

Information Search

Information Search

- **Introduction**
- **Searching in Textual Documents and Database Querying**
- **Multimedia Document Searches**
- **Advanced Filtering and Search Interfaces**

Information Search (cont.)

- **Information search should be a joyous experience, but it takes a skilled searcher with robust tools to perform an effective search**
- **Information retrieval and database management have evolved into:**
 - information gathering
 - Seeking
 - filtering
 - collaborative filtering
 - sensemaking
 - visual analytics
- **Now the concentration of CS scientists are on**
 - data mining from data warehouses and data marts
 - knowledge networks or semantic webs
- **All the above is complicated by the increased volume of material to search**

Search terminology

- **Task objects** (such as movies for rent) are stored in structured relational databases, textual document libraries, or multimedia document libraries
- A **structured relational database** consists of *relations* and a *schema* to describe the relations
- **Relations** have **items** (usually called tuples or records), and each item has multiple attributes (often called fields), which each have attribute values
- A **textual document library** consists of a set of collections (typically up to a few hundred collections per library) plus some descriptive attributes or metadata about the library (for example, name, location, owner)

Search terminology (cont.)

- *Task actions* are decomposed into *browsing* or *searching*
- Here are some examples of task actions:
 - ***Specific fact finding (known-item search)***
 - Find the e-mail address of the President of the United States.
 - ***Extended fact finding***
 - What other books are by the author of “Jurassic Park”?
 - ***Exploration of availability***
 - Is there new work on voice recognition in the ACM digital library?
 - ***Open-ended browsing and problem analysis***
 - Is there promising new research on breast cancer that might help my patient?

Search terminology (cont.)

- Once users have clarified their information needs, the first step towards satisfying those needs is ***deciding where to search***
- Supplemental ***finding aids*** can help users to clarify and pursue their information needs, e.g. table of contents or indexes
- Additional ***preview and overview surrogates*** for items and collections can be created to facilitate browsing

Searching in Textual Documents and Database Querying

- **Expert users can use SQL:**

```
SELECT DOCUMENT#  
FROM JOURNAL-DB  
WHERE (DATE >= 2004 AND DATE <= 2008)  
AND (LANGUAGE = ENGLISH OR FRENCH)  
AND (PUBLISHER = ASIST OR HFES OR ACM)
```

- **SQL has powerful features, but it requires training**
 - While SQL is a standard, form fill-in queries have simplified query formulation

Searching in Textual Documents and Database Querying (cont.)

- **Other methods include:**
 - Natural language queries
 - Form fill-in
 - Query by example (QBE)
- **Evidence shows that users perform better and have higher satisfaction when they can view and control the search**

Searching in Textual Documents and Database Querying (cont.)

The LIBRARY of CONGRESS THOMAS

The Library of Congress > THOMAS Home > Bills, Resolutions > Search Bill Text



Search Bill Text for the 110th Congress (2007-2008)

- THOMAS Home
- About THOMAS
- Bills, Resolutions
- Congressional Record
- Presidential Nominations
- Treaties
- Committee Reports
- Government Resources
- For Teachers
- Help

- House of Representatives
- Senate
- U.S. Code

Related Resources at the Library

- Law Library of Congress
- Century of Lawmaking
- Continental Congress and Constitutional Convention
- Related Webcasts from the Library

[Search Bill Text](#) | [Search Bill Summary, Status](#) | [Search Multiple Congresses](#)

Select Congress: 110 | [109](#) | [108](#) | [107](#) | [106](#) | [105](#) | [104](#) | [103](#) | [102](#) | [101](#)

[Help](#)

[Browse by Bill Number](#)

Enter Search

Word/Phrase

☒ Exact Match Only ☐ Include Variants (plurals, etc.)

Which Bills?

- ☒ All Bills
- ☐ Bills with Floor Action [What is a floor action?](#)
- ☐ Enrolled Bills [What is an enrolled bill?](#)

From Where?

