

Transaction Log Analysis of User Actions in a Faceted Library Catalog Interface

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ABSTRACT

In this paper, we report preliminary findings from an analysis of searcher actions in a faceted library catalog. In this comparative laboratory study (N=18) searchers were asked to conduct exploratory searches. For the control group facet use accounted for approximately 14% of logged actions. For participants who were shown a 60 second video about how to use facets, facet use accounted for approximately 21% of actions. We also observed differences in sequences of actions that participants undertook during their searches that suggest that searchers who watched the facet training video used facets at key points in their search process such as just after issuing a search and just before adding an item to their “book bag”.

INTRODUCTION

Faceted search interfaces (Tunkelang, 2009; Yee et al., 2003) are commonly used to support users’ needs to conduct iterative, exploratory searches (White et al. 2006). Search interfaces with hierarchical facets are often found on shopping and entertainment websites where users are likely to be familiar with the metadata used for the facet values, such as clothing styles or movie genres. Recently, libraries have started incorporating faceted search features into their on-line public access catalogs (OPACs) using facets such as Library of Congress subject headings and other metadata.

Previous research on facet use in OPACs indicates their usefulness. Lown and Hemminger (2009) examined log data from a four month period of real-world use of North Carolina State University’s OPAC and found that facets were used to refine the results of searches in 34% of the sessions. They also found that facet refinement of a search made up 18% of the overall log requests. In our work using eye-tracking to investigate faceted OPAC use, we have found that users do spend considerable time looking at the facets (Kules et al., 2009; Kules and Capra, 2010) suggesting that they play an important role in the search process.

The research presented here focuses on how users interact with faceted OPAC interfaces to conduct exploratory searches. Specifically, we are interested in improving our understanding of how faceted interfaces affect searcher actions and tactics.

The research questions investigated in this study address aspects of these objectives:

1. How often do searchers use facets for exploratory search in a library catalog?
2. Do searcher actions differ when training is provided?
3. What sequences of actions are used, and do they differ when training is provided?

METHOD

To examine the research questions, we conducted a laboratory study in which participants were given representative search tasks and asked to conduct searches using a custom-built, Web-based, faceted OPAC interface.

Participants

The study was conducted at Catholic University using an IRB approved protocol. Eighteen (18) undergraduate students were recruited as participants (8 male, 10 female). Participants represented 11 different major areas of study. Eleven participants were 20 or under; seven were 21-30. Most participants (15) conducted a web search at least every day and fourteen (14) conducted a library catalog search at least once per month. Participants were provided a small honorarium for participation.

Study Design

The data presented here was collected as part of a broader study designed to investigate aspects of how facets are used in exploratory search and the effects of different training conditions on the use of the interface. Two methods of data collection were used while participants completed the search tasks: 1) user actions with the interface were logged, and 2) users’ eye movements were tracked using a Tobii eye-tracking system. In this paper, we describe the overall study design, but only present preliminary results from analysis of the log of user actions.

Participants were assigned to one of three training conditions: a control group with no training, a group that was shown a short training video about facet use, and a group who did not see the video, but was given an interface that included help links labeled “What’s This”. There were six participants in each group. All participants conducted the same six searches based on representative task scenarios. Search task orders were counterbalanced within each training condition. Searches were conducted in a quiet

