

Interactive Information Retrieval

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Architecture Levels of IR Systems

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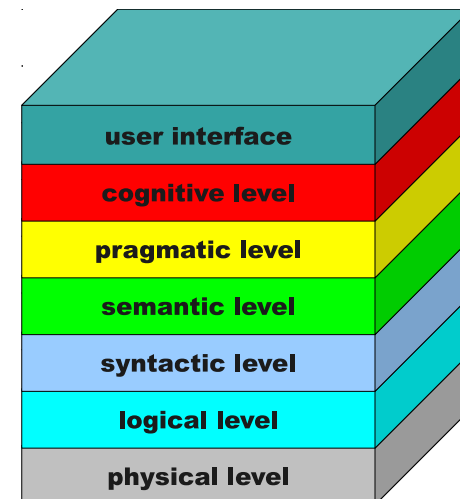
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Strategic Support

From Cognitive Models to IR Interfaces

Summary

Architecture Levels of IR Systems



Levels

- ▶ physical level: data structures and algorithms
- ▶ **logical level**: IR models
- ▶ syntactic level: focus on syntactic properties of objects (text as character sequence, image as pixel matrix, ...)
- ▶ semantic level: objects and their relationships → *ontologies*, ...
- ▶ pragmatic level: meaning of a document/application issue → *definition of relevance*
- ▶ **cognitive level**: user support during search *process*
- ▶ **user interface**

Models for Interactive Retrieval

A Probability Ranking Principle for Interactive IR

Motivation

Approach

The Model

Discussion

Estimating IPRP Parameters via Gaze Tracking

Remarks on architecture levels

most systems comprise only some of these levels

- ▶ users have to compensate the missing levels (especially cognitive and pragmatic level)
- ▶ missing separation of levels (e.g. no logical or physical data independence as in DBMS)

Classical Probability Ranking Principle

defines optimum retrieval for probabilistic models:

ranking documents according to decreasing values of the

probability of relevance

yields

optimum retrieval quality

Restrictions

- ▶ Relevance judgments of documents are independent
- ▶ Focus on user's assessment of result list

Interactive Retrieval

- ▶ User has a rich set of interaction possibilities
 - ▶ (re)formulate query
 - ▶ selection based on summaries of various granularity
 - ▶ select related terms from list
 - ▶ follow document link
 - ▶ relevance judgment
- ▶ Information need changes during a search

No theoretic foundation for constructing IIR systems!

Basic Assumptions

- ▶ Focus on a functional level of interaction (usability issues disregarded here)
- ▶ System presents list of choices to the user
- ▶ Users evaluate choices in linear order
- ▶ Only positive decisions/choices are of benefit for a user

Requirements for an IIR-PRP

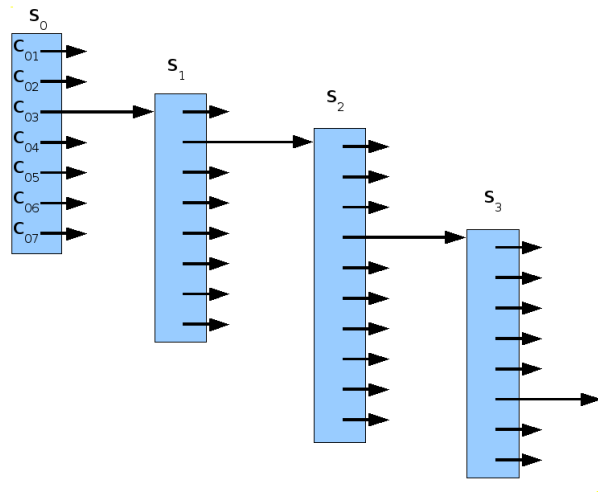
[Fuhr 08]

- ▶ Consider the complete interaction process
- ▶ Allow for different costs for different activities
- ▶ Allow for changes of the information need

Examples of decision lists

- ▶ ranked list of documents
- ▶ list of summaries
- ▶ list of document cluster
- ▶ KWIC list
- ▶ list of expansion terms
- ▶ links to related documents
- ▶ ...

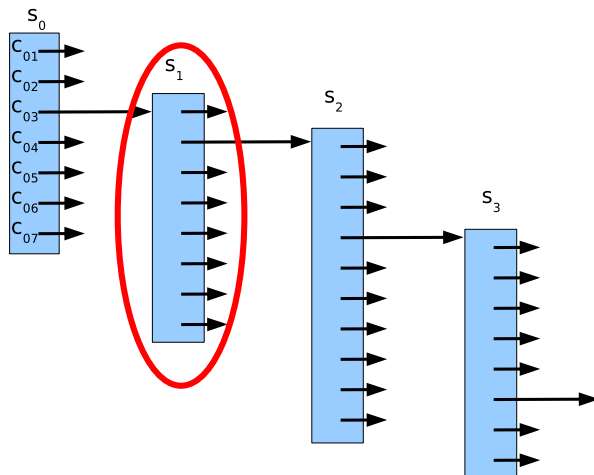
Abstraction: Situations with Lists of Choices



Basic ideas

- ▶ A user moves from situation to situation
- ▶ In each situation s_i , the user is presented a list of (binary) choices $\langle c_{i1}, c_{i2}, \dots, c_{i,n_i} \rangle$
- ▶ The user decides about each of these choices sequentially
- ▶ The first positive decision moves the user to a new situation s_j
- ▶ A decision may be wrong, requiring backtracking

Probabilistic model focusing on single situation



Expected Benefit of a choice

- p_{ij} probability that the user will accept choice c_{ij}
- q_{ij} probability that this decision was right
- $e_{ij} < 0$: effort for evaluating the choice c_{ij}
- $b_{ij} > 0$: resulting benefit from positive, correct decision
- $g_{ij} \leq 0$: cost for correcting a wrong decision

Expected benefit of choice c_{ij}

$$E(c_{ij}) = e_{ij} + p_{ij} (q_{ij} b_{ij} + (1 - q_{ij}) g_{ij})$$

Example

Web search: 'Java' $\rightarrow n_0=290$ mio. hits

System proposes extension terms:

term	n_i	p_{ij}	b_{ij}	$p_{ij}b_{ij}$
program	195 mio	0.67	0.4	0.268
blend	5 mio	0.02	4.0	0.08
island	2 mio	0.01	4.9	0.049

benefit $b_{ij} = \log \frac{n_0}{n_i}$

Strategies for maximizing expected benefit

$$E(c_{ij}) = e_{ij} + p_{ij}(q_{ij}b_{ij} + (1 - q_{ij})g_{ij})$$

(assume that benefit b_{ij} and corr. effort g_{ij} are given)

1. minimize effort $|e_{ij}|$ —
but keep p_{ij} (selection prob.) and q_{ij} (success prob.) high
2. maximize p_{ij} : user should choose c_{ij} whenever it is appropriate —
but keep success probability q_{ij} high
 \rightsquigarrow increased effort e_{ij}
3. maximize q_{ij} by avoiding erroneous positive decisions
 \rightsquigarrow increased effort e_{ij}

Further remarks

$$E(c_{ij}) = e_{ij} + p_{ij}(q_{ij}b_{ij} + (1 - q_{ij})g_{ij})$$

- ▶ Expected benefit should be positive
choices with negative values should not be presented to a user.
- ▶ Methods for estimating parameters p_{ij} , q_{ij} , b_{ij} , e_{ij} , g_{ij} :
Issue of further research
- ▶ In the following, let $a_{ij} = q_{ij}b_{ij} + (1 - q_{ij})g_{ij}$
("average benefit")

$$E(c_{ij}) = e_{ij} + p_{ij}a_{ij}$$

Example for Expected Benefit

After formulating a query, a user may choose to perform the following actions with the corresponding parameter triple (e_{ij}, p_{ij}, a_{ij})

1. $(-1.0, 0.3, 8)$ add expansion term to the query
2. $(-2.0, 0.4, 10)$ look at the first result list entry
3. $(-10.0, 0.4, 25)$ immediately go to the first document
4. $(-5.0, 0.3, 20)$ look at an aggregated summary of the top ranking documents

In which order should these choices be presented to the user?

1. $(-1.0 + 0.3 \cdot 8) = 1.4$
2. $(-2.0 + 0.4 \cdot 10) = 2$
3. $(-10.0 + 0.4 \cdot 25) = 0$
4. $(-5.0 + 0.3 \cdot 20) = 1$

Expected benefit of a choice list

situation s_i with list of choices $r_i = \langle c_{i1}, c_{i2}, \dots, c_{i,n_i} \rangle$

expected benefit of choice list:

$$\begin{aligned} E(r_i) &= e_{i1} + p_{i1}a_{i1} + \\ &\quad (1 - p_{i1})(e_{i2} + p_{i2}a_{i2} + \\ &\quad (1 - p_{i2})(e_{i3} + p_{i3}a_{i3} + \\ &\quad \dots \\ &\quad (1 - p_{i,n-1})(e_{in} + p_{in}a_{in}))) \\ &= \sum_{j=1}^n \left(\prod_{k=1}^{j-1} (1 - p_{ik}) \right) (e_{ij} + p_{ij}a_{ij}) \end{aligned}$$

Ranking of choices

Consider two subsequent choices c_{il} and $c_{i,l+1}$

$$E(r_i) = \sum_{\substack{j=1 \\ l \neq j \neq l+1}}^n \left(\prod_{k=1}^{j-1} (1 - p_{ik}) \right) (e_{ij} + p_{ij}a_{ij}) + t_i^{l,l+1}$$

where

$$\begin{aligned} t_i^{l,l+1} &= (e_{il} + p_{il}a_{il}) \prod_{k=1}^{l-1} (1 - p_{ik}) + \\ &\quad (e_{i,l+1} + p_{i,l+1}a_{i,l+1}) \prod_{k=1}^l (1 - p_{ik}) \end{aligned}$$

analogously $t_i^{l+1,l}$ for $\langle \dots, c_{i,l+1}, c_{il}, \dots \rangle$

Difference between alternative rankings

$$\begin{aligned} d_i^{l,l+1} &= \frac{t_i^{l,l+1} - t_i^{l+1,l}}{\prod_{k=1}^{l-1} (1 - p_{ik})} \\ &= e_{il} + p_{il}a_{il} + (1 - p_{il})(e_{i,l+1} + p_{i,l+1}a_{i,l+1}) - \\ &\quad (e_{i,l+1} + p_{i,l+1}a_{i,l+1} + (1 - p_{i,l+1})(e_{il} + p_{il}a_{il})) \\ &= p_{i,l+1}(e_{il} + p_{il}a_{il}) - p_{il}(e_{i,l+1} + p_{i,l+1}a_{i,l+1}) \end{aligned}$$