- ☒ Both House and Senate
- ☐ House Bills Only
- ☐ Senate Bills only

When? (This date is usually a few days after the date of introduction in Congress. [More about selecting the date.](#))

- ☒ All (2007 - 2008)
- ☐ First Session
- ☐ Second Session

Enter date in this format: mm/dd/yyyy or mm-dd-yyyy

☐ From through

[SEARCH](#)

[CLEAR](#)

Five-phase framework to clarify user interfaces for textual search

- 1. Formulation:** expressing the search
- 2. Initiation of action:** launching the search
- 3. Review of results:** reading messages and outcomes
- 4. Refinement:** formulating the next step
- 5. Use:** compiling or disseminating results

Five-phase framework to clarify user interfaces for textual search (cont.)

1. Formulation

- Provide access to the appropriate sources in libraries and collections.
- Use *fields* for limiting the source: structured fields such as year, media, or language; and text fields such as titles or abstracts of documents.
- Recognize *phrases* to allow entry of names, such as George Washington or Environmental Protection Agency, and concepts, such as abortion rights reform or gallium arsenide.
- Permit *variants* to allow relaxation of search constraints, such as case sensitivity, stemming, partial matches, phonetic variations, abbreviations, or synonyms from a thesaurus.
- Control the size of the result set.

2. Initiation of action

- Include *explicit actions* initiated by buttons with consistent labels (such as "Search"), locations, sizes, and colors.
- Include *implicit actions* initiated by changes to a parameter of the formulation phase that immediately produce new sets of search results.

3. Review of results

- Present explanatory messages.
- View an overview of the results and previews of items.
- Manipulate visualizations.
- Adjust the size of the result set and which fields are displayed.
- Change the sequencing (alphabetical, chronological, relevance ranked, and so on).
- Explore clustering (by attribute value, topics, and so on).
- Examine selected items.

4. Refinement

- Use meaningful messages to guide users in progressive refinement; for example, if the two words in a phrase are not found near each other, offer easy selection of individual words or variants.
- Make changing of search parameters convenient.
- Explore relevance feedback.

5. Use

- Allow queries, parameter settings, and results to be saved and annotated, sent by e-mail, or used as input to other programs (such as visualization or statistical tools).

Searching in Textual Documents and Database Querying (cont.)



As users press keys on the keypad (left figure), the data are shown and a search is implicitly initiated to display the list of information that match the series of keys pressed. On the right figure, blue wedges at the edge of the screen hint at the locations of off-screen results on a map

Searching in Textual Documents and Database Querying (cont.)

A search for “user interface” returns 144 results grouped into 10 pages. The menu at the upper right allows users to sort results by relevance or by date, while on the left a summary of the results organized by Subject, Genre, or Format provides an overview of the results and facilitates further refinement of the search.

The screenshot shows the NCSU Libraries search results page. At the top, there's a navigation bar with links like 'Search the Collection', 'Browse Subjects', 'Services', 'Library Information', 'Community', and 'Feed & Events'. Below this is a 'MY LIBRARY' section with links for 'Library Account', 'My Course Reserves', 'My Alerts', and 'RefWorks'.

The main search area shows the query 'user interface' in the 'in Title' field, with a 'Search' button. Below the search bar, there's a 'Library Catalog' section with a 'Search within results' checkbox and a 'Start Over' link. To the right, an 'Expand Your Search' box indicates '0 results at Triangle research libraries' and 'NCSU plus Duke, NCCU & UNC'.

The 'Your Current Search' section shows the search criteria: 'in Title' with 'user interface', 'Language' set to 'English', and a 'Refine Your Search' section with checkboxes for 'Currently available', 'Available online', and 'New titles'.

