Mapping the library future: Subject navigation for today's and tomorrow's library catalogs

John Mark Ockerbloom, University of Pennsylvania
Mapping the library future

Subject navigation for today’s and tomorrow’s library catalogs

John Mark Ockerbloom

ALA Catalog Form and Function Group

January 12, 2008
Take-away points

• LC Subject Headings form a rich basis for discovery, crippled by poor discovery tools, slow evolution
  – A deep ontology with many detailed terms and relationships
  – Network of concepts not captured by keywords or facets alone

• Subject maps enable better subject browsing with ontologies like LCSH
  – Multi-dimensional browsing, highlighting relevant connections
  – May also make it easier to maintain, evolve big, messy subject ontologies

• They are practical for present and next-generation catalogs
  – Build on legacy data, but accommodate new collecting practices
  – Both large (research library) & small (special collection) scales
  – With ordinary web browsers, servers, and ILS, and without expensive proprietary software
  – Can work well with facet browsing, tagging

• We can build on library strengths and Web innovations, to better connect our users with the resources they need
The appeal of browsing

Green Apple Books (San Francisco), March 2007
Photo by Dolan Halbrook (Copyright 2007. Creative Commons Licensed)
More content not on shelves...

Google Is Adding Major Libraries to Its Database

By JOHN MARKOFF and EDWARD WYATT
Published: December 14, 2004

Google, the operator of the world’s most popular Internet search service, plans to announce an agreement today with some of the nation’s leading research libraries and Oxford University to begin converting their holdings into digital files that would be freely searchable over the Web.

It may be only a step on a long road toward the long-predicted global virtual library. But the collaboration of Google and research institutions that also include Harvard, the University of Michigan, Stanford and the New York Public Library is a major stride in an ambitious Internet effort by various parties. The goal is to expand the Web beyond its current valuable, if eclectic, body of material and create a digital card catalog and searchable library for the world’s books, scholarly papers and special collections.
...and hard to browse
Women in Google Books

What about Women?: An Examination of the Present Characteristics, Nature, Status, and Position of ... - Page 1
by John Henry Cutler - 1961 - 241 pages
Some of the comments: American women are no longer prudes, chattels, or passives ... American women are marrying earlier and completing their families sooner ... Snippet view - About this book

Women - Page xi
by Booth Tarkington - 1926 - 415 pages
WOMEN MRS. DODGE AND MRS. CROMWELL W LEARNED in childhood that appear-ances are deceitful, and our subsequent ... Snippet view - About this book

Women
by Mistletoe, Gabriela, Jacqueline Clare Nonifoot, Marjorie Apersin - 2001 - 177 pages
most essential legacy as well as that which will offer the possibility for women to acquire a public space of power and a political voice for women. ... Limited preview - Tables of Contents - About this book

Women: Personal and Environmental Factors in Role Identification and Career Choices - Page 1
by Felice J. Karman - 1973

Find: elat Find Next Find Previous Highlight all Match case

http://books.google.com/books?q=women&btnG=Se

1999: Women Near You
Meet Women Locally, Cool Profiles & Photo Viewing. No Credit Card! I own Darta.net

Chadwick's Official Site
The newly redesigned Chadwicks.com New look, same great value & style! www.Chadwicks.com

99 Most Desirable Women

Online Dating at TRUE.com
Browse Photos & Profiles of Singles for Free & Find Your Perfect Match! www.TRUE.com

"YouTube" Women Love
WiredBarries - The Web's New Music & Healthy Living Network www.WiredBarries.com

John Mark Ockerbloom UNIVERSITY OF PENNSYLVANIA LIBRARIES Jan. 12, 2008
In academic tag-space

Written by herself: literary production by African American women, 1746-1892 / Frances Smith Foster.
Foster, Frances Smith. . Written by herself: literary production by African American women, 1746-1892 / Frances Smith Foster.
Call #: Van Pelt Library PS153.N5 F68 1993

belongs to Harper Project project.
tagged Harper project by jesweds ... on 27-JAN-07

Kaiser Family Foundation
A non-profit, private operating foundation focusing on the major health care issues facing the nation. Topics covered range from health insurance coverage, Medicaid, Medicare, state health policy to minority health, STDs, and women's health policy,

belong to Fundamentals of Epidemiology Resources project.
tagged health medicare state women insurance medicaid foundation organization minorities coverage policy by rodrigue ... on 24-JAN-07