Necessary condition for the maximum expected benefit of the list:

$d_i^{l,l+1} \stackrel{!}{\geq} 0$, which leads to

$$a_{il} + \frac{e_{il}}{p_{il}} \geq a_{i,l+1} + \frac{e_{i,l+1}}{p_{i,l+1}}$$

PRP for Interactive IR

$$a_{il} + \frac{e_{il}}{p_{il}} \geq a_{i,l+1} + \frac{e_{i,l+1}}{p_{i,l+1}}$$

↪ Rank choices by decreasing values of

$$\varrho(c_{ij}) = a_{ij} + \frac{e_{ij}}{p_{ij}}$$

Expected Benefit vs. Ranking Criterion

$$\text{expected benefit: } E(c_{ij}) = p_{ij}a_{ij} + e_{ij}$$

$$\text{ranking criterion: } \varrho(c_{ij}) = a_{ij} + \frac{e_{ij}}{p_{ij}}$$

choice	p_{ij}	a_{ij}	e_{ij}	$E(c_{ij})$	$\varrho(c_{ij})$
c_1	0.5	10	-1	4	8
c_2	0.25	16	-1	3	12

Expected benefits of the 2 possible lists:

$$E(\langle c_1, c_2 \rangle) = 4 + 0.5 \cdot 3 = 5.5$$

$$E(\langle c_2, c_1 \rangle) = 3 + 0.75 \cdot 4 = 6$$

IIR-PRP: Observations

Rank choices by $a_{ij} + \frac{e_{ij}}{p_{ij}}$

- ▶ p_{ij} 'probability of relevance' still involved
- ▶ tradeoff between effort e_{ij} and benefit a_{ij}
- ▶ difference between PRP and IIR-PRP due to variable values for e_{ij} and a_{ij}
- ▶ IIR-PRP looks only for the first positive decision

IIR-PRP vs. PRP

$$a_{il} + \frac{e_{il}}{p_{il}} \geq a_{i,l+1} + \frac{e_{i,l+1}}{p_{i,l+1}}$$

Assumptions for classical PRP:

1. constant effort for each document $e_{ij} = -E, E > 0$
2. constant benefit from each relevant document $a_{ij} = B$

$$B - \frac{E}{p_{il}} \geq B - \frac{E}{p_{i,l+1}}$$

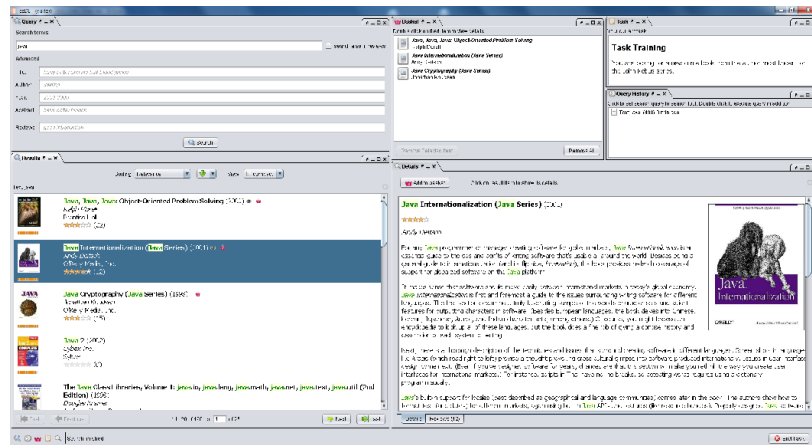
$$\Rightarrow p_{il} \geq p_{i,l+1}$$

↪ Classic PRP still holds!

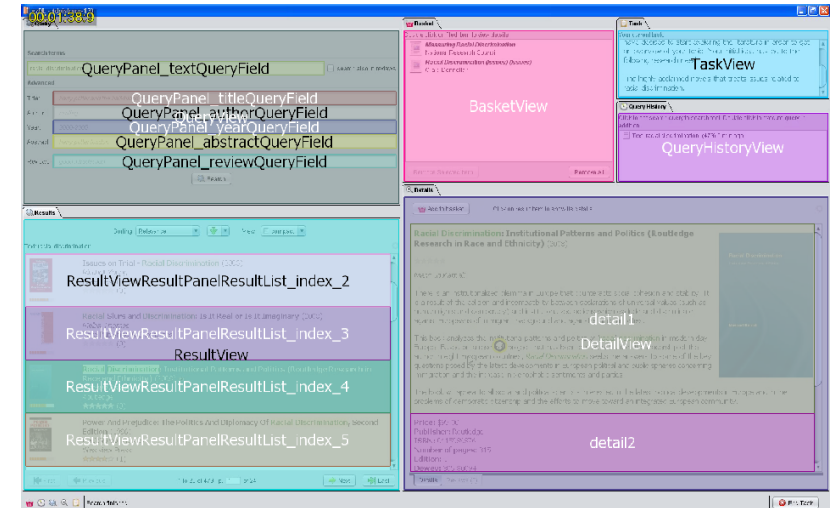
Parameter estimation

1. Selection probability p_{ij} :
focus of many IR models,
but models for dynamic info needs required
2. Effort parameters e_{ij}, g_{ij} + success probability q_{ij} :
most research needed
3. Benefit b_{ij} :
 - ▶ information value ?
 - ▶ saved effort

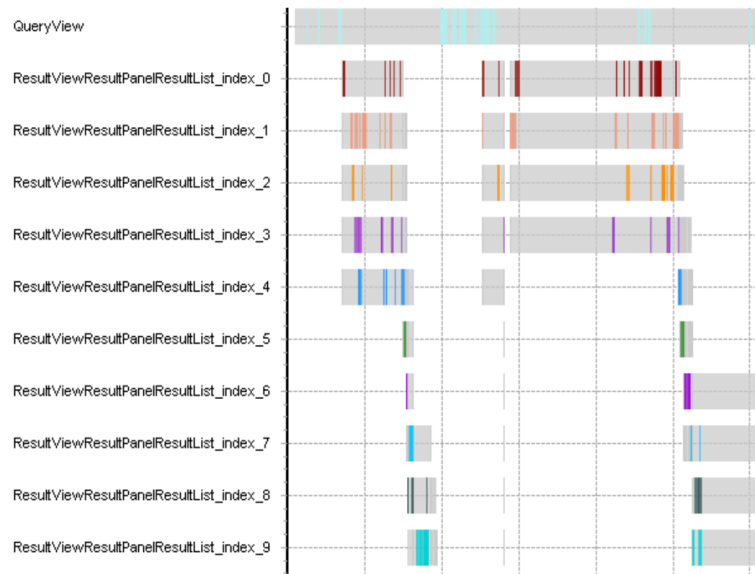
User Interface



Areas of Interest for Gaze Tracking



AOI Sequence

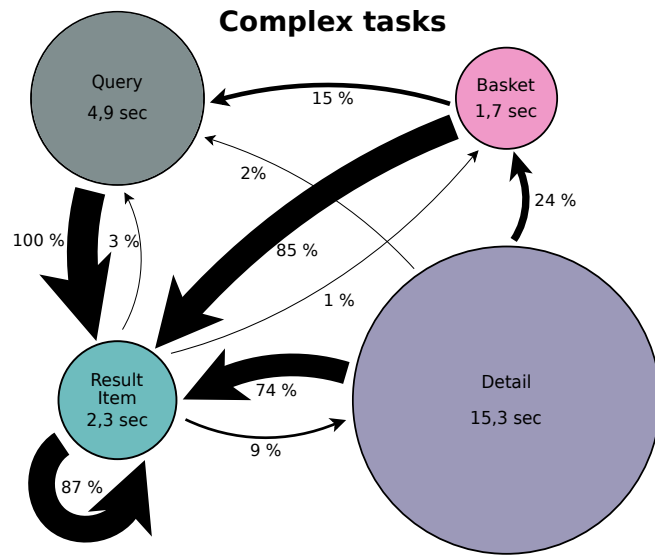


Task setting

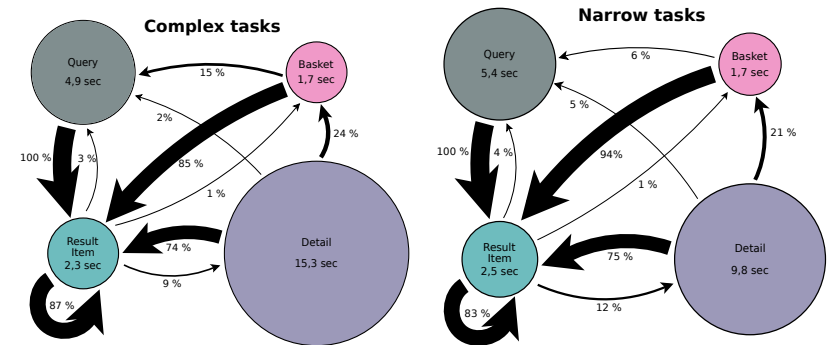
[Tran & Fuhr 12]

- ▶ Retrieval experiments with 12 subjects
- ▶ Users had to work on two tasks for 15 minutes each
 - ▶ complex tasks: consideration of user reviews necessary for judging relevance
 - ▶ narrow tasks: reading of book abstracts sufficient
- ▶ Users judge individually about relevance (by placing items in the basket)

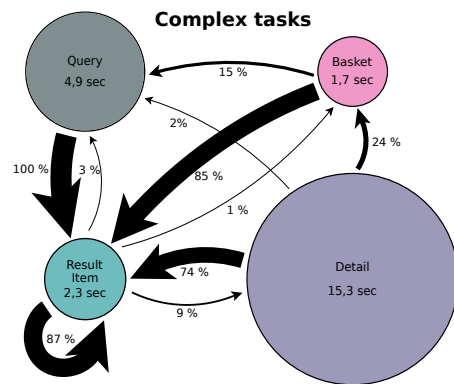
Markov Model for Complex Tasks



Markov Models Complex vs. Narrow Tasks



Estimating the iPRP parameters



- ▶ Effort: time spent in a situation
- ▶ Acceptance probability = transition probabilities
- ▶ Benefit?