The 'Refine Your Search' section is expanded, showing a list of subjects: 'User interfaces (Computer systems) (76)', 'Computer software (21)', 'Human-computer interaction (17)', 'Graphical user interfaces (Computer systems) (14)', and 'Interactive computer systems (12)'. There are also sections for 'Genre' and 'Format' with their respective counts.

The search results are displayed in a list format, showing the first 10 of 144 results. The results are sorted by 'Relevance'. The first result is 'User interface design and evaluation / Debbie Stone ...[et al.]', published in 2005, available in the D.H. Hill Library Stacks (6th floor) at QA76.9 .U83 U835 2005. The second result is 'User interface design : a software engineering perspective' by Lauesen, Soren, published in 2005, available in the D.H. Hill Library Stacks (6th floor) at QA76.9 .U83 L38 2005. The third result is 'User interface softbots [electronic resource]' by Dudani, Ajay B., published in 2003, available online. The fourth result is 'Practitioners handbook for user interface design and development' by Torres, R. J. (Robert J.), published in 2002, available in the D.H. Hill Library Stacks (6th floor) at QA76.9 .U83 T68 2002. The fifth result is 'User interface design for programmers' by Spolsky, Joel, published in 2001, available in the D.H. Hill Library Stacks (6th floor) at QA76.9 .U83 T68 2002.

Multimedia Document Searches

- **Image search**
- **Map search**
- **Design or diagram search**
- **Sound search**
- **Video search**
- **Animation search**

Multimedia document searches (cont.)

- **Image Search:**
 - **Finding photos with images such as the Statue of Liberty is a challenge**
 - Query-by-Image-Content (QBIC) is difficult
 - Search by profile (shape of lady), distinctive features (torch), colors (green copper)
 - **Use simple drawing tools to build templates or profiles to search with**
 - **More success is attainable by searching restricted collections**
 - Search a vase collection
 - Find a vase with a long neck by drawing a profile of it
 - **Critical searches such as fingerprint matching requires a minimum of 20 distinct features**
 - **For small collections of personal photos effective browsing and lightweight annotation are important**

Multimedia document searches (cont.)

- **Map Search**
 - On-line maps are plentiful
 - Search by latitude/longitude is the structured-database solution
 - Today's maps allow utilizing structured aspects and multiple layers
 - City, state, and site searches
 - Flight information searches
 - Weather information searches
 - Mapquest, Google Maps, etc.
 - Mobile devices can allow “here” as a point of reference

Multimedia document searches (cont.)

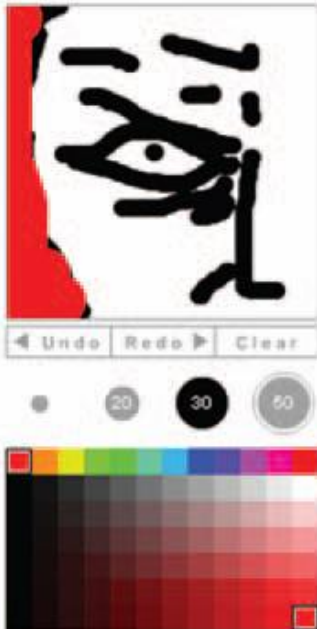
- **Design/Diagram Searches**
 - Some computer-assisted design packages support search of designs
 - Allows searches of diagrams, blueprints, newspapers, etc., e.g. search for a red circle in a blue square or a piston in an engine
 - Document-structure recognition for searching newspapers
- **Sound Search**
 - MIR supports audio input
 - Search for phone conversations may be possible in future on speaker independent basis
- **Video Search**
 - Provide an overview
 - Segmentation into scenes and frames
 - Support multiple search methods
 - Infomedia project
- **Animation Search**
 - Prevalence increased with the popularity of Flash
 - Possible to search for specific animations like a spinning globe
 - Search for moving text on a black background

Multimedia Document Searches (cont.)

retrievr

All images

Search by:
Sketch • [Image](#)



Need! Please help us [rate sketches](#) for [The Art of retrievr](#)! Only a million to go ...