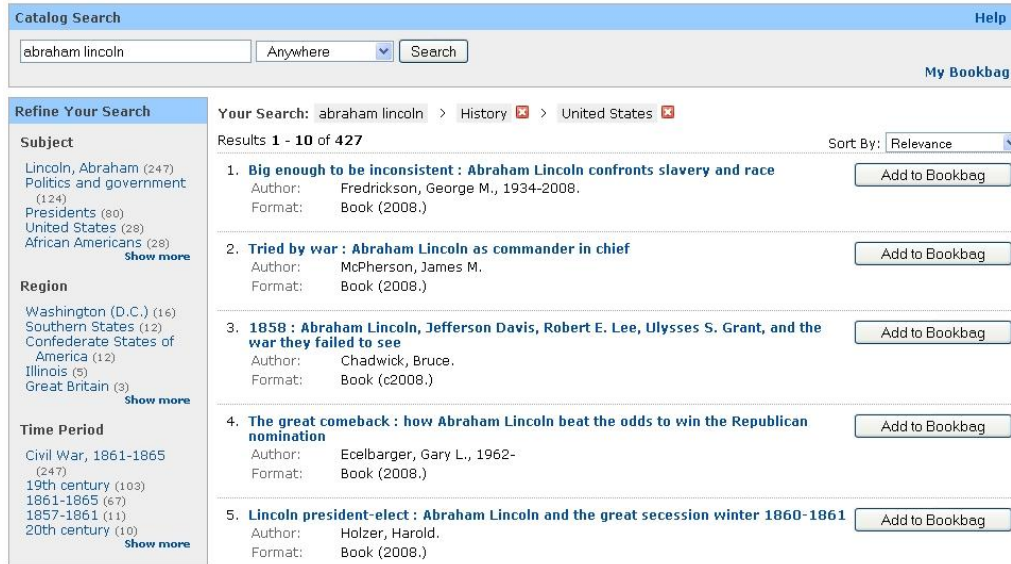


Figure 1. Faceted OPAC Interface

room using a Web browser (Internet Explorer 7) running on a Windows XP computer attached to the eye-tracker. After each search, participants completed a brief questionnaire.

The six search tasks were designed to be relevant to an undergraduate student doing research for an academic paper. For example, one task was:

“Imagine you are taking a class called ‘Feminism in the United States’. For this class you need to write a research paper on some aspect of the U.S. feminist movement, but have yet to decide on a topic. Use the catalog to find two possible topics for your paper. Then use the catalog to find three books for each topic so that you might make a decision as to which topic to write about.”

Procedure

Participants were greeted, given a brief introduction to the study and asked to sign an informed consent form. Next, all participants were shown a 60 second video that described how to complete the tasks by placing selected items in the “book bag” Participants in the facet training video group were shown an additional 60 seconds of video that explained how to use the facets. After watching the videos, the eye-tracker was calibrated and participants began the six search tasks. After each task, participants answered a questionnaire about their experience. After completing all six tasks, a retrospective interview was conducted. Overall, the sessions lasted about one and a half hours from start to finish.

Analysis

As users interacted with the faceted library interface using the Web browser, a back-end PHP script logged a variety of user actions. The summary counts and statistics presented

in this paper were generated by parsing these log files and tallying recorded actions. Actions logged are described in Table 1.

Table 1. Description of Actions Logged

SEARCH	user submitted a query via the search box at the top of the page
BOOKBAGADD	user added/removed an item in their bookbag via its corresponding button
BOOKBAGREMOVE	user clicked an item's title on the search results page, which will render the item's detail page
ITEMCLICK	user clicked a facet, which will apply the facet to the current results set
FACETADD	user clicked the "x" link to remove a facet from the results set
FACETREMOVE	user clicked the "Show more", which will display more facet values
FACETEXPAND	user clicked the "Show less" link to return a facet to show five values
FACETCOLLAPSE	user clicked a paging link to move to a different page of search results
PAGE	user chose a sort option from the "Sort By:" dropdown
SORT	user clicked "My Bookbag" link at the top part of the page
BOOKBAGVIEW	user clicked "Back to Search Results" link
RETURNTORESULTS	user clicked the "Help" link
HELPVIEW	

RESULTS

In this section, we present preliminary results of descriptive statistics about overall frequencies of logged actions and about pairwise sequences of actions (i.e. transitions from one action to another).

Overall Actions

The 18 participants each completed six tasks for a total of 108 task instances. Table 1 summarizes descriptive statistics about the top actions recorded in the logs for the 108 task instances.

