookmark](#)
By: **Aabid Shariff**, Joint Carnegie Mellon University/University of Pittsburgh Ph.D. Program, in Computational Biology on: 1:30 PM - 2:30 PM
Location: **Reddy Conference Room 4405 Gates and Hillman Centers**
- 10** views
[The Rise of Type Theory: From Principia Mathematica to Constructive Type Theory, circa 1910-2010](#) [Bookmark](#)
By: **Robert L. Constable**, Professor, Department of Computer Science, Cornell University on: 2:00 PM - 3:00 PM
Location: **3305 Newell-Simon Hall**
Series: [Computational Modeling and Analysis for Complex Systems Seminar \(CMACS\)](#) [Subscribe](#)



Feed

[RSS](#) [RTM](#) [iCal](#) [+](#)

SN in Information Space: The History

History-enriched environments

- Edit Wear and Read Wear (1992)
- Social navigation systems
 - Footprints, Juggler, Kalas

Collaborative filtering

- Manual push and pull
 - Tapestry, LN Recommender
- Modern automatic CF recommender systems

Social bookmarking

- Collaborative tagging systems

Social Search

Properties

Proxemic

Transparent space in that signs and structures can be easily understood

Passive

Allowing passive collection of history without interfering users' tasks

Rate/form of change

Summarizing what has happened

Degree of permeation

Separating interaction history from the object

Social

“we all benefit from the experience, preferably someone else's”

Kind of information

What

Searching for value

Giving guidance

Who

Doing things with friends

Doing things with people
who are similar to me

Establishing authority and
authenticity

Why

Doing similar things

Discovering similar goals

Explanation and learning

How

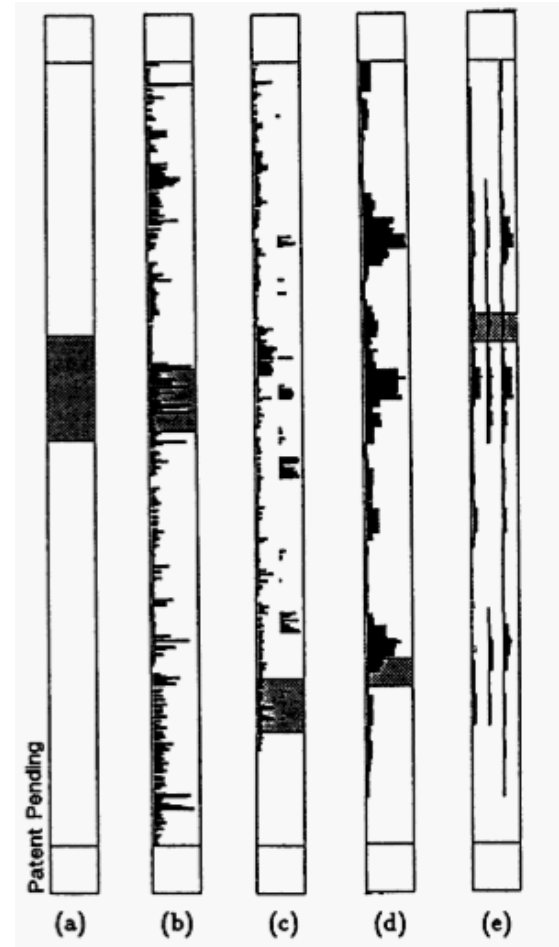
Showing how to do things

Edit Wear and Read Wear (1992)