From [herby_fr](#)



From [swardravs](#)



From [HSU baru](#)



From [Protagonist](#)



From [lololo](#)



From [Sabinche](#)



From [rubyan](#)



From [ThisBeautifulMess](#)



From [lucius](#)



From [krispie_p](#)



From [snapshot of life](#)



From [aroid](#)



From [PhotoShmote](#)



From [Kristoff \(sans\)](#)



From [Sexy Swedish Babe](#)



From [leir](#)

Advanced Filtering and Search Interfaces

- **Filtering with complex Boolean queries**
- **Automatic filtering**
- **Dynamic queries**
- **Faceted metadata search**
- **Query by example**
- **Implicit search**
- **Collaborative filtering**
- **Multilingual searches**
- **Visual field specification**

Advanced filtering and search interfaces (cont.)

For advanced uses there are alternatives to form fill-in query interfaces:

- **Filtering with complex Boolean queries**
 - Problem with informal English, e.g. use of ‘and’ and ‘or’
 - Venn diagrams, decision tables, and metaphor of water flowing have not worked for complex queries
- **Dynamic Queries - Adjusting sliders, buttons, etc and getting immediate feedback**
 - “Direct manipulation” queries
 - Use sliders and other related controls to adjust the query
 - Get immediate (less than 100 msec) feedback with data
 - Dynamic HomeFinder and Blue Nile
 - Hard to update fast with large databases
- **Query previews present an overview to give users information and the distribution of data and thereby eliminate undesired items**
- **Faceted metadata search**
 - Integrates category browsing with keyword searching

Advanced filtering and search interfaces (cont.)

- **Collaborative Filtering**
 - Groups of users combine evaluations to help in finding items in a large database
 - User "votes" and his info is used for rating the item of interest, e.g. a user rating six restaurants highly is given a list of restaurants also rated highly by those who agree the six are good
- **Multilingual searches**
 - Current systems provide rudimentary translation searches
 - Prototypes of systems with specific dictionaries and more sophisticated translation
- **Visual searches**
 - Specialized visual representations of the possible values, e.g. dates on a calendar or seats on a plane
 - On a map the location may be more important than the name
 - Implicit initiation and immediate feedback

Advanced Filtering & Search Interfaces (cont.)

using dynamic queries narrows down the results of searches. Here, the double-sided sliders were adjusted to show only lower-priced diamonds with very good cut and high carat ratings.

blue Nile Education, Guidance, Diamonds and Fine Jewelry.

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Search
keyword or item # go

Diamonds

- Search for Diamonds
- Blue Nile Signature Collection
- Canadian Diamonds
- Recently Purchased Engagement Rings

Related Links

- Engagement Ring Guide
- Learn About Diamonds
- Recently Purchased Engagement Rings

Expert Live Help
(Questions? Chat now)

Free FedEx® Shipping on Every Order

Home > Engagement > Search for Diamonds > Search Results
Give us your [feedback](#).

Search for Diamonds

Refine Search Criteria: Use the sliders below to modify your search results.

Additional Criteria

- ☐ Polish
- ☐ Symmetry
- ☐ Price per Carat
- ☐ Depth %
- ☐ Table %
- ☐ Fluorescence
- ☐ Culet

[how to use search](#)

Shape	Carat	Cut	Color	Clarity	Price
<input checked="" type="checkbox"/> Round	20.56	Signature Ideal	D	FL IF	\$1,110
<input type="checkbox"/> Princess			E	VVS1	
<input type="checkbox"/> Emerald			F	VVS2	
<input type="checkbox"/> Asscher			G	VS1	
<input type="checkbox"/> Marquize			H	VS2	
<input type="checkbox"/> Oval			I	S11	
<input type="checkbox"/> Radiant			J	S12	
<input type="checkbox"/> Pear	0.57	Fair			\$272
<input type="checkbox"/> Heart					
<input type="checkbox"/> Cushion					

[Clear All Criteria](#)

☐ Receive e-mail alerts when new diamonds, matching your criteria, have been added.