Expected time for reaching the basket

- ▶ effort in states t_q , t_r , t_d and t_b
- ▶ p_{XY} : transition probability from state X to state Y
- ▶ expected times T_q , T_r and T_d for reaching the basket state

$$T_q = t_q + p_{qr} T_r$$

$$T_r = t_r + p_{rq} T_q + p_{rr} T_r + p_{rd} T_d$$

$$T_d = t_d + p_{dq} T_q + p_{dr} T_r$$

	complex	narrow
T_q	127.9	120.8
T_r	123.0	115.4
T_d	109.5	102.4
b_q	4.9	5.4
b_r	17.7	14.7
b_d	15.9	10.7

- ▶ c_{ij} : choice
- ▶ m_{ij} alternatives c'_{ijk} , $k = 1, \dots, m_{ij}$
- ▶ a'_{ijk} corresponding benefits
- ▶ q_{ijk} selection probabilities such that

$$\sum_{k=1}^{m_{ij}} q_{ijk} = 1 \quad \text{and} \quad \sum_{k=1}^{m_{ij}} q_{ijk} a'_{ijk} = a_{ij}.$$

Example: examining a result item in a complex task:

$$b_r = \frac{0.03(T_q - T_r) + 0.01(T_r - 0) + 0.09(T_d - T_r)}{0.03 + 0.01 + 0.09} = 17.7s$$

Information Seeking Behavior

Information Seeking Behavior and Information Searching
Ellis' Behavioral Model of Information Seeking Strategies

Models of information searching

- ▶ **classic IR**
 - ▶ content-oriented search in unstructured documents
 - ▶ vague information needs, uncertain representations
 - ▶ system-oriented view, assume static information need
- ▶ **Interactive information retrieval**
 - ▶ focus on user interaction with information system
 - ▶ dynamic information need
- ▶ **2 views on interactive IR:**
 1. Information Seeking Behavior
 2. Information Searching

Information Seeking Behavior

- ▶ broader view than content-oriented search
- ▶ model user's actions, motivations and strategies for satisfying an information need
- ▶ questions of interest:
 - ▶ what triggers an information need?
 - ▶ what are users doing for solving this problem?

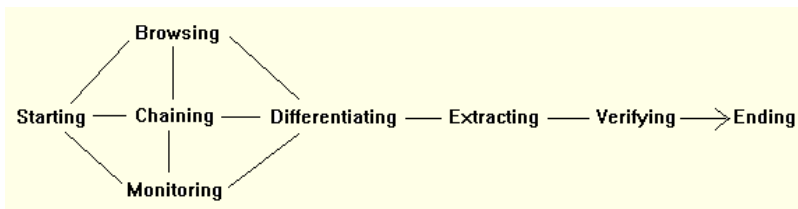
Information Searching

- ▶ focus on user's interaction with information sources
- ▶ regard classic IR systems as well as other sources (e.g. personal communication)

Ellis' Behavioral Model of Information Seeking Strategies

[Ellis 89]

- ▶ general model of search behavior
- ▶ based on empirical studies in social sciences and engineering companies
- ▶ general categories or properties of search behavior: Starting, Chaining, Browsing, Differentiating, Monitoring, Extracting, Verifying, Ending



Categories of search behavior according to Ellis (1)

Starting

- ▶ get overview of literature/locate key authors in a field, e.g. by
 - ▶ selection of information source (e.g. personal collection, digital library, Web search engine)
 - ▶ review articles
 - ▶ personal contacts

Categories of search behavior according to Ellis (2)

Chaining

- ▶ follow different forms of referential connections between sources (in both directions)
 - ▶ citations
 - ▶ Web links
 - ▶ same author/ research team
 - ▶ same conference / journal issue
 - ▶ same category
- ▶ factors considered:
 - ▶ topical relevance
 - ▶ popularity of author
 - ▶ timeliness
 - ▶ citation frequency
 - ▶ cost and time for document acquisition
- ▶ leads to finding new sources or even to reformulation of information need

Categories of search behavior according to Ellis (3)

Browsing

- ▶ starts from information sources and retrieved documents
- ▶ semi-goal-oriented search by browsing in promising areas
- ▶ scanning of tables of contents, references, lists of people and organizations
- ▶ browsing is used when relevant information is available in a comprehensive way

Categories of search behavior according to Ellis (3)

Differentiating

- ▶ judging of sources according to type, quality, importance, usefulness
- ▶ leads to information filtering
- ▶ e.g. comment vs. report, specification vs. manual

Categories of search behavior according to Ellis (4)

Monitoring

- ▶ maintain awareness of developments and technologies in a field
- ▶ by following particular sources
 - ▶ formal channels: scientific journals, conferences, alert profiles
 - ▶ informal channels: personal contacts, actual practice (field research, experimental work)

Categories of search behavior according to Ellis (5)

Extracting

- ▶ working through sources to locate material of interest
- ▶ material: documents, new sources, passages
- ▶ cognitive capture of information by the user
- ▶ user's background knowledge important

Categories of search behavior according to Ellis (6)

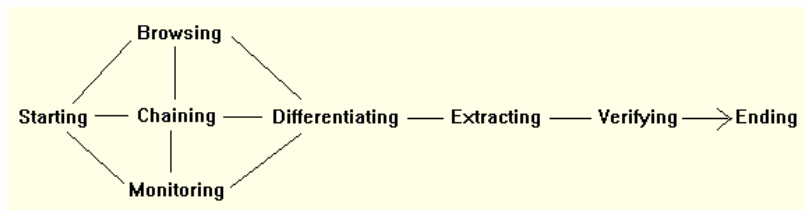
Verifying

check information wrt. correctness and reliability

Ending

end of search, linking of new information with previous knowledge

Process model



- ▶ no strict sequential process
- ▶ starting, browsing, chaining and monitoring are search procedures
- ▶ differentiating is a filtering step

Extension by Meho/Tibbo

- ▶ Repeated Ellis' study, new analysis (especially wrt. new technologies)
- ▶ confirmation of Ellis' model
- ▶ but: extension by new categories

Additional categories

Accessing

- ▶ Access to full texts (instead of surrogates)
- ▶ acquisition of contents via different channels and with different costs

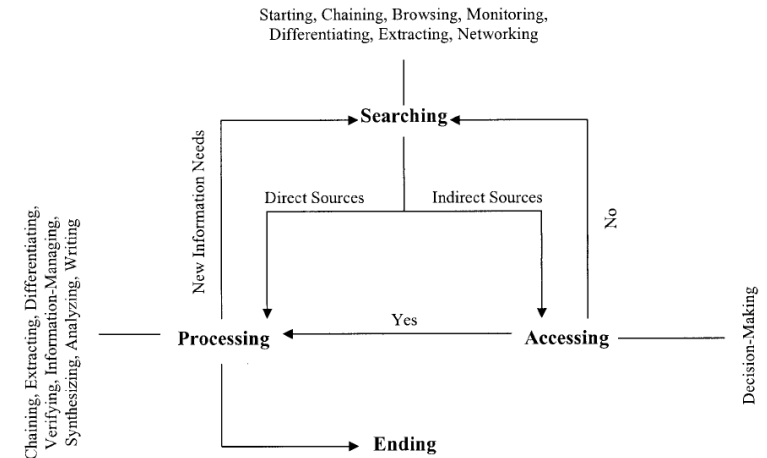
Networking

- ▶ personal communication with various persons
- ▶ discussion and evaluation of retrieved information via internet/intranet fora

Information Managing

- ▶ filing, storing and organizing retrieved and used information

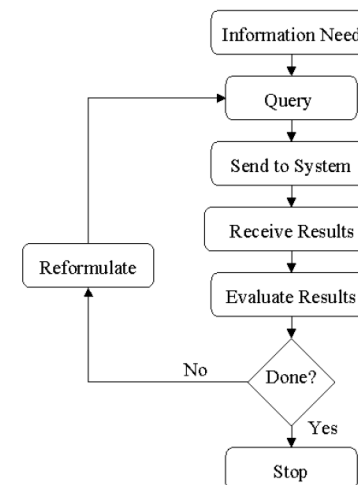
Phases in search behavior



Information Searching

Simple models of the search process
Patterns of search behavior
Search activities
Anomalous State of Knowledge
Ingwersen's Cognitive Model
Classification of search activities

Classical search process model



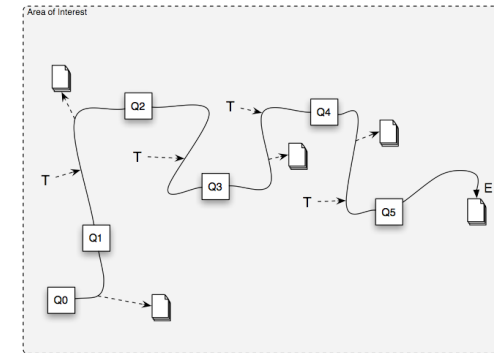
Empirical studies

- ▶ information search consists of a sequence of connected, but different searches
- ▶ search result may trigger new searches
- ▶ only task context remains the same
- ▶ main goal of a search is accumulated learning and collection of new information while searching

Berrypicking Model

[Bates 90]

- ▶ continuous change of information need and queries during search
- ▶ information need cannot be satisfied by a single result set
- ▶ instead: sequence of selections and collection of pieces of information during search



Support for Berrypicking

- ▶ Filing of single results
- ▶ Adding terms/items to the query

A taxonomy of Web search

[Broder 2002, Rose & Levinson 2004]