The pioneer idea of asynchronous indirect social navigation

Developed for collaborating writing and editing

Indicated read/edited places in a large document



The Pioneers: *Footprints*

Wexelblat & Maes, 1997

Allowing users to create history-rich objects

Providing History-rich navigation in complex information space

Contextualizing Web pages

- Maps
- Path view
- Annotations
- Signposts

Footprints: Maps

Showing the traffic through a website

Nodes

Documents

Links

Transition between them

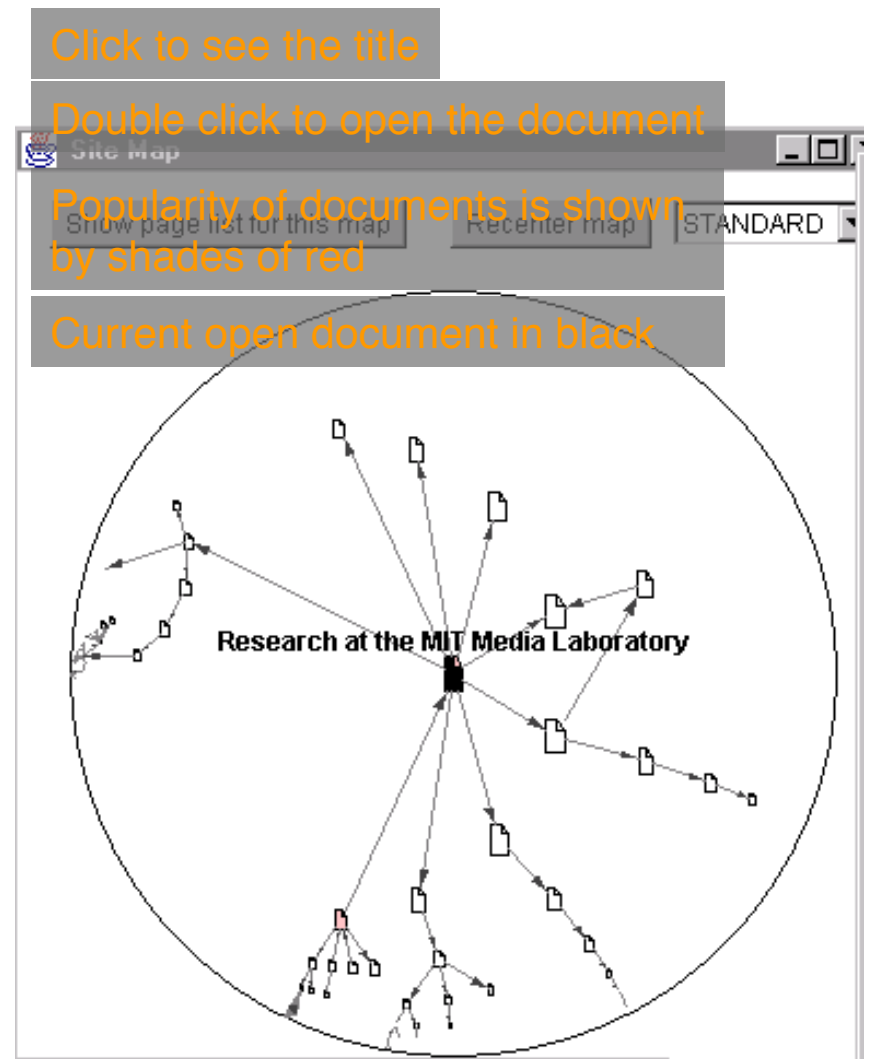
Tracking transition from all possible sources