Your Search Results: 31 Round Diamonds

compare	Carat	Cut	Color	Clarity	Report	Price	Details
<input type="checkbox"/>	0.58	Very Good	J	S11	GIA	\$981	view/select
<input type="checkbox"/>	0.58	Very Good	J	S11	GIA	\$981	view/select
<input type="checkbox"/>	0.57	Very Good	I	S11	GIA	\$995	view/select
<input type="checkbox"/>	0.60	Very Good	J	S11	GIA	\$1,011	view/select
<input type="checkbox"/>	0.60	Very Good	J	S11	GIA	\$1,011	view/select
<input type="checkbox"/>	0.60	Very Good	J	S11	GIA	\$1,011	view/select
<input type="checkbox"/>	0.58	Very Good	I	S11	GIA	\$1,012	view/select
<input checked="" type="checkbox"/>	0.58	Ideal	J	S11	GIA	\$1,016	view/select
<input type="checkbox"/>	0.61	Very Good	J	S11	GIA	\$1,027	view/select
<input type="checkbox"/>	0.61	Very Good	J	S11	GIA	\$1,027	view/select
<input checked="" type="checkbox"/>	0.59	Ideal	J	S11	GIA	\$1,037	view/select
<input type="checkbox"/>	0.59	Very Good	J	S11	GIA	\$1,039	view/select
<input type="checkbox"/>	0.59	Very Good	J	S11	GIA	\$1,045	view/select
<input checked="" type="checkbox"/>	0.57	Ideal	J	S11	GIA	\$1,055	view/select
<input type="checkbox"/>	0.57	Ideal	J	S11	AGSL	\$1,056	view/select
<input type="checkbox"/>	0.58	Ideal	I	S11	GIA	\$1,060	view/select

[compare](#)

Diamond Information:

Stock Number: LD01340006
Depth: 62.3%
Table: 57.0%
Girdle: Medium to Slightly Thick
Symmetry: Very Good
Polish: Excellent
Culet: None
Fluorescence: Faint
Measurements: 5.30x5.35x3.32 mm
Price per carat: \$1,752/ct

Shipping Information:
Order by: 3 PM ET tomorrow
Receive Loose: Wednesday, September 3
Set in jewelry: Thursday, September 4

Advanced Filtering and Search Interfaces (cont.)

Flamenco Fine Arts Search
Images from the Collections of the Fine Arts Museums of San Francisco, Legion of Honor and de Young Museums. <http://www.thinkart.org>

Refine your search further within these categories: These terms define your current search. Click the **X** to remove a term.

Media (group results)
[Aquatint](#) (46) [Etching](#) (225)
[Book](#) (35) [Glass](#) (28)
[Ceramic](#) (1) [Linocut](#) (1)
[Costume](#) (3) [Lithograph](#) (194)
[Drawing](#) (23) [more...](#)
[Drypoint](#) (102)

Date: 20th century **X**
Location: Europe **X**

☒ all items ☐ within current results





1060 items (grouped by location) [view ungrouped items](#)





Location: [all](#) > Europe
[Austria](#) (5) [Holland](#) (1)
[Belgium / Flanders](#) (9) [Italy](#) (12)
[Czechoslovakia](#) (10) [Netherlands](#) (11)
[France](#) (686) [Scotland](#) (39)
[French](#) (19) [more...](#)
[Germany](#) (125)

Date: [all](#) > 20th century (group results)
[1900 - 1909](#) (161) [1960 - 1969](#) (48)
[1910 - 1919](#) (188) [1970 - 1979](#) (2)
[1920 - 1929](#) (151) [1980 - 1989](#) (2)
[1930 - 1939](#) (206) [1990 - 1999](#) (11)
[1940 - 1949](#) (175) [more...](#)
[1950 - 1959](#) (86)