Factors associated with intention to breastfeed among low-income, inner-city pregnant women.
tagged breastfeeding philladelphia articles by laileen ... on 17-JAN-07
In our catalog

Franklin: Penn Library Catalog

Search Request: Subject = women
Search Results: Displaying 1 through 50 of 50 entries.
The strength and the weakness of the subject catalog

• “One researcher… was interested in linguistic studies of the Cockney dialect. He simply typed ‘Cockney’ as a keyword into our catalog… [and] missed most of the linguistic studies….. The proper LC subject heading ‘English language -- Dialects -- England -- London’ rounds up in one categorical grouping all such works scattered by variant keywords-- and variant languages”

– Thomas Mann, “Research at Risk”, in Library Journal online site, article dated June 15, 2005
How do we get there?

Search Request: Subject = cockney
Search Results: Displaying 1 through 50 of 50 entries.

<table>
<thead>
<tr>
<th>#</th>
<th>Titles</th>
<th>Headings</th>
<th>Headings Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>more info</td>
<td>0 Cockpits of airplanes</td>
<td>Library of Congress</td>
</tr>
<tr>
<td>1</td>
<td>more info</td>
<td>0 Cockran, Bourke, 1854-1923</td>
<td>Library of Congress</td>
</tr>
<tr>
<td>1</td>
<td>more info</td>
<td>0 Cockran, W. Bourke (William Bourke), 1854-1923</td>
<td>Library of Congress</td>
</tr>
<tr>
<td>2</td>
<td>Cockran, William Bourke, 1854-1923</td>
<td></td>
<td>Library of Congress</td>
</tr>
<tr>
<td>3</td>
<td>Cockrell, Alan, 1849</td>
<td></td>
<td>Library of Congress</td>
</tr>
<tr>
<td>4</td>
<td>Cockrell, F. M. (Francis Marion), 1834-1915</td>
<td></td>
<td>Library of Congress</td>
</tr>
<tr>
<td>5</td>
<td>Cockrell, Francis Marion, 1834-1915</td>
<td></td>
<td>Library of Congress</td>
</tr>
<tr>
<td>6</td>
<td>Cockrell, Mr. (Francis Marion), 1834-1915</td>
<td></td>
<td>Library of Congress</td>
</tr>
<tr>
<td>7</td>
<td>Cockrell, Senator (Francis Marion), 1834-1915</td>
<td></td>
<td>Library of Congress</td>
</tr>
<tr>
<td>8</td>
<td>Cockrell, Maurice, 1936—Cock and interpretation.</td>
<td></td>
<td>Library of Congress</td>
</tr>
<tr>
<td>9</td>
<td>Cockcroaches</td>
<td></td>
<td>Library of Congress</td>
</tr>
<tr>
<td>10</td>
<td>Cockroaches</td>
<td></td>
<td>Library of Congress</td>
</tr>
</tbody>
</table>
Cataloging is messy
Better browsing with facets
Better browsing with facets

But what are you missing?

Search 'women':
We found 24729 matching items. Limit results to currently available items.

Narrow By Call Number Range:

A - General Works (13)
B - Philosophy, Psychology, Religion (1066)
C - Auxiliary Sciences of History (246)
D - History (General) and History of Europe (633)
E - History: America (747)
F - America: local history (281)
G - Geography, Anthropology, Recreation (465)
H - Social sciences (7617)
J - Political Science (282)
K - Law in general. Comparative and uniform law. Jurisprudence ... (293)
L - Education (715)
M - Music (146)
N - Fine Arts (388)
P - Language and literature (7450)
Q - Science (324)
R - Medicine (471)
S - Agriculture (70)
T - Technology (282)
U - Military science (General) (63)
V - Naval science (14)
Z - Bibliography. Library science. Information resources (ge ... (259)

Narrow Results By:

Subject: Topic
- Women (9985)
- History (5825)
- History and criticism (2681)
- Women authors (2401)
- Social conditions (2355)

Show More ...