Navigational: to reach a particular site

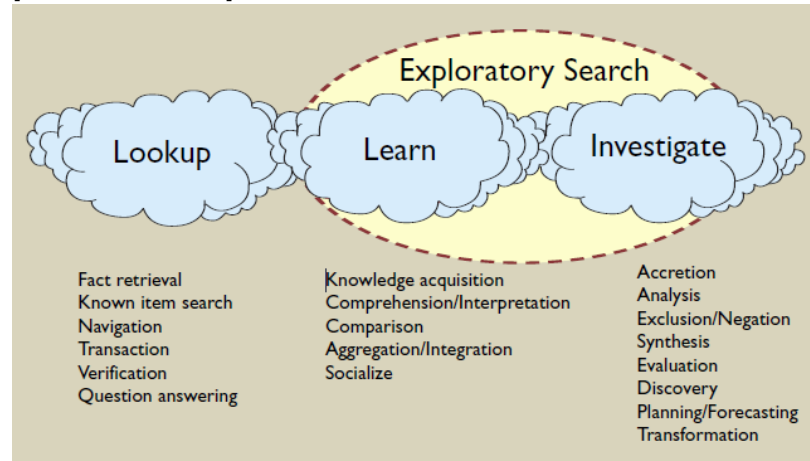
Informational: to acquire information assumed to be present on one or more web pages

Transactional: to perform some web-mediated activity

Resource: to get access to an online resource

Search activities

[Marchionini 1995]



Search modes

- Lookup**
 - ▶ Locating
 - ▶ Verifying
 - ▶ Monitoring
- Learn**
 - ▶ Comparing
 - ▶ Comprehending
 - ▶ Exploring
- Investigate**
 - ▶ Analyzing
 - ▶ Evaluating
 - ▶ Synthesizing

Search Modes: Lookup

- Locate** Find a specific (possibly known) item
- Verify** Confirm that an item meets some specific, objective criterion
- Monitor** Maintain awareness of the status of an item for purposes of management or control

Search Modes: Learn

- Compare** To identify similarities & differences between a set of items
- Comprehend** To generate independent insight by understanding the patterns within a data set
- Explore** To investigate an item or data set for the purpose of knowledge discovery

Search Modes: Investigate

- Analyze** To examine an item or data set to identify patterns & relationships
- Evaluate** To use judgement to determine the value of an item with respect to a specific goal
- Synthesize** To create a novel or composite artefact from diverse inputs

Anomalous State of Knowledge (ASK)(2)

ASK-Hypothesis

- ▶ information need results from user's *anomalous state of knowledge (ASK)*
- ▶ user is unable to precisely specify information need for removing the ASK
- ▶ instead: describe ASK
- ▶ requires capture of cognitive and situation-specific aspects for resolving this anomaly

Anomalous State of Knowledge (ASK)(1)

[Belkin 80]

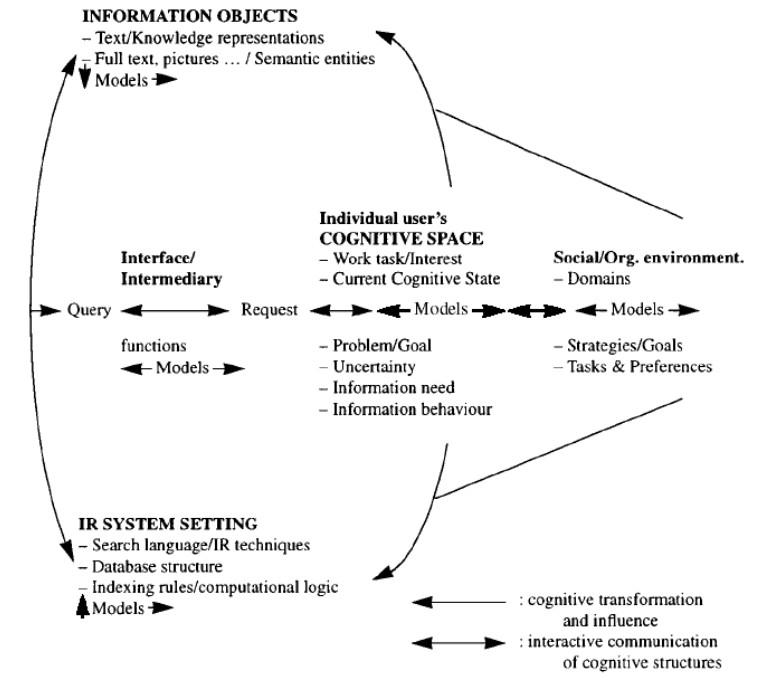
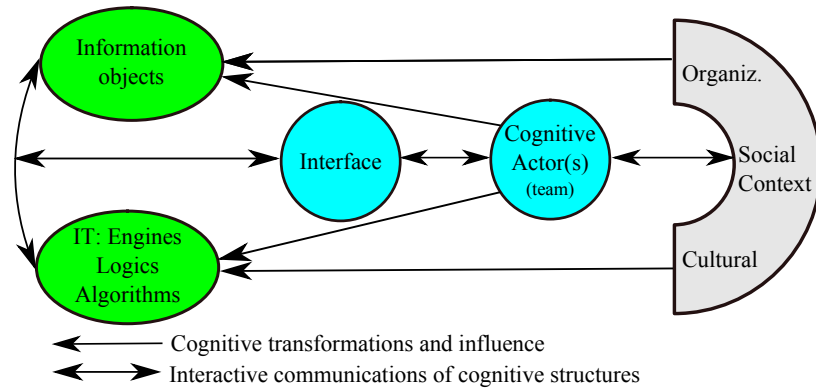
Classic IR systems: "best match" principle

- ▶ system returns those documents that fit best to the representation of the information need (e.g. query statement)
- ▶ only feasible, if user can give precise specification of her information need (like e.g. in DBMS)

Ingwersen's Cognitive Model

- ▶ Global perspective
- ▶ comprises all factors influencing a search
 - ▶ social context
 - ▶ IR system
 - ▶ information objects
 - ▶ user interface
 - ▶ user
- ▶ focuses on *cognitive structures* – manifestations of human cognition, reflexions and ideas

Ingwersen's Cognitive Model



Classification of search activities

[Cool & Belkin 2002]

- ▶ Access:
 - ▶ method: scanning ... searching
 - ▶ mode: recognition ... specification
- ▶ object interacted with
 - ▶ level: information ... meta-information
 - ▶ media: text, images, speech, video, ...
 - ▶ quantity: 1 object, set of objects, database
- ▶ common dimensions of interaction
 - ▶ information objects: parts ... complete objects
 - ▶ systematics: random ... systematic
 - ▶ degree: selective ... exhaustive
- ▶ interaction criteria
(e.g. precision, authority, date, person)

Polyrepresentation

[Ingwersen 94]

- ▶ representation of information objects in different forms
- ▶ representations should correlate with cognitive structures
- ▶ example: document can be represented by
 - ▶ title (specified by the author)
 - ▶ keywords (by indexer)
 - ▶ other documents citing the current doc (extern)
 - ▶ annotations (extern)
- ▶ retrieval system should supports several representations (thus, also several cognitive structures)
→ *intentional redundancy*
- ▶ good search result, when several representations point to the same document (Overlap)

Polyrepresentation: the Amazon case

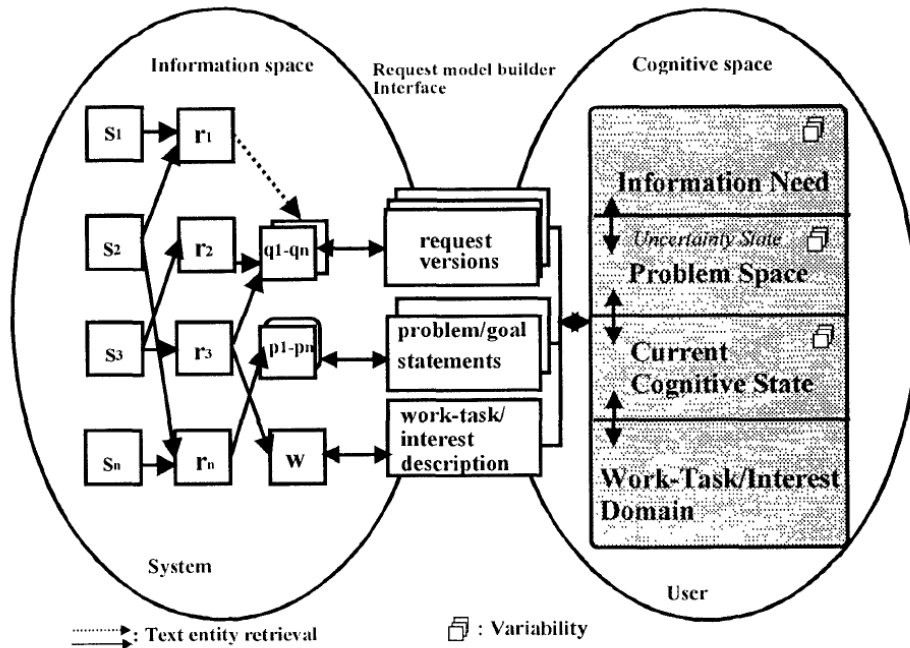


Polyrepresentation of the cognitive user space

cognitive space can be represented via polyrepresentation

- ▶ requests
- ▶ problems/goals
- ▶ work task

Global Polyrepresentation Model



Strategic Support

- Information Seeking Behavior & Information Searching
- Levels of search activities
- Degrees of system involvement
- Proactivity in IR Systems

Information Seeking Behavior & Information Searching

- ▶ searching consists of sequence of different phases
- ▶ experienced searchers employ a variety of actions in different phases
- ▶ these actions should be supported by the system as much as possible
- ▶ each phase should be supported appropriately by the system

Bates' model for strategic system support

- ▶ Levels of search activities
- ▶ Degrees of system involvement

Monitoring Techniques

CHECK	To review the original request and compare it to the current search topic to see that it is the same.
WEIGH	To make a cost-benefit assessment, at one or more points of the search, of current or anticipated actions.
PATTERN	To make oneself aware of a search pattern, examine it, and redesign it if not maximally efficient or if out of date
CORRECT	To watch for and correct spelling and factual errors in one's search topic.
RECORD	To keep track of followed and of desirable trails not followed or not completed.

Levels of search activity

1. **Move:** An identifiable thought or *action* that is a part of information searching.
2. **Tactic:** One or a handful of moves made to *further* a search.
3. **Stratagem:** A larger, more complex set of thoughts and/or actions than the tactic, all designed to exploit the file structure of a *particular search domain* thought to contain desired information.
4. **Strategy:** A *plan*, which may contain moves, tactics, and/or stratagems, for an entire information search.

File Structure Tactics

BIBBLE	To look for a bibliography already prepared, before launching oneself into the effect of preparing one; more generally, to check to see if the search work one plans has already been done in a usable form by someone else.
SELECT	To break down complex search queries into subproblems and work on one problem at a time.
SURVEY	To review, at each decision point of the search, the available options before selection.
CUT	When selecting among several ways to search a given query, to choose the option that cuts out the largest part of the search domain at once .
STRETCH	To use a source for other than is intended purposes.
SCAFFOLD	To design an auxiliary, indirect route through the information files and resources to reach the desired information.
CLEAVE	To employ binary searching in locating an item in an ordered file.

Search Formulation Tactics

SPECIFY	To search on terms that are as specific as the information desired.
EXHAUST	To include most or all elements of the query in the initial search formulation; to add one or more of the query elements to an already-prepared search formulation.
REDUCE	To minimize the number of the elements of the query in the initial search formulation; to subtract one or more of the query elements from an already-prepared search formulation.
PARALLEL	To make the search formulation broad (or broader) by including synonyms or otherwise conceptually parallel terms.
PINPOINT	To make the search formulation precise by minimizing (or reducing) the number of parallel terms, retaining the more perfectly descriptive terms.
BLOCK	To reject, in the search formulation, items containing or indexed by certain term(s), even if it means losing some document sections of relevance.

Idea Tactics

RESCUE	In an otherwise unproductive approach, to check for possible productive paths still untried.
BREACH	To breach the boundaries of one's region of search, to revise one's concept of the limits of the intellectual or physical territory in which one searches to respond to a query.
FOCUS	To look at the query more narrowly, in one or both of two senses: (1) to move from the whole query to a part of it or (2) to move from a broader to a narrower conceptualization of the query.

Term Tactics

SUPER	To move upward hierarchically to a broader (superordinate) term.
SUB	To move downward hierarchically to a more specific (subordinate) term.
RELATE	To move sideways hierarchically to a coordinate term.
TRACE	To examine information already found in the search in order to find additional terms to be used in furthering the search.
VARY	To alter or substitute one's search terms in any of several ways. See remaining term tactics for some specific variations.
REARRANGE	To reverse or rearrange the words in search terms in any or reasonable orders.
CONTRARY	To search for the term logically opposite that describing the desired information.
RESPELL	To search under a different spelling.
RESPACE	To try spacing variants.
NEIGHBOR	To seek additional search terms by looking at neighboring terms, whether proximate alphabetically, by subject similarity, or otherwise.
FIX	To try alternative affixes, whether prefixes, suffixes, or infixes.

Example stratagems

Subject Search

Journal Run Having identified a journal central to one's topic of interest, one reads or browses through issues or volumes of the journal.

Citation Search Using a citation index or database, one starts with a citation and determines what other works have cited it.

Area Scan After locating a subject area of interest in a classification scheme, one browses materials in the same general area.

Footnote Chase One follows up footnotes or references, moving backward in time to other related materials.

Tactics suggested in response to searcher request

SEARCHER COMMAND	SYSTEM RESPONSE LIST
Too many hits	SPECIFY EXHAUST PINPOINT BLOCK SUB
Too few hits	NEIGHBOR TRACE PARALLEL FIX SUPER RELATE VARY

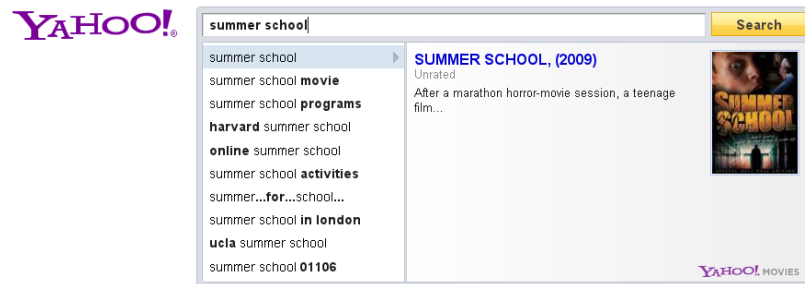
SEARCHER COMMAND	SYSTEM RESPONSE LIST
No hits	RESpace RESPELL REARRANGE CONTRARY SUPER RELATE NEIGHBOR TRACE
Need other terms or wrong terms	NEIGHBOR TRACE SUPER SUB RELATE

SEARCHER COMMAND	SYSTEM RESPONSE LIST
Revise terms	SPACE RESPELL FIX REVERSE CONTRARY SUPER SUB RELATE
Revise search formulation	SPECIFY EXHAUST REDUCE PARALLEL PINPOINT BLOCK

Degrees of system involvement

- 0 – **No system involvement** All search activities human generated and executed.
- 1 — **Displays possible activities.** System lists search activities when asked. Said activities may or may not also be executable by system (higher levels).
- 2 — **Executes activities on command** System executes specific actions at human command.
- 3 — **Monitors search and recommends** System monitors search process and recommends search activities:
 - a) Only when searcher asks for suggestions.
 - b) Always when it identifies a need.
- 4 — **Executes automatically.** System executes actions automatically and then:
 - a) Informs the searcher.
 - b) Does not inform the searcher.

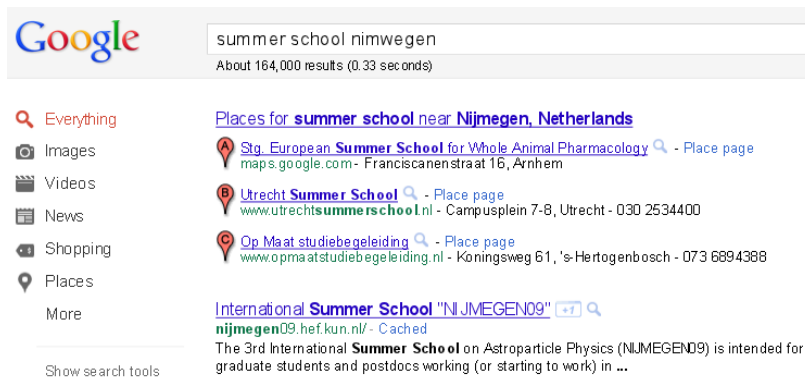
Monitors search and recommends



Executes automatically + informs



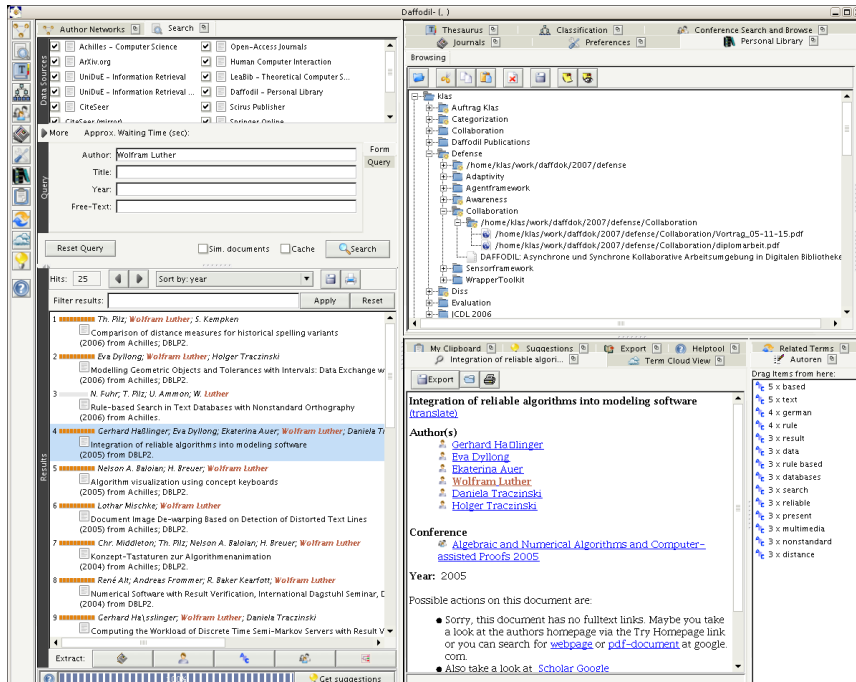
Executes automatically + does not inform



Combination of search activities and system support

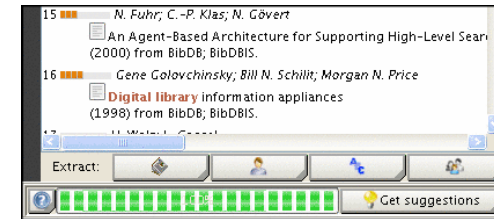
Search Activity/ System involvement	Move	Tactics	Stratagem	Strategy
No system involvement				
Displays possible activities				
Executes activities on command				
Monitors search and recommends				
Executes automatically				

Daffodil desktop

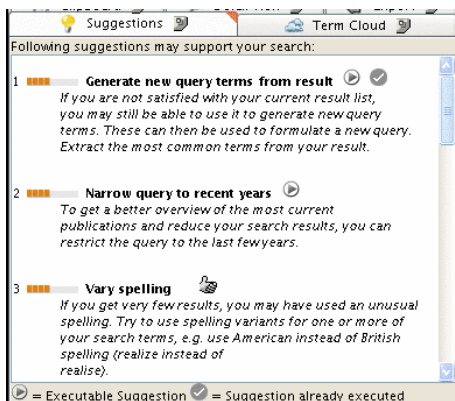


Daffodil: Search Continuation

- ▶ proposal based on automatic analysis of the current search result
- ▶ case-based reasoning
- ▶ availability of suggestions indicated as button at the bottom of result list window



Daffodil: Search Continuation 2



- ▶ suggestions displayed as ranked list
- ▶ descriptive title, explanation, success rate
- ▶ execute on or more suggestions, with following feedback
- ▶ icons indicate the state of suggestions: (executable, used, useful)

Evaluation of search suggestions

- ▶ 24 test subjects, half of them w/ suggestion component
- ▶ each subject worked on 3 tasks
- ▶ case base contained 30 different suggestions

Results:

supported users

- ▶ are more content with the search process ($p = 0,067$)
- ▶ are significantly more satisfied with the result
- ▶ find more relevant documents
- ▶ use significantly more often Daffodil's advanced search tools (unsupported users mainly restrict on reformulating queries)

From Cognitive Models to IR Interfaces

Session support in the user interface
Design Patterns for Search Modes
Support for seeking behavior according to Ellis/Meho/Tibo

- ▶ Show results together with the query
- ▶ Allow editing of the previous query
- ▶ Show search history
- ▶ Allow for combination of queries
- ▶ Filing of single results
- ▶ Storing of sessions

Show results together with the query

Query

- title = stemen retrieval in context

As HyREX query: wsum(1.0,/#PCDATA \$title:stemen\$ "retrieval",1.0,/#PCDATA \$title:stemen\$ "in",1.0,/#PCDATA \$title:stemen\$ "context")

Results

100 documents found, 100 documents displayed (with PIRE)

Massimo Melucci (2008).
[A Basis for Information Retrieval in Context](#). *ACM Transactions on Information Systems* 26(3)

Boicho Kokinov; Daniel C. Richardson; Thomas R. Roth-Berghofer; Laure Vieu (eds.) (2007).
[Modeling and Using Context 6th International and Interdisciplinary Conference \(CONTEXT\)](#). Springer, Berlin et al..

Giuseppe Atardi; Sergio Di Marco; Davide Salvi (1998).
[Categorisation by Context](#). *Journal of Universal Computer Science* 4(9)

Peter Ingwersen (2000).
[Users in Context](#). . www.itim.mi.cnr.it/Eventi/essir2000/download/ingwersen.pdf

Allow editing of the previous query

Google Web Bilder Groups Verzeichnis News Froogle ^{Neu!}

uni-colleg duisburg-essen 2005 [Erweiterte Einstellungen](#)

Suche: Das Web Seiten auf Deutsch Seiten aus Deutschland

Web Ergebnisse 1 - 10 von ungefähr 19 für uni-colleg duisburg-essen 2005. (0,58 Sekunden)

[Uni-Colleg Duisburg](#)
... Das Duisburger **Uni-Colleg**, ein Mix aus allgemein verständlichen Vorträgen,
... Auch im Wintersemester 2004 / 2005 freuen sich die Colleg-Organisatoren ...
[www.uni-duisburg-essen.de/ presse/events/uni-colleg.shtml](#) - 9k - [Im Cache](#) - [Ähnliche Seiten](#)

[Veranstaltungen des Uni-Colleg - Sommersemester 2005](#)
... Das Duisburger **Uni-Colleg**, ein Mix aus allgemein verständlichen Vorträgen,
... April 2005 @ Universität **Duisburg-Essen** - Kontakt: ...
[www.uni-duisburg-essen.de/ presse/events/uni_colleg_sommer2005.shtml](#) - 11k -
[Im Cache](#) - [Ähnliche Seiten](#)
[[Weitere Ergebnisse von www.uni-duisburg-essen.de](#)]

Show search history

PubMed Advanced Search

Search Box [Limits](#) [Details](#) [Help](#)

Search **Preview** **Clear**

Search Builder

All Fields **AND** **Add to Search B**

[Show Index](#)

[Search Builder Instructions](#)

Search History

Search	Most Recent Queries
#5	Search escherichia coli treatment
#4	Search escherichia coli symptoms
#3	Search escherichia coli
#2	Search Escheria coli
#1	Search ehc virus

Allow for combination of queries

PubMed.gov U.S. National Library of Medicine National Institutes of Health

Search: PubMed **#1 or #3** **Search** [RSS](#) [Save search](#) [Limits](#) [Advanced search](#)

[Display Settings:](#) Summary, 20 per page, Sorted by Recently Added [Send to:](#) **Filter your r**

Results: 1 to 20 of 283422 << First < Prev Page 1 of 14172 Next > Last >> [Free Full](#) [Review \(1](#)

[In vivo post-translational modifications of recombinant mussel adhesive protein in insect cells.](#)
 1. Lim S, Kim KR, Choi YS, Kim DK, Hwang D, Cha HJ.
 Biotechnol Prog. 2011 Jun 16. doi: 10.1002/btpr.662. [Epub ahead of print]
 PMID: 21732552 [PubMed - as supplied by publisher]

[Engineering the pentose phosphate pathway to improve hydrogen yield in recombinant Escherichia coli.](#)
 2. Kim YM, Cho HS, Jung GY, Park JM.
 Biotechnol Bioeng. 2011 Jul 5. doi: 10.1002/bit.23259. [Epub ahead of print]
 PMID: 21732330 [PubMed - as supplied by publisher]

Save Resu
[My NCBI](#)
[Search All Tools](#)
[My History](#)

Filing of single results

[Display Settings:](#) Summary, 20 per page, Sorted by Recently Added [Send to:](#) **Clipboard: 7 items**

Clipboard: 7 [Remove all items](#)

[In vivo post-translational modifications of recombinant mussel adhesive protein in insect cells.](#)
 1. Lim S, Kim KR, Choi YS, Kim DK, Hwang D, Cha HJ.
 Biotechnol Prog. 2011 Jun 16. doi: 10.1002/btpr.662. [Epub ahead of print]
 PMID: 21732552 [PubMed - as supplied by publisher]
[Remove from clipboard](#)

[Engineering the pentose phosphate pathway to improve hydrogen yield in recombinant Escherichia coli.](#)
 2. Kim YM, Cho HS, Jung GY, Park JM.
 Biotechnol Bioeng. 2011 Jul 5. doi: 10.1002/bit.23259. [Epub ahead of print]
 PMID: 21732330 [PubMed - as supplied by publisher]
[Remove from clipboard](#)

[Cell surface display of carbonic anhydrase on Escherichia coli using ice nucleation protein for CO\(2\) sequestration.](#)
 3.

Filter your results:
 All (7)
 Free Full Text (0)
 Review (0)

Save Results in Co
[My NCBI - Collections](#)
[My NCBI - Collections](#)
 Search All Tools Remove selected

Save sessions for continuing later

Recent Activity

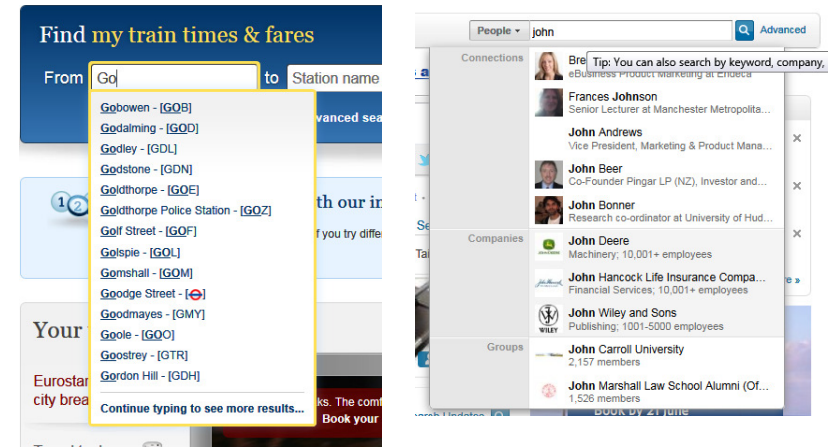
Time	Database	Type	Term
Yesterday 1:59 PM	PubMed	record	In vivo post-translational modifications of recombinant...
Yesterday 1:48 PM	PubMed	search	(ehc virus) OR (escherichia coli)
Yesterday 1:43 PM	PubMed	search	escherichia coli treatment
Yesterday 1:42 PM	PubMed	search	escherichia coli symptoms
Yesterday 1:41 PM	PubMed	search	Escheria coli
Yesterday 1:36 PM	PubMed	search	ehc virus

[Clear](#) [Turn Off](#)
[See All Recent Activity >>](#)

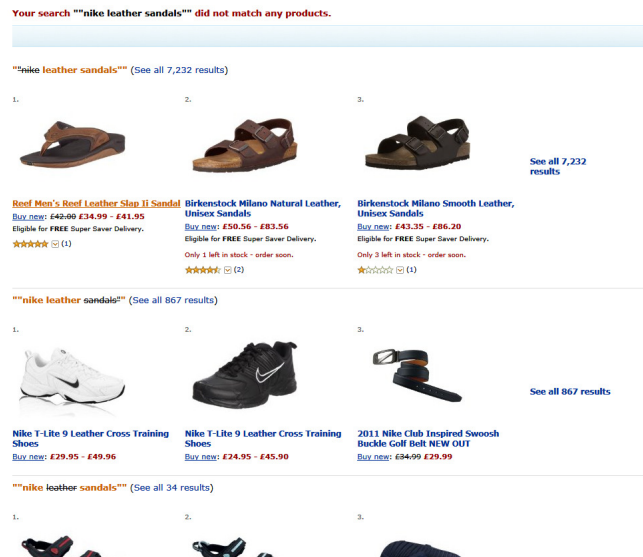
Design Patterns for Search Modes

Support for Marchionini's search modes

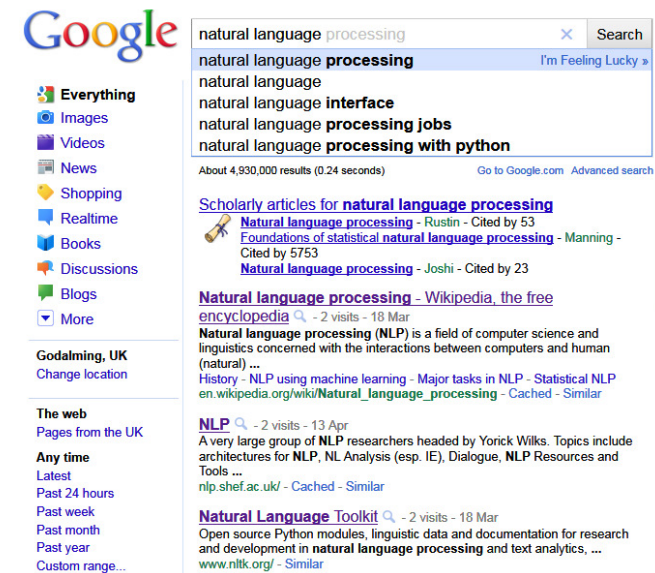
Locating: Autocomplete



Locating: Partial Matches



Verifying: Instant Results



Verifying: Detail Overlay

Google search for "chain" showing 8,110,000 results. A detail overlay for a "3d chrome chain in 3ds max usi" is shown, including a 400 x 300 - 3D Modeling of a Chain in 3D Studio MAX image and a link to seconpicture.com.