Table 2. Summary of Logged Actions for all Task Instances

Action	Count	% total	Avg per task instance
BOOKBAGADD	965	29%	8.9
FACETADD	536	16%	5.0
PAGE	487	15%	4.5
SEARCH	459	14%	4.3
FACETREMOVE	192	6%	1.8
Other actions	683	21%	6.3
Total of all actions	3322	100%	30.8

Adding an item to the book bag made up 29% of the overall actions and on average, participants added 8.9 items to their book bag per task. Participants also added on average 5.0 facets per task and used moved to a new page of results about 4.5 times per task. Searches made up about 14% of the overall actions and there were on average 4.3 searches per task. These results indicate that participants were engaged with the tasks and did make use of the features provided in the interface.

Figure 2 shows a comparison of the five actions for each interface condition. Each bar in the chart represents data from the six participants in that condition completing the six tasks (a total of 36 task instances per bar). As can be seen in the chart, the training video condition had higher use of facets (e.g. FACETADD and FACETREMOVE) than the other two conditions. The results also suggest that the training video condition had slightly less use of search and paging actions.

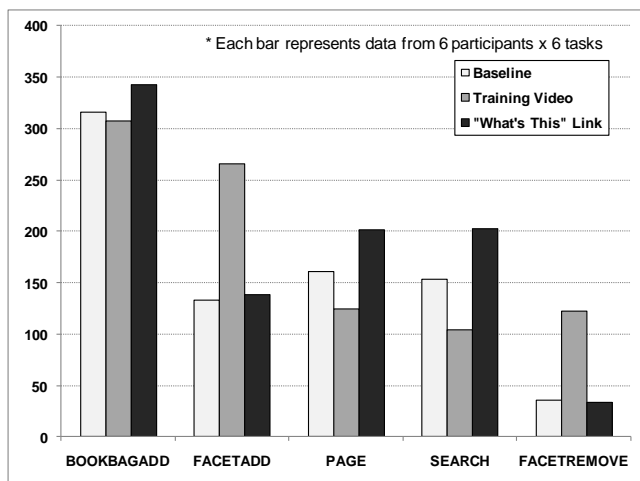


Figure 2. Summary Counts of Top Five Actions Overall

Adding facets to refine a search made up 14% of the total logged actions for the baseline condition, 21% for the training video condition, and 13% for the “What’s This”

help link condition. Issuing a search accounted for 16%, 8%, and 19% of the actions in each condition, respectively.

Pairwise Sequences of Actions

Figure 3 shows a summary of the top 10 pairwise sequences of actions (transitions) overall. As with the individual actions, for each interface condition, we tallied the logged actions for the six participants in that condition and present the top 10 pairs of actions overall as bars in Figure 3. These represent approximately 55% of all pairs. The chart shows that the BOOKBAGADD-BOOKBAGADD pair is most common, with an average of 126 occurrences, or 3.5 per search session. The four next most common pairs, BOOKBAGADD-PAGE, PAGE-PAGE, PAGE-BOOKBAGADD, and FACETADD-BOOKBAGADD occur 61-64 times each, or on average 1.7-1.8 per session. The remaining five pairs, FACETADD-FACETADD, SEARCH-SEARCH, SEARCH-BOOKBAGADD, SEARCH-FACETADD, and SESSIONSTART-SEARCH, occur 36-48 times, or on average 1.0-1.3 times per search session. Note that the SESSIONSTART-SEARCH pair represents the first query submitted at the beginning of each search session.

The prevalence of the BOOKBAGADD-BOOKBAGADD pairs suggests that searchers marked potential items in a “bursty” manner. That is, they would add multiple items to the bookbag one after another with no intervening logged action. We note that the three pairs of actions involving facets were more common in the training condition and that the five pairs that do not involve facets were more prevalent in the non-training conditions. This suggests that searchers in the training condition were more likely use the facets in the course of their exploration. For example, in the training condition, searchers were less likely to issue a query followed immediately by adding a book (SEARCH-BOOKBAGADD) and more likely to follow a query with a facet (SEARCH-FACETADD) and a facet with a book add (FACETADD-BOOKBAGADD).