Selecting a link

Typing a URL

Selecting a bookmark

Externalization of users' mental model



Footprints: Path View

Lower level view

What paths have been followed by other people

Relevant to current open document

Merging path with common starting points

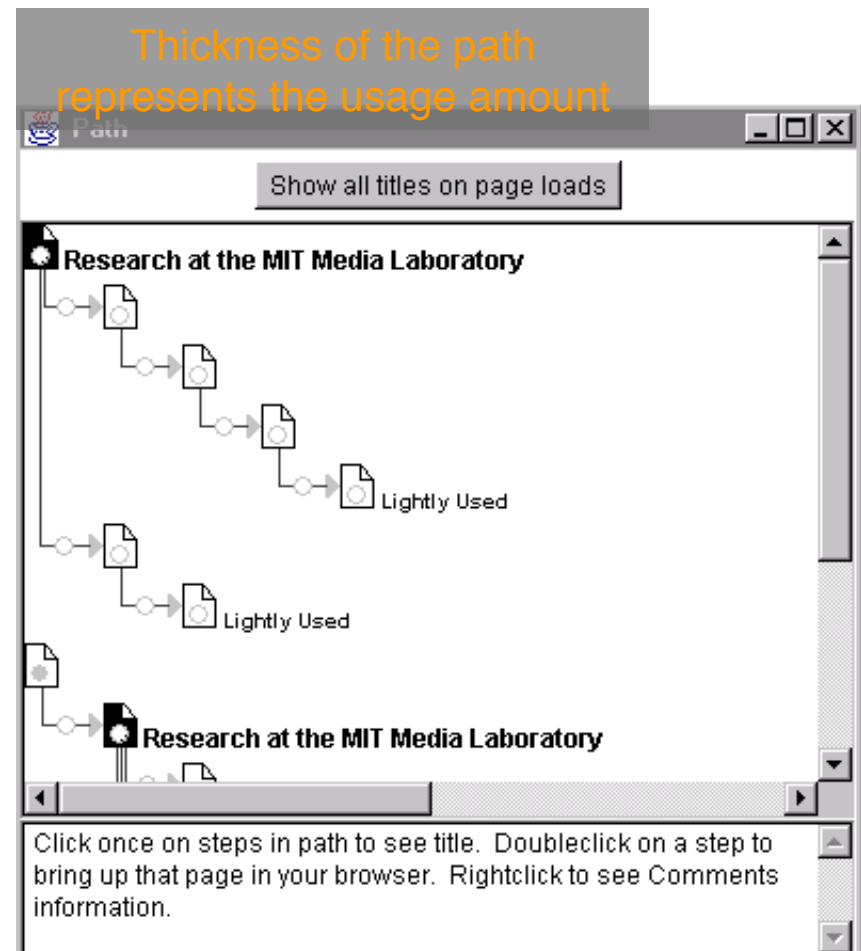
Matching the framework

Social?

Passive?

Proxemic?

Unpermeated?



Footprints: Annotations

Showing what percentage of users have followed each link

Link-centric social navigation approach

Research Groups

- [Aesthetics and Computation \(8%\)](#)
- [Affective Computing](#)
- [Electronic Publishing](#)
- [Epistemology and Learning](#)
- [Explanation Architecture](#)
- [Gesture & Narrative Language](#)
- [Interactive Cinema](#)
- [Machine Listening](#)
- [Machine Understanding \(8%\)](#)
- [Micromedia](#)
- [Object-Based Media](#)
- [Opera of the Future](#)
- [Personal Information Architecture](#)
- [Physics and Media](#)
- [Sociable Media](#)
- [Software Agents](#)

Footprints: Signposts

Allowing users to enter feedback

On pages

On paths

“go this way for software agents; go that way for artificial life”

Viewing comments left by other users

How we can classify this social navigation?

The Pioneers: *Juggler*

Dieberger, 1998

Textual virtual environment (MOO)

History-enriched environment

- Showing access-counter for rooms

Recognizing URLs in the output of a communication tool

- Hiding it from user

- Popping out the page

- Integrating with social navigation

Supporting interaction between teachers and students

The Pioneers: *Juggler*

Pointing out pages

While talking to people

By saying them

Looking at people and object

Associating URL with people, objects, and locations

Pointing out button

Pointing out (sharing) the current page

Ideas for Social Navigation on WWW

Awareness of presence of other users

- Discussion of an article
- Location attracting large crowds of users

Relevant objects

- Links visited by similar users
- Items appreciated by similar users

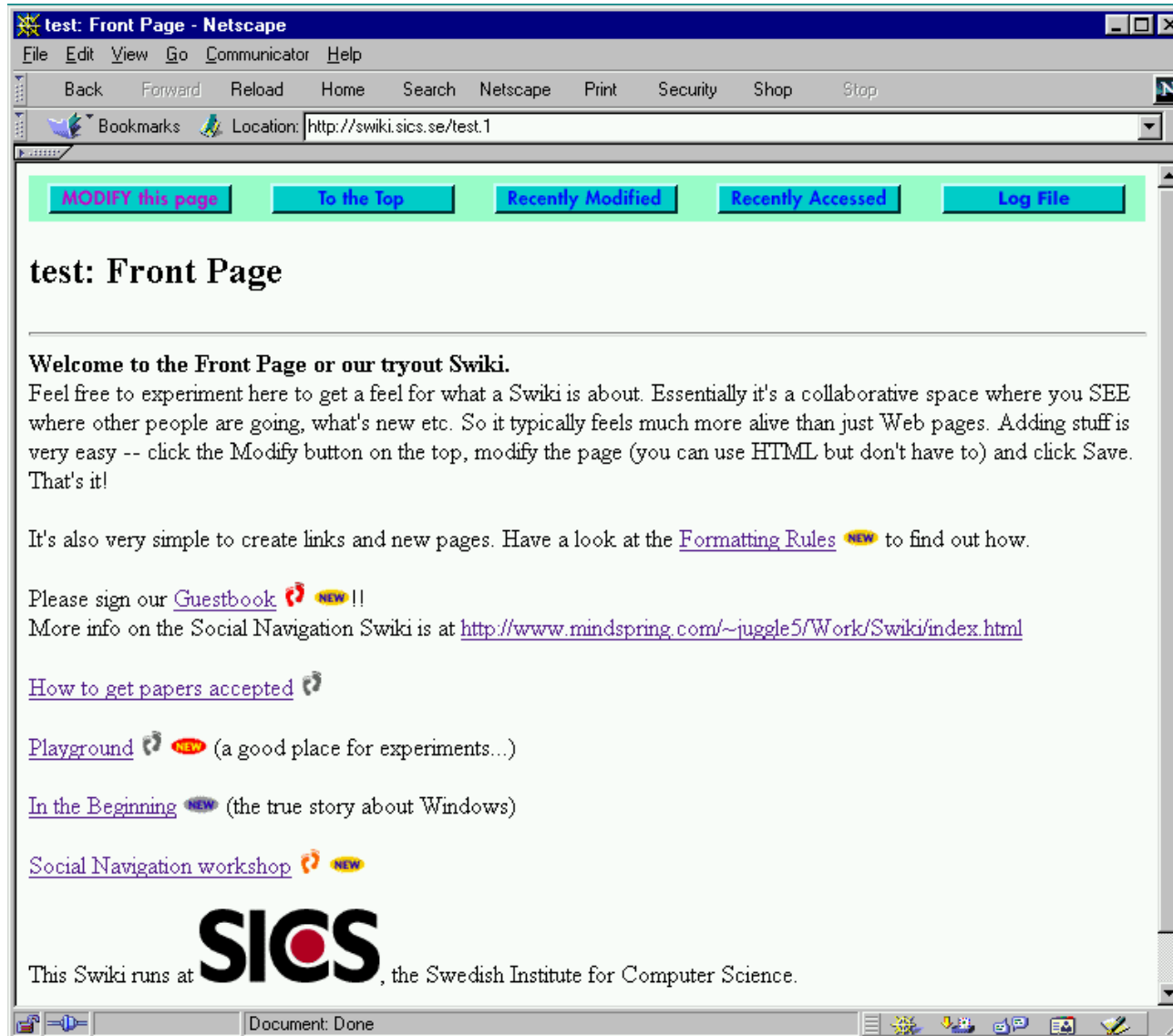
Recency

- How long ago the page was created/visited

Attitude

- What other users did/thought about an item

Example: CoWeb



Advancing SN: Beyond Click

Clicks are not reliable signs of interest!
What other kinds of user activities can be tracked?

- Annotation
- Bookmarking
- Sending e-mail
- Solving a problem
- Downloading
- Purchasing
- Rating and liking

Advancing SN: One Size Fits All?

Which users' actions are taken into account for social navigation?

- All users
- Coherent, like-minded group of users

Group-level social navigation

- KnowledgeSea II, Progressor – a class
- CourseAgent – users with similar goals
- CoFIND
- Facebook – social network
- Amazon - context

Facebook: Propagation of Likes

facebook **E** Eventur - Events in Pittsb...

E Eventur - Events in Pittsb... **Timeline** **Now** **Highlights**

Like · Comment · Share

E Eventur - Events in Pittsburgh shared a link. Yesterday

03-21-2012 07:30 PM

 **Celtic Woman**
eventur.sis.pitt.edu

Like · Comment · Share

Mahin Mahmoodi likes this.

Write a comment...

E Eventur - Events in Pittsburgh shared a link. 9 hours ago

Free concert 03-21-2012 Wednesday 08:00 PM

 **University of Pittsburgh Symphony Orchestra**
eventur.sis.pitt.edu

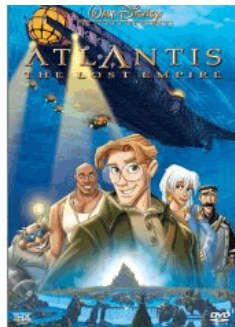
Roger Zahab leads the orchestra in music by Egytian composer Halim El-Dabh and Pulitzer Prize-winning composer Robert Ward.

Like · Comment · Share

E Eventur - Events in Pittsburgh shared a link. Saturday

03-18-2012 Sunday 03:00 PM

Amazon: Context-based SN



[See larger image](#)



[See 1 customer image](#)

[Share your own customer images](#)

Atlantis - The Lost Empire (2001)

Starring: [Michael J. Fox](#), [Jim Varney](#) **Director:** [Gary T](#)

[Kirk Wise](#) **Rating:** [PG](#) **Format:** [DVD](#)

★★★★☆ (347 customer reviews)

List Price: ~~\$19.99~~

Price: **\$17.49** & eligible for **FREE Super Saver S** orders over \$25. [Details](#)

You Save: **\$2.50 (13%)**

In Stock.