Brief View | Full View

1. The book as art: artists' books from the National Museum of Women in the arts
   Author: Wasniewski, Krystyna.
   Published: 2007.
   Format: Book
   Design Library
   N7431 .S58 W37 2007

2. Embracing sisterhood : class, identity, and contemporary Black Women
   Author: McDonald, Kathy Sue.
   Published: 1991.
Problems with LCSH

• Subject headings are expensive and difficult to assign, maintain
  – And are inconsistently assigned across time and collections
• They are difficult to use
  – a >100 year old legacy system, with all the backward compatibility issues, mismatches with expectations that implies
  – They tend not to keep up with ongoing terminology well
• Our patrons aren’t using subject headings-based discovery much
  – Hard to find all the terms that are relevant, or even the first one
  – With the tools we give them, can you blame them? [see critiques by Karen Schneider and others]

• Are the costs worth the benefits?
Some benefits of LCSH

• It’s the metadata and ontology we have at hand
  – That’s the flip side of it being a >100 year old legacy system
  – Many resources of interest are only described by it

• Enables great precision in identifying subject areas
  – Millions of terms (including 200,000+ authorized headings), careful definitions, lots of explicit and implicit relationships
  – Can pinpoint items with subject as main topic more precisely than one can with keyword search
  – Much larger array of effectively controlled areas than tags or keywords

• Ontology can support much richer subject browsing, with good tools
  – Users like to browse (e.g. in stacks) when they can easily do so
  – Allows level of specificity not easily found with facets (e.g. general works on a topic)
  – May also allow useful browsing, adaptation when assigning headings

• Can we revive focused topical browsing with dispersed collections?
Subject maps: It’s the network

• Organized networks of well-defined subject terms and relationships between them
  – Applied and customized to particular collections of items

• Clustered, side-by-side displays of subjects, items, and relationships in ordinary text-based Web browsers
  – Other display options also possible

• Designed to function like geographic maps
  – Get users to a [subject] area they’re interested in
  – Let them see what’s there, and in nearby areas, at a glance
  – Show them routes to get to nearby areas, so they can home in on what’s most useful to them
  – Detail and layout helps compensate for
    » Imprecise cataloging (“It’s near the underground station”)
    » Differences in concepts and names (“Subway? Trolley? Regional rail?”)

• Work well with detailed ontologies like LCSH
Subject maps on a small collection

• The Online Books Page
  – 30,000+ items
  – 25,000+ subjects
  – Subject maps in production there since 2006

• Live online demo:
  – http://onlinebooks.library.upenn.edu/subjects.html

• Live laptop demo:
  – http://127.0.0.1/books/subjects.html
  – (it’s just as fast, on this MacBook)
Building subject maps

Build them automatically:

• First, create a collection-independent topic map based on authorities
• Second, tweak it based on local needs and data
  – “Tweaks” can overlay, inform centrally maintained authorities
  – Sources include usage data, domain-specific knowledge bases
• Third, adapt it to a particular [set of] collection[s]
  – Start by mining bibliographic data
  – Add terms not already in collection-independent version
  – Prune “dead ends” from collection-independent version
  – Apply rules to create additional subject relationships
Where do terms and relationships come from?

• From bibliographic data
  – Terms used in a catalog generally assumed to be valid
  – If terms not present, normalization may be possible
  – For relationships, consider assignment patterns: e.g. name as first subject followed by “<topic> -- Biography”

• From authority files and other “canonical” data
  – “BT”, “NT”, “UF”; lists of state names and abbreviations

• From user data
  – Look at search logs, tag usage and correlations, etc.

• From facet analysis
  – Which facets can be added or dropped? Which can have broader or narrower terms substituted? Permutations?

• From lexical and domain analysis
  – If “X and Y” relates to Y, it probably also relates to X
  – Recognizing geographic terms and abbreviations

• Inclusion rules can be added or removed as required
Subject maps on a large collection

• Franklin, the Penn Library catalog
  – Over 3 million items
  – Over 1 million subject terms
  – Subject maps built, demonstrated, now being tested
    » Can be newly generated from harvested data in ~40 minutes on up-to-date hardware with 8GB memory

• Live online demo:
  – http://devplw.library.upenn.edu/cgi-bin/sdi/vbook/browse?type=lcsubb&key=Women
  – (Now only available for limited times like this talk)

• Or see screenshot on the next slide
Subject maps on Franklin

Franklin Discovery - from the Penn Library Catalog

Browsing subject area: Women (About this browser)
You can also browse an alphabetical list from this subject or from:

Women
Here are entered works on the human female. Works on female organisms in general are entered under Females.

Broader terms:
- Anthropology
- Females
- Man
- Sociology

Related term:
- Misogyny

Narrower terms:
- Women -- 19th century
- Women -- 20th century
- Women -- Abstracts

Filed under: Women

<table>
<thead>
<tr>
<th>Full Title</th>
<th>Author</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>: escrita y dirigida por Benito Zambrano</td>
<td>Louann, 1952</td>
<td></td>
</tr>
<tr>
<td>Devaki [videorecording] / presented by K D Singh</td>
<td>Brizendine,</td>
<td>2006</td>
</tr>
<tr>
<td>: produced by Alchemist Ltd. ; directed by Bagnadny</td>
<td>Louann, 1952</td>
<td></td>
</tr>
<tr>
<td>Novia que te veo [videorecording] = Like a bride /</td>
<td>Brizendine,</td>
<td>2006</td>
</tr>
<tr>
<td>producida por Instituto Mexicano de Cinematograf[ia] y Punto de Fomento a la Cualidad Cinematograf[ica]</td>
<td>Louann, 1952</td>
<td></td>
</tr>
<tr>
<td>Arte Nuevo ; screenplay by Hugo Hirsch ; Latina Schyff film</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female brain / Louann Brizendine</td>
<td>Brizendine,</td>
<td>2006</td>
</tr>
<tr>
<td>Brizendine, Louann, 1952</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What Lacan said about women : a psychoanalytic study / Colette Soler</td>
<td>Louann,</td>
<td>2006</td>
</tr>
<tr>
<td>: translated by John Holland</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Androgyny and reproduction alone / [edited by]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Find: Find Next Find Previous Highlight all Match case Phrase not found

Done
Integrating subject maps with a library catalog

- Our ILS (Voyager) gives us a few important tools
  - SQL: Data-mine and query authority and bibliographic metadata
  - JavaScript: Rewrite catalog web pages to link out to map tools
  - URLs with fielded queries: Link back to the catalog from maps

- We’ve already used these techniques to integrate PennTags with our existing Franklin catalog
- Better: Subject map-aware catalogs
- Better still: ILS’s with well-defined APIs providing data and services to subject map and other displays
  - That’s the subject of an ongoing Digital Library Federation initiative
A larger repertoire of discovery tools

Subject maps
Facets

Full text search
Social tagging
A larger repertoire of discovery tools

Subject maps ——— Facets

Full text search ——— Social tagging

* Subject maps, non-subject facets (e.g. media type, language, availability), can be used simultaneously
* Subject maps can be annotated when built so only terms that apply under arbitrary facet limitations get shown
A larger repertoire of discovery tools

Subject maps

Facets

Full text search

Social tagging

- Correlated with formal ontology terms (perhaps automatically?)
- Useful both as leadin to catalog, leadout to user-tagged items
A larger repertoire of discovery tools

Subject maps

Facets

Full text search

Social tagging

- Search of full text (or metadata) can be used to identify frequently occurring subjects to browse
- Or, full text search limit results to items falling within a particular subject cluster
Some early promising signs and speculations

• Since maps introduced to The Online Books Page, users making substantially heavier use of subject browsing
  – And going deeper into the collection than before
  – Adding basic geographic smarts was easy

• Demos with Franklin, multiple sources show feasibility of building, using maps with larger collections
  – Noise filtering / normalization an issue with any large collection
  – Scaling issues seem to be increasingly tractable
    » As memory gets bigger and cheaper, map building for larger collections can be done on cheaper hardware
    » Map navigation is computationally cheap already (since it’s only looks at local portions of map)
    » We’re looking at more advanced techniques for presenting heavily populated map portions more effectively to users

• Could we scale this up to the global level?
  – Why not include what your users can get via ILL, other means?
What would we like to do next?

- Put full Penn catalog maps in front of users
  - Will require some refinement of maps, tweaking of Voyager, possibly normalization of obsolete/improper terms
  - User studies could be useful as well, not sure we’ll do this

- Try combining it with ongoing facet work
  - Test idea of subject maps that adapt with facet restrictions
  - See if we can combine it with Lucene/Solr views

- Develop smarter map building and display techniques

- Create a subject map builders toolkit
  - Configurable for different authorities, collections, rule sets
    - Authorities web service could be useful here
  - Make it easier to fix headings, add tweaks, correlate with tags…

- Think about how our users will discover the best resources (ours or others’) in a networked, highly digital world
Conclusions

- Subject browsing is an important mechanism for resource discovery
- Detailed ontologies like Library of Congress Subject Headings can form the basis for useful browsing, if used with appropriate tools
- Subject maps are useful and practical tools for exploring collections with complex ontologies, maintaining those ontologies

Subject maps build on library strengths to better connect our users with the resources they need in a distributed, digitized information environment

- For more information (demos, whitepapers...):
  - Web: http://labs.library.upenn.edu/subjectmaps/
  - Email: ockerblo@pobox.upenn.edu

- Thanks!