Limitations

The results we present here are preliminary in nature. We mainly present summary count statistics of logged actions. These counts and comparisons provide insights into the data, but more rigorous comparative analysis will be needed to assess and establish statistically significance differences.

One limitation of this analysis is that the data does not capture use of the Back button, because this was logged at the server. The tasks we gave participants were grounded in actual search data and framed in a familiar context of writing an undergraduate research paper. However, these type of task represent a fairly narrow slice of the overall space of exploratory search tasks that might be done with a faceted OPAC interface. A broader range of task scenarios, perhaps including participant-motivated searches would be useful to explore.

DISCUSSION AND CONCLUSION

Using facets to refine search results made up 16% of the overall actions logged in this study. Although the data are not directly comparable due to differences in methods and data collection, Lown and Hemminger (2009) reported facet refinement made up 18% of the overall actions logged in a study of four months of data from the “live” OPAC and NCSU. Taken together, we believe that the results of these studies indicate the important role that facets play in the searching for information in a library OPAC.

We also found evidence that even simple training on the use of facets may increase their use. Participants in our study who received 60 seconds of video training on facet use made greater use of facets in conducting their searches than those participants who did not receive the training. While it is possible this was due to an experimentation effect, it suggests strategies for provide training to library patrons.

Investigation of pairwise sequences of actions suggests that participants who received training used facets at key points in their searches where participants in the non-training conditions issued additional search or paging actions. For example, participants in the training condition used facets more often just after issuing a search and just before adding an item to their “book bag”. This suggests that these participants were using facets as an additional search refinement tactic at their disposal.

ACKNOWLEDGEMENTS

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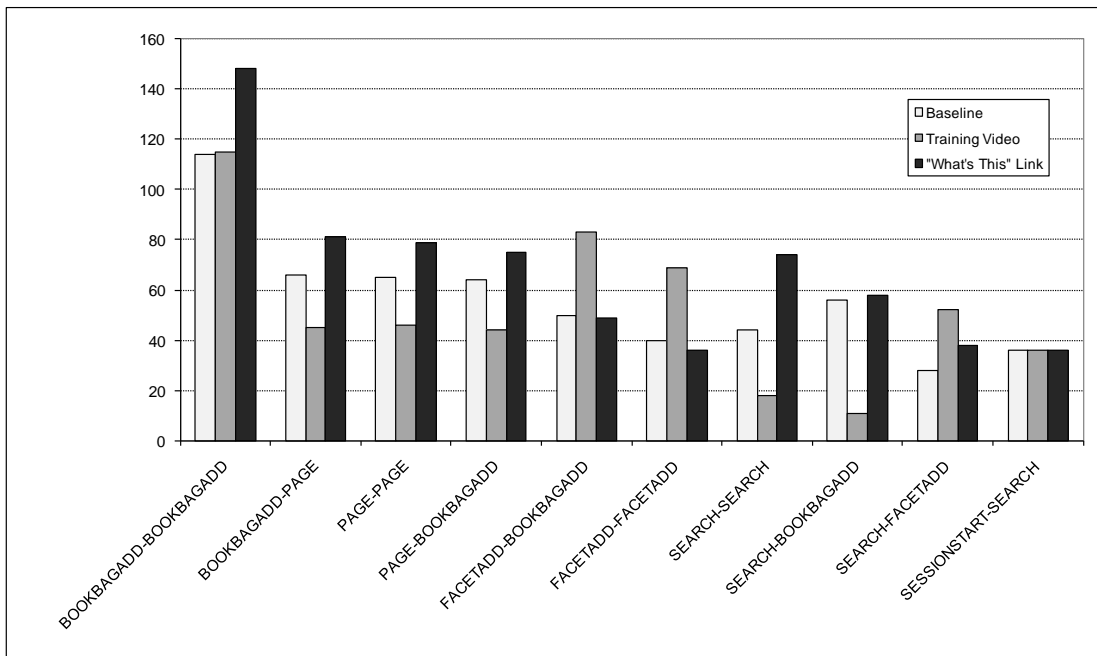


Figure 3. Pairwise Sequences of Actions (transitions)