Ships from and sold by **Amazon.com**. Gift-wrap available.

Want it delivered Thursday, January 14? Order it in the next 48 minutes, and choose **One-Day Shipping** at checkout.

31 new from \$9.92 **65 used** from \$2.74 **5 collectible** from \$14.99

Also Available in: List Price: Our Price: Other Offers:

[VHS Tape](#)

[116 used & new](#) from \$2.98

Frequently Bought Together

Customers buy this DVD with [Treasure Planet](#) DVD ~ Joseph Gordon-Levitt



+



Price For Both: \$30.98

[Add both to Cart](#)

[Add both to Wish List](#)

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•Compare with an Amazon review: “the remake of this movie is horrible, I recommend to watch the original version instead”

What Do Customers Ultimately Buy After Viewing This Item?



89% buy the item featured on this page:

[Atlantis - The Lost Empire](#) ★★★★★ (347)

\$17.49



4% buy

[Treasure Planet](#) ★★★★★ (169)

\$13.49



3% buy

[Up \(Single Disc Widescreen\)](#) ★★★★★ (485)

\$14.99



2% buy

[Mulan \(Special Edition\)](#) ★★★★★ (483)

\$14.99

Customers Who Shopped for Atlantis - The Lost Empire Also Shopped For



Brother Bear (2-Disc Special Edition)

DVD Joaquin Phoenix

Price: ~~\$20.00~~ **\$18.49** ★★★★★ (230)

Used & new from \$2.98

[Add to Cart](#)



Home on the Range

DVD G.W. Bailey

Price: ~~\$19.00~~ **\$16.49** ★★★★★ (85)

Used & new from \$2.26

[Add to Cart](#)



Tarzan (Special Edition)

DVD Tony Goldwyn

Price: ~~\$20.00~~ **\$13.49** ★★★★★ (336)

Used & new from \$9.95

[Add to Cart](#)

Knowledge Sea II

Assisting students finding educational resources on the web

Social Navigation

- Traffic based
 - Using intensity of colors to present footprints of other students
 - Distinguishing the most and the least visited pages
- Annotation based
 - Using visual cues to present students' annotation activity
 - magnitude of group annotation activity
 - presence of learners annotation
 - magnitude of individual annotation activity

Knowledge Sea: Map

Knowledge Sea v2.0 - TALER - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://ir.exp.sis.pitt.edu/ks2/default.jsp?userid=rosta&groupid=3&kt_sid=null

Getting Started Latest Headlines Affogato Coffee Google Music & Lyrics by Zib... http://www.bbc.co... Yahoo! Mail - The be...

KnowledgeSea v2.0

Help

Search in KnowledgeSea Submit

operator, loop, expression L11	operator, loop, expression	operator, expression, value L14	data, type, variable L8	data, type, variable	variable, data, type	variable, function, declaration	function, variable, declaration
loop, operator, statement	operator, loop, expression	language, operator, type	data, type, variable L9	data, variable, type	variable, declaration, function	function, variable, declaration	function, variable, declaration L18 L23
loop, statement, operator L12 L15	statement, loop, operator L16	language, statement, problem	language, problem, work	language, data, problem	memory, variable, structure	memory, function, pointer	function, memory, pointer
statement, compiler, loop	language, statement, compiler	language, problem, run	language, problem, scanf	memory, scanf, language	memory, pointer, structure	pointer, memory, function	pointer, memory, function
file, compiler, include	compiler, file, language	language, compiler, run L7	language, scanf, problem	scanf, language, memory	memory, pointer, scanf	pointer, memory, array	pointer, memory, array L21
file, compiler, include	file, compiler, run	language, printf, scanf	scanf, string, printf	scanf, string, character	pointer, memory, string	pointer, memory, array	pointer, array, memory
file, source, include L10	file, output, function	file, output, printf	string, character, printf L20	string, character, scanf	string, character, scanf	array, pointer, string	array, pointer, memory
file, output, source	file, output, input	file, string, output L13	string, character, printf	string, character, print	string, character, array	array, string, pointer L19	array, pointer, string L17 L22