TV show page for "30 Rock: Season 1 (2006)". A detail overlay shows the show's cast (Tina Fey, Alec Baldwin), director (Adam Bernstein), genre (Television), and rating (TV-14). It also includes a 4.5 star rating and a "Our best guess for Fall" badge.

Comparing: Parallel Views

Product Comparison page for LG Electronics washing machines. It compares four models: GE GTWN4030MWS, GE GTWN4003MWS, LG WM1687HW, and LG WM1675XQ. A table lists specifications like Brand Name, Manufacturer, Detergent Dispenser, and Wash Cycle. To the right is a stock chart for Thomson Reuters Corporation (Public, TSE:TRI) showing a price of 38.04 and a 0.34% increase.

Exploring: Autosuggest

Yahoo! search for "natural language" with an autosuggest dropdown showing suggestions like "natural language processing", "natural language parsing", and "eliza natural language proc...".

eBay.co.uk search for "golf" with an autosuggest dropdown showing suggestions like "golf clubs", "vw golf", "golf gti", "mk2 golf", "mk1 golf", "golf balls", "golf bags", "golf r32", and "vw golf mk4".

Exploring: faceted search

Library of Congress Online Catalog search interface. It shows search filters for "all of these" and "any of these" for AND, OR, and NOT operators. A dropdown menu lists index names like Keyword Anywhere (GKEY), Title: All (KTIL), and LC Control No.:LCN (K010). A "Guided Search Tips" section provides instructions on how to use the search interface.

Exploring: faceted search

The screenshot shows the NC State University Libraries search interface. The search term is "natural language processing". The results are faceted, showing filters for format (eBook), subject (Natural language processing, Machine learning), and genre (Electronic books). The main results list four items, each with a title, author, and publication information, and an "Add to Cart" button.

Comprehending: facet menus

This screenshot shows a search results page with a detailed facet menu on the left. The facet menu includes categories like "Subject", "Genre", "Format", and "Call Number Location", each with a list of sub-categories and counts. The main results area shows a list of items with their titles, authors, and publication information, along with "Add to List" buttons.

The sidebar titled "Refine Your Search By..." contains a "Keyword Search" field, a "Search" button, and several filter options: "Makes & Models", "Years", "Body Type", "Price Range", and "Fuel Type". A histogram is shown below the "Price Range" filter, with "C Min up to C Max" and "You have matched ALL cars" text.

Analyzing: alternate views

Two side-by-side screenshots of Google Patents search results for "natural language". The left screenshot shows the default view, and the right screenshot shows an alternate view. A "Sort By" dropdown menu is visible in the bottom right, with options: Relevance, Pub Date (newest), Pub Date (oldest), Title A-Z, Author A-Z, Call Number, and Most Popular.

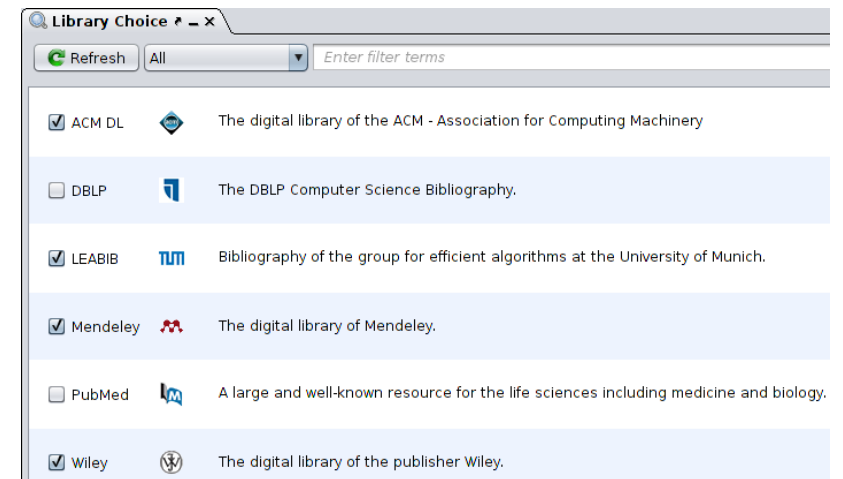
Analyzing: data visualization

The screenshot shows NewsSift search results for "Clash-Media". It features a "Business Topic" table with columns for Organization, Place, Person, and Theme. Below the table are two pie charts: "Sentiment" (Positive: 122, Negative: 21) and "Article Sources". A main article snippet is visible, along with "Global downturn" advertisements.

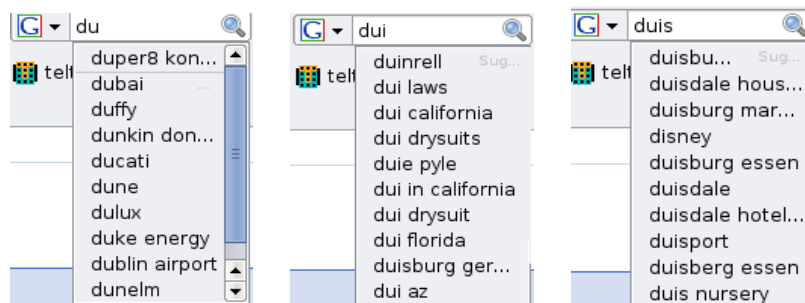
Support for seeking behavior according to Ellis/Meho/Tibo

- Starting** Resource selection
 - identifying popular authors
 - entering search terms
- Browsing** Sort result list by different criteria
 - highlighting, also user-defined
- Chaining** links in results pages
 - comparison of result pages
- Monitoring** storing and periodical execution of queries
- Extracting** searching in the result page
- Inform. Mgmt.** Collate/organize result items
 - Annotate items (Interpret)

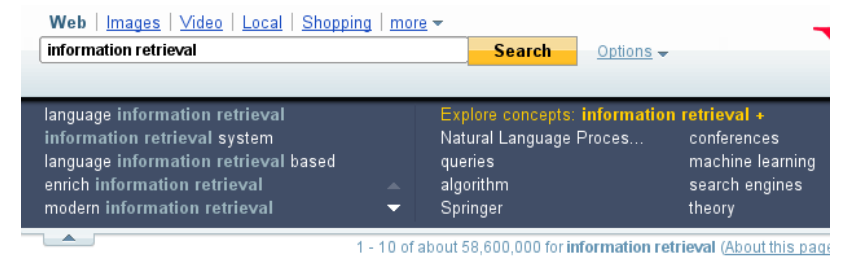
Starting: Resource Selection



Starting: Search term completion



Starting: Related Terms



Starting: Identify important authors
'extract authors' in ezdl

The screenshot shows the ezdl search interface. At the top, there is a 'Search query' section with 'Advanced' and 'Basic' tabs. The search criteria are: Text: "e.g. 'information retrieval' OR search", Title: interactive retrieval, Author: "e.g. 'seth nickel' OR 'suzanna smith'", and Year: "e.g. 1970-1972". Below the search criteria are 'Clear' and 'Search' buttons. The main results area shows 'Results: 415' and a 'Sort by: Relevance' dropdown. A 'Group by: Nothing' dropdown is also present. A red circle highlights the 'Extract' button, which has a dropdown menu with options: Keywords, Authors, Years, and Libraries. The first result is '09101 Abstracts Collection Dagst' by Belkin et al. (2009, Mendeley).

Browsing: Sort/group results by different criteria

The screenshot shows the ezdl search results page. The 'Sort by: Relevance' and 'Group by: Authors' dropdowns are highlighted with a red circle. The results list includes: 'Image Retrieval by Local Evaluation of Nonlinear Kernel Functions around Salient Points.' by Alaa Halawani; Hans Burkhardt (2004, DBLP); 'Retrieval Status Values in Information Retrieval Evaluation.' by Amélie Imafouo; Xavier Tannier (2005, DBLP); 'Evaluation of a Tool for Visualization of Information Retrieval Results.' by Aravindan Veerasamy; Nicholas J. Belkin (1996, DBLP); 'Here or there: preference judgments for relevance' by Ben Carterette; Paul N. Bennett; David Maxwell Chickering; Susan T. Dumais (2008, ACM DL); and 'Semiautomatic evaluation of retrieval systems using document similarities.' by Ben Carterette; James Allan (2007, DBLP).

Browsing: Meaningful Surrogates

The screenshot shows a search interface with a search rule: 'Any field contains topology'. Below the search rule are 'Add sub-clause' and 'Add another rule' buttons. The search results are displayed in two columns. The left column shows 'Currently displaying 1 - 15 of 5882' and a list of articles related to topology, including 'The compact weak topology on a Banach space.' by Manuel González, Joaquín M. Gutiérrez — Extracta Mathematicae. The right column shows 'Journals' and 'Years' surrogates. The 'Journals' list includes: Commentationes Mathematicae (656), Universitatis Carolinae (335), Czechoslovak Mathematical Journal (310), Annales de l'Institut Fourier (282), Compositio Mathematica (276), and Algebraic & Geometric Topology (276). The 'Years' list includes: 2011 (2), 2010 (93), 2009 (103), 2008 (124), and 2007 (135).

Browsing: Highlighting in the Result List

The screenshot shows a Google search result for 'peer to peer information retrieval'. The search results are displayed in a list format. The first result is 'Wissenschaftliche Artikel zu peer to peer information retrieval' by Peer-to-peer information retrieval using self-organizing ... - Tang - Zitiert durch: 541 ... mining for the biologist: from information retrieval to ... - Jensen - Zitiert durch: 331 ... indexing for efficient peer-to-peer information retrieval - Tang - Zitiert durch: 179. The second result is 'IPDF| An Architecture for Peer-to-Peer Information Retrieval' by infoscience.epfl.ch/.../P2P-IR_Architecture.pdf - Diese Seite übersetzen. The third result is 'An Architecture for Peer-to-Peer Information Retrieval' by Karl Aberer, Fabius Klemm, Martin Rajman, Jie Wu. School of Computer and Communication Sciences ... The fourth result is 'Workshop on Information Retrieval in Peer-to-Peer Networks (P2PIR ...' by Isirwww.epfl.ch/p2pir2006/ - Diese Seite übersetzen. The fifth result is 'Workshop on Information Retrieval in Peer-to-Peer Networks: collocated with the ACM Fifteenth Conference on Information and Knowledge Management (CIKM ...'.