Themes (group results)
[Military](#) (75) [Nautical](#) (43)
[Mortality](#) (10) [Religion](#) (44)
[Music, writing, and sport](#) (698)

Objects (group results)
[Clothing](#) (112) [Lighting](#) (17)
[Containers](#) (58) [Timepieces](#) (9)
[Food](#) (33) [Vehicles](#) (13)
[Furnishings](#) (68) [Wares](#) (7)

Austria 5

Der Polster Kurzveil 1903

Der Polster (The Kurzveil 1903

Ruined Garden in Michalek 1918

Study for Portrait of Klimt early 20th century
[all 5 items...](#)

Belgium / Flanders 9

Au Square Evenepoel 1987

Avec le plus vif Lennu 1909

Cup plate St. Lambert circa 1900

Cup plate St. Lambert circa 1900
[all 9 items...](#)

Czechoslovakia 10

an example of a faceted metadata search. Facets include Media, Location, Date, Themes, and so on. Here, two attribute values are selected (Date = 20th century and Location = Europe) with results grouped by location. The image previews are updated immediately as constraints are added or removed (another example of implicit query initiation). Clicking on a group heading such as “Belgium/Flanders” refines the query into that category, while clicking on “All” dates relaxes the date constraint.

Advanced Filtering and Search Interfaces (cont.)

users can review all waterproof binoculars in the catalog of products and browse the items in the list, grouped by manufacturer.

Each box corresponds to a pair of binoculars, and the size of the box is proportional to its price.

Green boxes are best-sellers.

Users can filter the results using the dynamic query sliders on the right. Here all the binoculars with less than three user reviews have been filtered out, leaving only 61 binoculars to consider.


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 BUSINESS AT A GLANCE

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Binoculars: Waterproof

GROUP by: 1. Manufacturer
 SIZE represents: A. Price @ Amazon
 COLOR represents: 1. Avg. Customer Rating



Manufacturer	Price	Rating	Reviews	Product Name
Canon	\$1057.7	4.50	33	Canon 18x50 Image Stabilization All-Weather Binoculars w/Case, Neck Strap & Batteries
Nikon	\$429.95	5.00	2	Nikon Premier LX-L 10x25 Binoculars
Nikon	\$177.14	5.00	25	Nikon Action 16x50
Nikon	\$151.98	5.00	25	Nikon Action
Bushnell	\$129.99	3.50	3	Bushnell Marine 7x50
Bushnell	\$119.16	5.00	3	Bushnell Trophy
Bushnell	\$112.2	4.50	3	Bushnell
Bushnell	\$109.9	5.00	2	Bushnell
Steiner	\$499.0	3.50	6	Steiner 10x50 Military/Marine Binocular
Celestron	\$144.56	5.00	2	Celestron Oceana 7x50 Waterproof
Celestron	\$110.57	5.00	2	Celestron
Brunton	\$109.0	4.00	6	Brunton
Korona M6	\$157.00	4.50	12	Korona M6
Meade	\$67.5	1.50	1	Meade
VANGUARD	\$55.06	2.00	2	VANGUARD
Bar	\$29.00	2.50	2	Bar
Tasco	\$62.00	3.00	2	Tasco
Yukon	\$4.00	4.00	4	Yukon
Thum	\$4.00	4.00	4	Thum

FILTERS AND HIGHLIGHTS

- ☐ 1. Show Available Items
- ☐ 2. Show Items w/ Pictures
- ☒ 3. Price: min: 29 max: 2.9K
- ☒ 4. Avg. Customer Rating: min: 1 max: 5
- ☒ 5. # of Customer Reviews: min: 3 max: 43
- ☐ 6. Sales Rank: min: 377 max: 496.1K

States: [Manage](#)

[Export Data...](#)
 Displaying: 61 of 276 Products
 Labels: ☒ Details
 Find A Product: