

UIs for Faceted Navigation

Recent Advances and Remaining Open Problems

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ABSTRACT

Faceted navigation is a proven technique for supporting exploration and discovery within an information collection. The underlying data model is simple enough to make navigation understandable while at the same time rich enough to make navigation flexible in a wide range of domains. Nonetheless, there remain issues in both the presentation of navigation options in the interface and in how to extend the model to allow more flexible discovery while still retaining understandability. This paper explores both of these issues.

1. INTRODUCTION

Faceted navigation is a proven technique for supporting exploration and discovery [8, 4] and has become enormously popular for integrating navigation and search on vertical websites. Its popularity is attested to in part by the fact that content management architectures, such as Solr and Drupal, contain support for faceted navigation. Despite its widespread use, there are design challenges inherent in building the interface for faceted navigation. The two biggest challenges are: (i) poor choices in the design can lead to decreased usability of the interface, and (ii) large category systems, especially subject-oriented category systems, are still not well-supported in the interface. This paper discusses these issues in the context of some recent innovations in the design space for faceted navigation and discusses some future directions.

2. BACKGROUND AND TERMINOLOGY

The starting assumption is that the overall goals of faceted navigation are to support flexible movement through the information space, provide suggestions of navigation choices at each point in the search process, provide seamless integration with keyword search, allow for fluid switching between refining and expanding, prevent empty result sets, and provide a feeling of control and understanding without confusion.

Facets refer to categories used to characterize information items in a collection. A facet can be flat or hierarchical; in either case, a set of labels is associated with each facet. Portions of the hierarchy within a facet is that facet's sub-hierarchy. In an information collection that supports faceted search, multiple labels are assigned to each item, as opposed to a strictly hierarchical system in which items are placed into single categories or folders. (In this respect, faceted

information structures bear some relationship to social annotations, or tagging, that is a popular user-participation form of metadata assignment today. In fact, I believe that tags can provide an excellent basis for the formation of better organized faceted navigation structures, but that is a different topic.)

In the faceted navigation interface, when a label is selected by a user, all items that have been assigned to that label are retrieved, so selecting a label within a facet hierarchy is equivalent to querying on a disjunction over all the labels beneath the selected one. When labels from different parts of the hierarchy are selected, the system in effect builds a conjunct of disjuncts over the selected labels and their subcategories.

In an earlier paper [3], I laid out some issues surrounding the design of faceted interfaces and their interface solutions. In particular, that paper discussed how to clarify navigation within and across facet hierarchies, how to represent history (breadcrumb trails), the importance of incorporating keyword search within the faceted structure, the importance of details in graphic design, and innovations in facet exposure choices as put forward by eBay Express.

In this paper, I extend this discussion to reflect advances that have occurred in the interim, as well as to underscore some of the remaining issues.

3. MIXING CONCEPTS WITHIN FACETS

Faceted navigation generally works best if the facets are conceptually orthogonal and the item assignment is responsible for mixing and matching them. However, there are many cases in which some concepts mix with only a subset of other concepts, and so grouping them in the interface might make the relationships clearer. Getty Images' faceted interface has an interesting way of doing this. Figure 1 shows facets about characteristics of people grouped all in one super-facet. This is similarly done for Style divided into Composition, Viewpoint, and Image Technique. Although conceptually this approach is not different than the standard approach (as seen in Flamenco [8] and many commercial sites), the visual grouping of related but orthogonal modifiers seems like a good idea. Unfortunately, there is a substantial problem with the facet organization in this interface. The grouping called Keywords consists of both Concept and Subject, and these in turn contain a hodgepodge of subject categories. Thus this interface does not address the problem of how to deal with a large number of subject labels.



Figure 1: Getty Images’ faceted navigation interface uses a graphic design to visually group related facets together.

4. INTEGRATING “SMARTS” INTO SEARCH USER INTERFACES

Aided by support for fast client-side processing, it has become feasible to incorporate information related to the users’ query in dynamic, and sometimes subtle ways. Below I discuss two exciting examples of this development as they intersect with faceted navigation interfaces.

4.1 Auto-Suggest Search Within Facets

Auto-suggest, aka auto-compete, aka dynamic term suggestions is a mechanism in which, as a user is typing a query term into the entry box, queries that are lexically related and that have been asked by other searchers in the past are shown beneath the entry form [1]. . This is an attempt to help the user finish formulating their query by showing what should be highly relevant terms, and seems to be a generally a good idea that should be used wherever possible. This is a rare case in which there have been few if any usability studies (the closest to it that I know of is by White and Marchionini [7]), but by observation and anecdote, I am willing to claim that the usability appears to be very high.

A twist on the idea is to provide separate autocomplete entry forms for each facet [2]. This is especially useful for facets with very large numbers of labels that cannot be organized into a hierarchy; a common example is names of authors in a bibliographic collection. But even for facets with fewer labels, dynamic suggestions of terms related to the letters typed so far seems to be a helpful and usable feature.

4.2 Keyword Search Terms Affecting Facet Label Ordering

Before discussing this feature, some background information is needed. As discussed in an earlier paper [3], eBay Express introduced a number of innovations in their method of presenting faceted metadata. Rather than placing the facets on the side, which can require scrolling by the user, they place a small number of facets (four or five) in the interface “sweet spot” across the top of the page, showing only a few labels per facet, and a *More...* link to see the rest. Clicking on this link brings up a dialog box containing checkboxes, allowing the user to create an OR (disjunction) over the choices within one facet. The designers determined in advance (largely through query logs and click logs) which facets are most important for each major product type, and initially expose those facets only, with a compressed list of additional facets on the line below. Selecting a facet adds it to the query representation (the breadcrumb) and causes that facet to disappear from the main canvas, and be replaced by one of those not expanded yet.

Another innovation was to employ cleverness in the handling of keyword queries. A query on “women’s rebocks” within the Shoe product space would show the corresponding facets *Type > women’s* and *Brand > Rebock* selected already within the query breadcrumb. This is terrific when it works, of course, but in many cases the mapping might not be correct.

Recently the lifestyle website Yelp converted its navigation interface to eBay Express-style faceted navigation, adding in some innovations of their own (see Figure 2). To facilitate more multi-select options, the interface has a clever blending of checkboxes and hyperlinks (but unfortunately does not support hierarchical facets). Some facet labels start out with checkboxes (such as Cities), indicating the ability to do a disjunction on the facet from the start, while others show a hyperlink (such as Distance Away), indicating that only one choice can be made at a time in the facet. After one of these choices is made, it filters the results, but is not added to the query explicitly; rather, the other choices continue to be shown as hyperlinks with the currently selected choice shown in bold. This is a departure from the standard approach in which selecting a label removes the other choices for that label.

On the downside, additional categories are tucked away under Features, which suggests that the additional ones will rarely be seen or used. This view also does not show previews of number of hits; it is potentially confusing to do so when disjunctions are allowed; this is a tradeoff in the interface design that must be weighed.

But the innovation of interest here is that Yelp modifies the use of keyword search, using the terms typed in to change the order of labels shown within facets. For example, searching for “restaurants” within the area of “kirkland, wa” returns facets labeled Sort By (best match or best reviews), Cities, Distance, Features, Price, and Category. In the case of the screenshot, the latter is type of restaurant; initially the first few types of restaurant shown are Chinese, Indian/Pakistani, Japanese, and Sushi Bars, with a link to show more. However, if instead the initial query is “italian restaurants” the labels shown under Category are Italian, Restaurants, Pizza, and Mexican. If the query is changed to “italian restaurants”, the choices shown are Dim Sum, Chinese, Restaurants, Bakeries, Asian Fusion, and other Asian

