Beyond 10 Blue Links: User-Oriented Design of Search Interfaces

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Introduction

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Search Tasks

Most Web search tasks are rather simple

• Finding a single page is often sufficient

What is L3S?

What is the weather forecast for Hannover?

L3S Web Maps Images Shopping Videos More - Search tools

About 391,000 results (0.28 seconds)

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Search Tasks

- There are also (less frequent) complex Web search tasks
- Tasks in other domains with other data are usually more complex, e.g.
 - medical search
 - patent search
 - enterprise search

Find information about the treatments of diabetes mellitus

Conducting a prior-art patent search for avoiding patent infringement

Tasks and Search Functions

- Different task types need different kinds of search system functions
- $\rightarrow\,$ "one size fits all" approach neither effective nor efficient for advanced search tasks

Search System Functions

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Search System Functions

Search System Function

- Operation or parameter of a search system
- Can be invoked by the user or (automatically) by the system

Select - Organize - Project

- Select: Selecting possibly relevant items
- Organize: How the set of result items is structured and organized logically
- Project: Construction of the surrogates to be presented in the results page



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Select Example: Taxonomies of Web Search

Broder 2002 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

Develop task-specific selection methods Navigational: find home page Informational: find page containing requested info Transactional: find page w/ transaction form

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Ranking method: e.g. precision- or recall-oriented

Ranking principle: e.g. relevance or diversity ranking

Querying: simple (set of words) to complex (field, data types) queries, a-priori or by given items (query by example)

Hannover 96

Text:	retrieval
Title:	e.g. "information retrieval" AND search
Author:	smith
Year:	e.g. >=1970 AND <=1972



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e.g. >=1970 AND <=1972



Formal filter conditions: Filtering by formal criteria

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w	eb	Maps	Images	News	Videos	More 👻	Search tools
Pa	ast 24	hours -	Sorted by	y relevance	✓ All re	sults 👻	Clear
Ar	ny time						
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Sorting: Sorting of items by one (1D) or more attributes (2D, ...)





Grouping: Grouping by simple (e.g. grouping by document type) or complex criteria

-	Years 1960 - 1969 (1)
1.	Fact Retrieval and Deductive Question-Answering Information Retrieval Systems
	1964 (DBLP)
-	Years 1970 - 1979 (1)
1.	A Heuristic Approach to Inductive Inference in Fact Retrieval Systems C. Willam Slanner 1974 (DBLP)
-	Years 1980 - 1989 (2)
1.	Indexing and Retrieval Strategies for Natural Language Fact Retrieval
	Janet L. Kolodner 1983 (DBLP)
2.	Emis: An online fact retrieval and publication system
	J. L. Sears
•	1952 (UBLP) Vears 1990 - 1999 (4)
1	Integration of Probabilistic Eact and Text Retrieval
	Norbert Fuhr
	1992 (DBLP)
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Clustering: Content-focused grouping by similarity



Linking: Showing e.g Web links, co-author relationships, citations,

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. . .

Search System Functions



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Selecting: Select attributes of result items





Introduction to Information Retrieval by Christopher D. Manning, Prabhakar Raghavan and Hinrich Schütze (Jul 7, 2008)

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Selecting: Select attributes of result items



Summarizing: Summaries of single answer documents

Advantages of query biased summaries in information retrie... dl.acm.org/citation.cfm?id=290947 ➤ Dises Seite übersetzen von A Tombros - 1998 - Zitiert von: 414 - Ähnliche Artikel Hideo Joho , David Hannah , Joemon M. Jose, Emulating query-biased summaries using document titles, Proceedings of the 31st annual international ACM ...

Aggregating: Generate single entry representing several items

***** EXCELLENT CAMERA

This is an EXCELLENT CAMERA, This is the

The best feature: Great quality photos! I just



I have owned earlier models of this camera, so



Purbo computed the following summary by analyzing hundreds of reviews (see numerical scores) Despite reservations with the low battery life and size, reviewers enjoy the video mode, sharp zoom, and large display. If you don't care about the battery life and size, it's a desard indice



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***** Love this camera! The best feature: Great quality photos! I just

***** Easy to use great pics I have owned earlier models of this camera, so



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Extracting: Extracting and generating new data (e.g common terms or frequent authors)

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Supporting Search Modes

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Search Activities and Search Modes [Marcchionini 1995]



- Top-level categories of search activities by Marchionini
- Notion of Search Mode by Russel-Rose et al.
- Search mode = subtype of a search activity category
- Based on analyzing real-world scenarios (site and enterprise search)
- → entity search

Search Activities and Search Modes

• Lookup: (i) Locate, (ii) Verify, (iii) Monitor

- Specified queries
- No complicated examination of results required
- Learn: (i) Compare, (ii) Comprehend, (iii) Explore
 - Gaining knowledge, comprehension, comparisons, ...

- Processing and interpretation necessary
- Investigate: (i) Analyze, (ii) Evaluate, (iii) Synthesize
 - Analysing, synthesizing information
 - Searchers needs high knowledge level

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Mapping Search Modes to Search Functions

• Examples of search modes and how they can be supported by search functions

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- Each search mode needs Select, Organize and Project functions
- Focus on most important and distinctive functions

Lookup: Verify/Monitor

wolfga	wolfgang nejdl phone number								
Web	lmages	Maps	News	Shopping	More -	Search tools			
About 272,000 results (0.52 seconds)									
Cookie: Learn m	Cookies help us deliver our services. By using our services, you agree to our use of cookies. Learn more Got it								

Homepage of Wolfgang Nejdl - KBS

www.kbs.uni-hannover.de/~nejdl/ ~

George Bernard Shaw. Prof. Dr. techn. Dipl.-Ing. **Wolfgang Nejdl**. Institut für Verteilte Systeme Wissensbasierte Systeme (KBS) Appelstrasse 4 30167 Hannover

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Prof. Dr. techn. Wolfgang Nejdl. Prof. Dr. Wolfgang Nejdl (born 1960) has been full professor of computer science at the University of Hannover since 1995.

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www.informatik.uni-trier.de/~ley/pers/hy/n/Nejdl:Wolfgang.html *

Wolfgang Nejdl, Johann Gamper: Model-Based Diagnosis with Qualitative Temporal ... Wolfgang Neidl.Peter Brusilovskv. EIC Editorial and Introduction of New ... < ロト く(アト くきト くきト き つくへ

Lookup: Verify/Monitor

Verifying that a CPU has a certain clock rate

• Selecting relevant parts or attributes for projection (P)

• ;	amd fx	

Produkt	🚹 Taktfrequenz	Level2 Cache	Level3 Cache	Bewertung	Preis
AMD EX-4100 Boxed, "Zambezi" Auf Lager	3600 MHz	4096 kB	8192 kB	46 Bewertungen	€ 107,90*
AMD FX-4170 Boxed, "Zambezi" Auf Lager	4200 MHz	4096 kB	8192 kB	25 Bewertungen	€ 129,90* টে⊉ ► \;
AMD FX-4170 "Zambea" Auf Lager	4200 MHz	4096 kB	8192 kB	★★★★★ 3 Bewertungen	€ 122,90*

Learn: Compare

Comparing ovens to identify similarities and differences

• Sorting relevant items (O) and selecting relevant attributes for projection visualized in tabular form (P)

SIEMENS

Product Code	HB75GB550B	☆Remove	HB78GB590B	☆ Remove	HB78GB670B	☆ Remove
Product Image	3 400 3					
	Siemens Partner		Siemens Partner		Siemens Partner	
General Properties						
Color / Material Front	Stainless steel		Stainless steel		Black	
Built-in / Free-standing	Built-in		Built-in		Built-in	
Installation typology	Half-integrated		Half-integrated		Half-integrated	
Energy input	Electric		Electric		Electric	
Electrical connection rating (VV)	3,650 W		3,650 W		3,650 W	
Current (A)	16 A		16 A		16 A	

Intel (228)

Learn: Comprehend

Comprehending and understanding important attributes when buying a solid-state drive

• Showing facets (P) and using them for grouping (O)



Learn: Explore

Explore interesting new topics for organizing a seminar

• Facet as formal filter conditions (S), grouping according to facets (O) and extracting frequent terms (P)





Analyzing which stories, actors, .. make current movies successful

• Multidimensional sorting (O), grouping (O), clustering (O) and linking of results (O)

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Investigate: Analyze HyperScatter (2D sorting) and Parallel Bargrams visualisation



Investigate: Evaluate

Evaluating cheap antivirus software for use on a notebook

• Sorting ascending by price (O) and summarizing main features (P)

on Internet rity
Norton et. \$70
ite with oftware
nprehensive tion, very: protection, i-spam and orotection, vall.good ols n number of s, detects than aducts.

Implications for the design of search systems

- Ideal system should be flexible enough to support various search modes
- Alternatively there can be specialized systems (e.g. smartphone apps)
- No feature-bloated system, only appropriate functions should be offered (richer functionality ~> requires increased user expertise)
- Interaction and visualisation techniques for the UI have to be chosen carefully

Conclusion and Outlook

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Conclusion and Outlook

- Select Organize Project as basic search function types
- Different search modes require different search functions
- Open Issues
 - Visualization
 - Easy-to-use user interface
- Current Web search deals mainly with unstructured objects (little semantics)

• Various entity types, richer structure, more attributes ~> need for advanced search functions

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