Chaining: Clickable Entries in Result Pages

User term feedback in interactive text-based image retrieval

Full Text: Pdf Buy this Article

Authors: [Chen Zhang](#) Michigan State University, East Lansing, MI
[Joyce Y. Chai](#) Michigan State University, East Lansing, MI
[Rong Jin](#) Michigan State University, East Lansing, MI



Published in:



Proceeding
 SIGIR '05 Proceedings of the 28th annual international ACM SIGIR conference on Research and development in information retrieval
 ©2005 [table of contents](#) ISBN:1-59593-034-5
 doi> [10.1145/1076034.1076046](https://doi.org/10.1145/1076034.1076046)

Bibliometrics

Downloads (6 Weeks): 6
 Downloads (12 Months): 48
 Citation Count: 7

Forward Chaining in Web Searches

Google

Suche 7 Ergebnisse (0,23 Sekunden)

Alles [DAFFODIL: Strategic Support Evaluated](#)
www.is.informatik.uni-duisburg.de/bib/docs/Klas_04ta.html

Bilder [DAF FODIL: Strategic Support Evaluate d. UDEFakultäten](#)
 IngenieurwissenschaftenAbteilung InKoInformationssystemeDAFFODIL: Strategic Support Evaluated ...

Maps [DILAS: a Digital Library Annotation Service](#)

Videos [www.is.informatik.uni-duisburg.de/bib/docs/Agosti_etal_05.html](#)

News [UDEFakultätenIngenieurwissenschaftenAbteilung InKoInformationssystemeDILAS ...](#)

Shopping

Mehr [Teaching](#)
www.is.informatik.uni-duisburg.de/.../index.htm... - Diese Seite übersetzen
 UDEFakultätenIngenieurwissenschaftenAbteilung InKoInformationssysteme ...

Das Web
 Seiten auf Deutsch
 Übersetzte Seiten [Comparing different architectures for query routing in peer-to...](#)
www.is.informatik.uni-duisburg.de/bib/.../Nottelmann_Fuhr_06.html
 Zitationsschlüssel: Nottelmann/Fuhr06; Titel: Comparing different ...

Chaining: backward/forward chaining of references

Abstract Authors **Cited By** Index Terms Publication Reviews Comments Table of Contents

7 Citations

Zhenyu Zhang , Tong Lu , Feng Su , Rueyu Yang, A new text detection algorithm for content-oriented line drawing image retrieval, Proceedings of the 11th Pacific Rim conference on Advances in multimedia information processing: Part I, September 21-24, 2010, Shanghai, China

Mouna Torjmen , Karen Pinel-Sauvagnat , Mohand Boughanem, Using textual and structural context for searching Multimedia Elements, International Journal of Business Intelligence and Data Mining, v.5 n.4, p.323-352, October 2010

Woo-Cheol Kim , Ji-Young Song , Seung-Woo Kim , Sanghyun Park, Image retrieval model based on weighted visual features determined by relevance feedback, Information Sciences: an International Journal, v.178 n.22, p.4301-4313, November, 2008

Dilip Kumar Limbu , Andy Connor , Russel Pears , Stephen MacDonell, Contextual relevance feedback in web information retrieval, Proceedings of the 1st international conference on Information interaction in context, October 18-20, 2006, Copenhagen, Denmark

Mouna Torjmen , Karen Pinel-Sauvagnat , Mohand Boughanem, Towards a structure-based multimedia retrieval model, Proceeding of the 1st ACM international conference on Multimedia information retrieval, October 30-31, 2008, Vancouver, British Columbia, Canada

Joyce Y. Chai , Chen Zhang , Rong Jin, An empirical investigation of user term feedback in text-based targeted image search, ACM Transactions on Information Systems (TOIS), v.25 n.1, p.3-as, February 2007

Daniela Petrelli, On the role of user-centred evaluation in the advancement of interactive information retrieval, Information Processing and Management: an International Journal, v.44 n.1, p.22-38, January, 2008

Differentiating: comparison of result pages

The image shows two side-by-side browser windows displaying search results for the same article. The left window shows the article 'User term feedback in interactive text-based image retrieval' with a 'Feedback' button. The right window shows the article 'An empirical investigation of user term feedback in text-based targeted image search' with a 'Feedback' button. Both pages show the article title, authors, and publication information, but the right page has a more detailed abstract and a 'Feedback' section.

Extracting: Highlighting in the result page

Sheffield July 29

27th Annual International ACM SIGIR Conference Workshop on Peer-to-Peer Information Retrieval

SIGIR is the major international forum for the presentation of new research results and the demonstration of new systems and techniques in the broad field of **information retrieval**.

This SIGIR workshop on **Peer-to-Peer Information Retrieval** focus on new methods of resource representation, resource selection, and data fusion in **peer-to-peer** networks. The workshop particularly encourages papers that address heterogeneous **peer-to-peer** networks, as well as papers about methods that cope with partial and uncertain **information**. However, more broadly, papers are solicited on any topic related to **information retrieval** in **peer-to-peer** networks.

Extracting: Searching in the result page

COMMUNICATIONS ACM neuron 14 / 116

news

is messy. Molecules have to bind and unbind, and chemical and signal elements have to mix and diffuse.”

Nature bypasses this messiness in part by resorting to statistical methods. For example, Wang and his colleagues combined recordings of in vivo neural activity, with a computer simulation of **neuron** function in the visual cortex of a cat, to show that **neurons** fired most reliably when they were stimulated by the almost simultaneous arrival of approximately 30 input signals. With fewer than 20 signals arriving at once, the **neuron** was significantly less likely to fire, but the simultaneous arrival of more than 40 signals brought no gain in the reliability of the output sig-

The current puzzle is to understand how a brain built from fundamentally unreliable components can reliably perform tasks that digital computers have barely begun to crack.

Monitoring 'Saved Searches' at PubMed

Table of Contents My NCBI Home My Saved Data Search Filters Preferences About My NCBI

My NCBI Home > Saved Data > Saved Searches Saved Search Settings

Your PubMed search

Search: phototherapy diabetic neuropathy

Name of Search: phototherapy diabetic n

E-mail: doctorpeabody@gmail.com

Would you like e-mail updates of new search results?

No thanks.

Yes, once a month.

Which day? the first Saturday

Yes, once a week.

Which day? Monday

Yes, every day.

Formats:

Report format: Summary

Number of items:

Send at most: 5 items Send even when there aren't any new results

Any text you want to be added at the top of your e-mail (optional):

Save

Monitoring Watchthatpage.com

Your profile
This information will be kept strictly CONFIDENTIAL and will NOT be shared with any other party or mailing list or contained in our terms and conditions

User name (email address) * jome@company.com

User alias jude

Password *

Repeat password *

Your pages

Delete selected Collapse all Expand all Move selected

Competitors

Computers

jakarta.apache.org/

java.sun.com

www.jboss.org/

Your pages for channel Computer

WatchThatPage: 3 pages changed

.....

Differences in page <http://java.sun.com>

.....

Let There Be Light
Learn how professors and programmers at the University of California, Berkeley, designed and built a visionary student information system. (May 28)
<http://servlet.java.sun.com/lookRedirect/frontpage-banner-graphic/http://java.sun.com/>
<http://servlet.java.sun.com/lookRedirect/frontpage-banner-title/http://java.sun.com/>

Information management: Organizing and Annotating results

UNIVERSITÄT DUISBURG ESSEN	Einfache Suche	Ergebnisliste	Aufstellungssystematik	Fernleihe	Anmelden
	Erweiterte Suche	Suchverlauf	Zeitschriftenkatalog	Neuerwerbungen	Neustart
	Indexsuche	Merkliste	Sonderkataloge	Feedback	Hilfe

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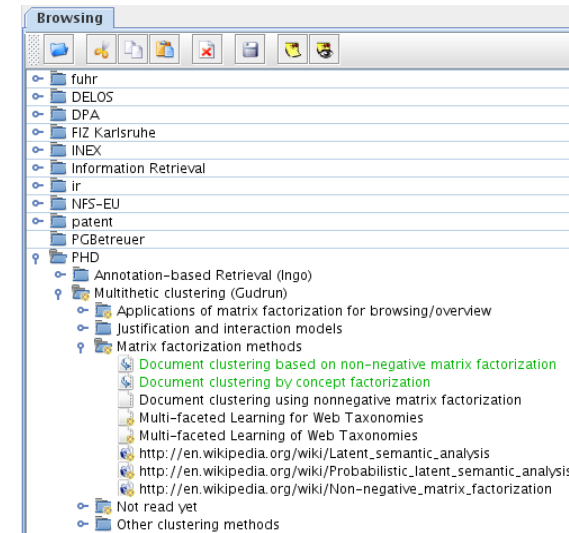
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#	✓	✗	Urheber	Titel	Jahr	Bestand	Notiz
1	<input type="checkbox"/>	<input type="checkbox"/>	Stock, Wolfgang G.	Information-Retrieval	2007	Campus Duisburg (4/4) Campus Essen (1/1)	Lehrbuch
2	<input type="checkbox"/>	<input type="checkbox"/>	Baeza-Yates, Ricardo	Modern information retrieval - [Nachdr.]	2005	Campus Essen (4/2)	
3	<input type="checkbox"/>	<input type="checkbox"/>	Ferber, Reginald	Information Retrieval - 1. Aufl.	2003	Campus Duisburg (1/1) Campus Essen (1/1)	

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Summary





Information management: personal library in Daffodil







Summary

- ▶ Interactive PRP for analysis and design of IIRS
- ▶ Information seeking behavior vs. searching
- ▶ cognitive models:
 - ▶ search as iterative process
 - ▶ large variation in search tasks
 - ▶ search influenced by many factors
- ▶ systems:
 - ▶ strategic support through high-level search functions (especially for typical cognitive actions)
 - ▶ proactive support
- ▶ user interface design on cognitive models

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