Knowledge Sea: Cells & Pages

Univ. of L... : [Functions and Protot ...](#)

R. Miles : [void](#)

R. Miles : [notitle](#)

R. Miles : [\(void \)](#)

R. Miles : [\(](#)

R. Miles : [Functions So Far](#)

R. Miles : [Function Heading](#)

R. Miles : [Function Body](#)

R. Miles : [return](#)

R. Miles : [Calling a Function](#)

R. Miles : [Full Functions Examp ...](#)

S. Summit : [2.7 Function Calls](#)

S. Summit : [Chapter 5: Functions ...](#)

S. Summit : [5.1 Function Basics](#)

S. Summit : [5.3 Function Philoso ...](#)

P. Burden : [Functions and storag ...](#)

P. Burden : [Functions and storag ...](#)

P. Burden : [Functions and storag ...](#)







P. Burden : [Functions and storag ...](#)

P. Burden : [Functions and storag ...](#)

P. Burden : [Functions and storag ...](#)

D. Marshall : [Random Numbers](#)

Subsections

- [History of C](#)
- [Characteristics of C](#)
- [C Program Structure](#) 
- [Variables](#)
 - [Defining Global Variables](#)
 - [Printing Out and Inputting Variables](#) 
- [Constants](#)
- [Arithmetic Operations](#)  
- [Comparison Operators](#)
- [Logical Operators](#)
- [Order of Precedence](#)  
- [Exercises](#)

CourseAgent

Adaptive community based course recommendation system

- Provides personalized access to course information

- Provides social recommendation about courses

Recommendation in the form of in-context adaptive annotation

- Visual cues

 - Expected course workload

 - Expected relevance to students' career goals

- Course Schedule

- Course Catalog

Course Schedule

Spring 2006 List

Click to see the schedule

CourseAgent
Adaptive Online Course Recommendation System

Control Panel Schedules Career Scope Course Catalog Faculties Register

Roste's CourseAgent Help Log off

Schedule of spring 2006

Taken Courses, Planned Courses, Currently Taken Courses, Recommend by Advisor, Degree of Relevance to Career Goals

CRN	Course No	Title	Day	Time	Location	Instructor	Workload	Relevance	Action
2692	TELCOM 2940	PRACTICUM	apt			Richard Thompson			Plan It
16084	INFSCI 2120	INFORMATION AND CODING THEORY	tue	6:00-8:50 P	302 CL	Paul Munro	🔧🔧	👍👍👎	Plan It
16077	INFSCI 2130	DECISION ANALYSIS AND DECISION SUPPORT SYSTEMS	wed	6:00-8:50	411 IS	Marek Druzdel	🔧🔧	👍👍👎	Plan It
16088	LIS 2194	ETHICS IN THE INFORMATION SOCIETY	mon	3:00-5:50 P	403 IS	Toni Carbo			Plan It
16099	INFSCI 2350	HUMAN FACTORS IN SYSTEMS	thu	6:00-8:50 P	411 IS	Michael Lewis	🔧🔧	👍👎👎	Register It
16056	INFSCI 2470	INTERACTIVE SYSTEM DESIGN	wed	6:00-8:50 P	405 IS	Peter Brusilovsky	🔧🔧	👍👍👍	Evaluate It
16079	INFSCI 2511	INFORMATION SYSTEMS ANALYSIS, DESIGN, AND EVALUATION	tue	6:00-8:50 P	411 IS	Glenn Baz	🔧		Plan It
16011	INFSCI 2610	DATA STRUCTURES	thu	3:00-5:50 P	501 IS	Boyer Flynn	🔧🔧	👍👍👎	Plan It
16118	INFSCI 2611	ALGORITHM DESIGN	tue	3:00-5:50 P	406 IS	Hassan Karmi	🔧🔧		Plan It
16065	INFSCI 2720	GEOGRAPHIC INFORMATION SYSTEMS	thu	6:00-8:50 P	405 IS	Hassan Karmi	🔧🔧	👍👍👍	Plan It

Difficulty level of the course
Low 🔧 , Medium 🔧🔧 , High 🔧🔧🔧

Planned to take (can be registered)

Already taken (can be evaluated)

Degree of relevance to students' career goal
Marginaly relevant
Relevant
Very Relevant

Course Catalog



Course Catalog

Please select one of the programs to view the course list:

Select the program

(Click on each "AREA" to see the list of related courses)

Taken Courses, Planned Courses, Currently Taken Courses, Recommend by Advisor, Degree of Relevance to Career Goals

Cognitive Science Area

Select the area of study

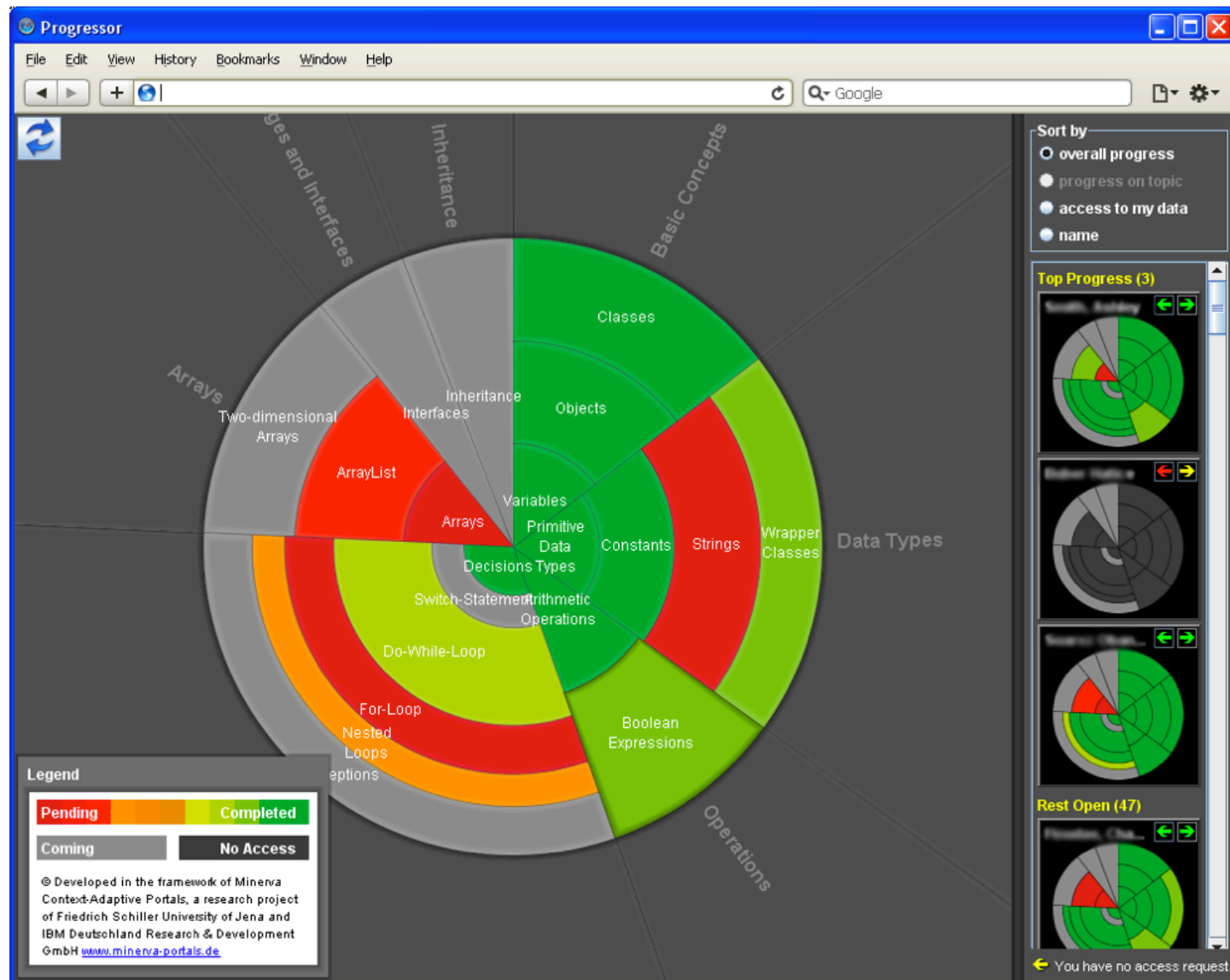
Course No	Course Title	Workload	Relevance	Action
INFSCI 2300	HUMAN INFORMATION PROCESSING			View Feedback
INFSCI 2330	FOUNDATIONS OF COGNITIVE SCIENCE			Plan It
INFSCI 2350	HUMAN FACTORS IN SYSTEMS			

Plan the recommended course to take

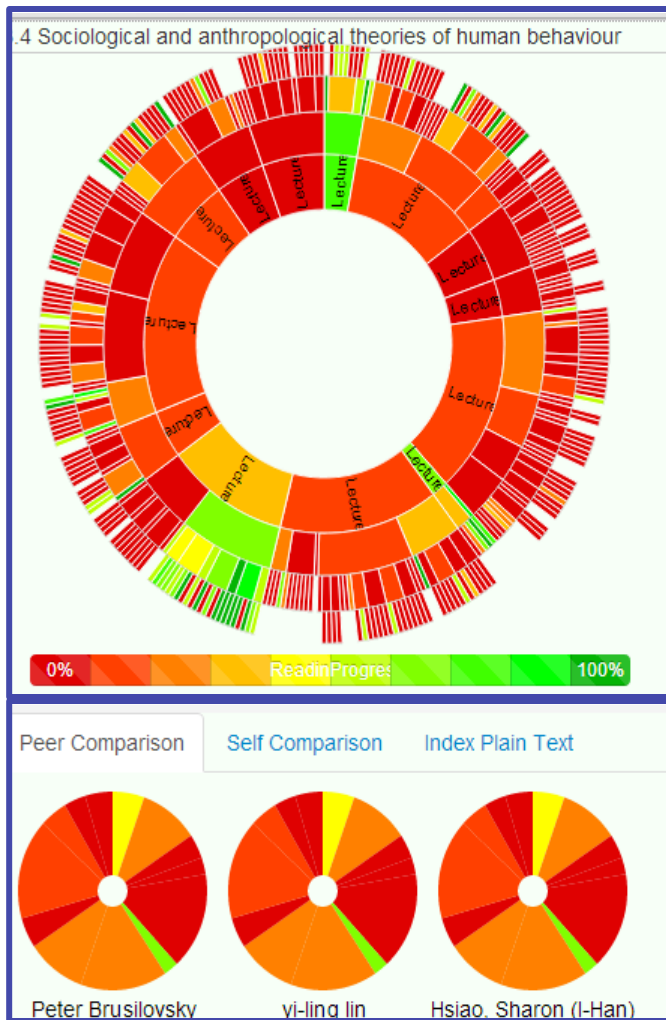
-Cognitive Systems Area

Course No	Course Title	Workload	Relevance	Action
INFSCI 2410	INTRODUCTION TO PARALLEL DISTRIBUTED PROCESSING			Plan It
INFSCI 2420	NATURAL LANGUAGE PROCESSING			Plan It
INFSCI 2440	ARTIFICIAL INTELLIGENCE			Plan It
INFSCI 2450	ARTIFICIAL INTELLIGENCE PROGRAMMING TOOLS			Plan It
INFSCI 2470	INTERACTIVE SYSTEM DESIGN			Leave Feedback

Social + Progress-based Navigation in Progressor



Social + Progress-based Navigation in Reading Circle



>>

ALL ME OFF SUMMARY

annotation-test
1 comment(s)

chapter
1 Usability of Interactive Systems

Designing an object to be simple and clear takes at least twice as long as the usual way. It requires concentration at the outset on how a clear and simple system would work, followed by the steps required to make it come out that way—steps which are often much harder and more complex than the ordinary ones. It also requires relentless pursuit of that simplicity even when obstacles appear which would seem to stand in the way of that simplicity.

T. H. NELSON
The Home Computer Revolution, 1977

CoFIND

Collaborative bookmark database

Self-Organized Database of Resources

Combination of usage and explicit ratings causes the system to dynamically and continuously reorganize its resources.

Stigmergy

Communication via the environment

Nature

Ant trails

leave a trail of pheromones when find food and return to the nest

The trail gets stronger, attracting more ants

CoFIND

Successful topic groups, topics, qualities and resources tend to grow more successful, influencing patterns of behavior for all users of the system

Challenges

Concept drift

Snowball effects

Bootstrapping

Concept Drift

Old history information becomes less relevant

History decay

different for a very popular and a less popular information

Shift of Interest

Snowball effect

Just one visit before the current visit can turn the page into 'hot'

The page could be useful or useless

Next users follow the same path

Snowball gets bigger and bigger



Bootstrapping

Social navigation works with many users

What if there are very few users?

How to match a new user against already populated system?

How to encourage users to leave their trails (commenting, ...)?

How to make the new information visible in already populated system?