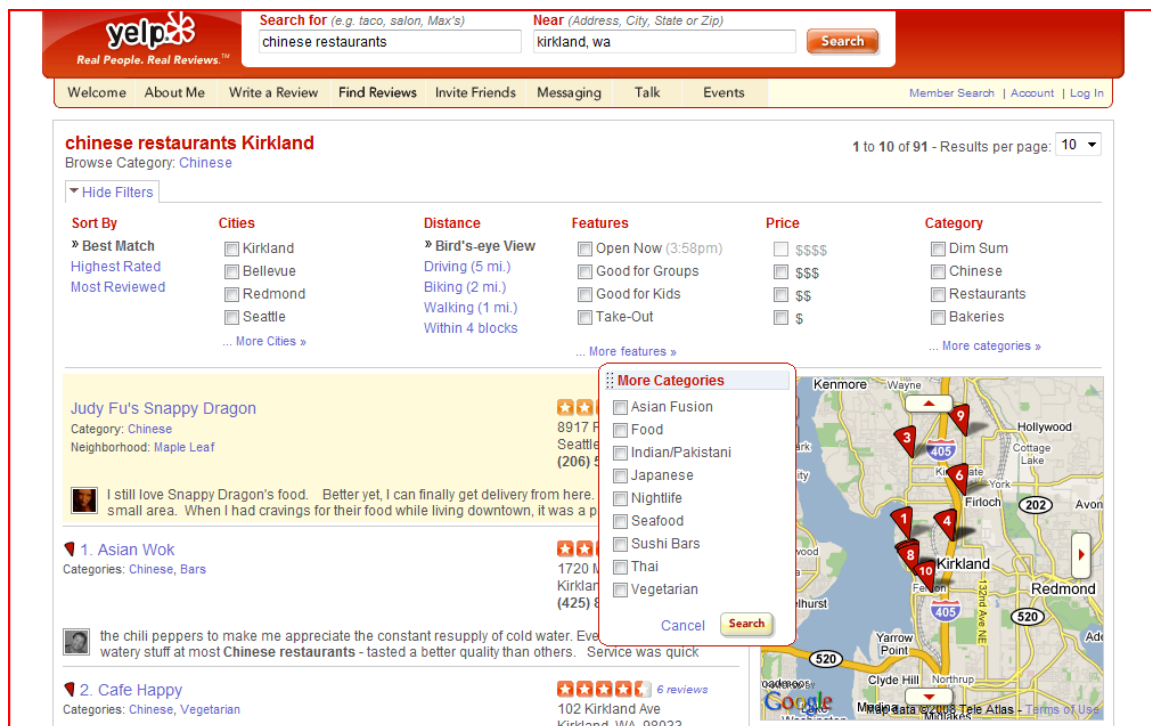


Figure 2: Yelp’s new faceted search interface, modeled after that of eBay Express, but with some innovations (see text).

food categories.

Thus, this interface modifies the labels shown beneath the facets to match similar but expanded concepts related to the keyword query. It does not move out of the Restaurants domain into other topics such as Shopping, which would not be appropriate. But a query on “Asian” alone changes the Category facet to show choices such as Grocery alongside restaurant types such as Asian Fusion.

How does this behavior differ from standard (Flamenco-style) faceted navigation when given a keyword query? In Flamenco, the items that match the query determine which facet labels are shown. So a query on “chinese” would return all documents that contain that word or are assigned that label, and would show the aggregation of facet labels that are assigned to those retrieved items. These may well include Grocery and Dim Sum. But Yelp appears to be doing something more calculated. For example, a query on “dim sum” shows the categories Dim Sum, Chinese, Seafood, Food, and Restaurants, but the hits returned contain other categories including Grocery and Korean.

This interface also eliminates entire facets when not applicable to the chosen category. Choosing Beauty & Spas eliminates the Meals Served facet and brings up the By Appointment Only facet, which is not shown for Groceries. However, the mechanism does not work perfectly. For example, Beauty Salon & Spa also brings up Nightlife, Nurseries & Gardening, and Wineries. Selecting Beauty and Spa along with Wineries and Takes Credit Cards brings up an interesting collection.

5. FACETS ON MOBILE INTERFACES

Can faceted navigation be moved to the small interfaces

of mobile devices? The Fathumb project at Microsoft Research [5] attempts to do just that, with a clever restriction on the number of facets, using positioning to mirror that of the number pad of a typical cell phone (see Figure 3). The results are promising, although hampered by the fact that the interface lends itself better to a touch screen than the indirection of clicking on the keyboard. The design also incorporates a subtle visualization to help indicate where in the navigation the user is, but as is often the case with such things, the participants in the lab study did not notice the visualization, or if they did, did not understand it (personal communication, Amy Karlson). This might change with further exposure to the design.

6. VISUALIZATIONS OF FACETED NAVIGATION

There have been a number of fascinating visualizations of faceted navigation, including a whimsical one from the WeFeelFine project (see Figure 4) and the FacetMap project from Microsoft Research [6]. These are visually engaging but take up a lot of screen space, so it is unclear what their ultimate uptake will be.

7. EXTENDING THE FACETED MODEL

Faceted navigation allows for flexible moves within a collection, but could be limiting for more ambitious information discovery tasks. In what ways can the model be extended but still retain the understandability needed by non-expert searchers? A full-fledged knowledge representation is too complex, but a representation that conservatively extends the design might be useful.

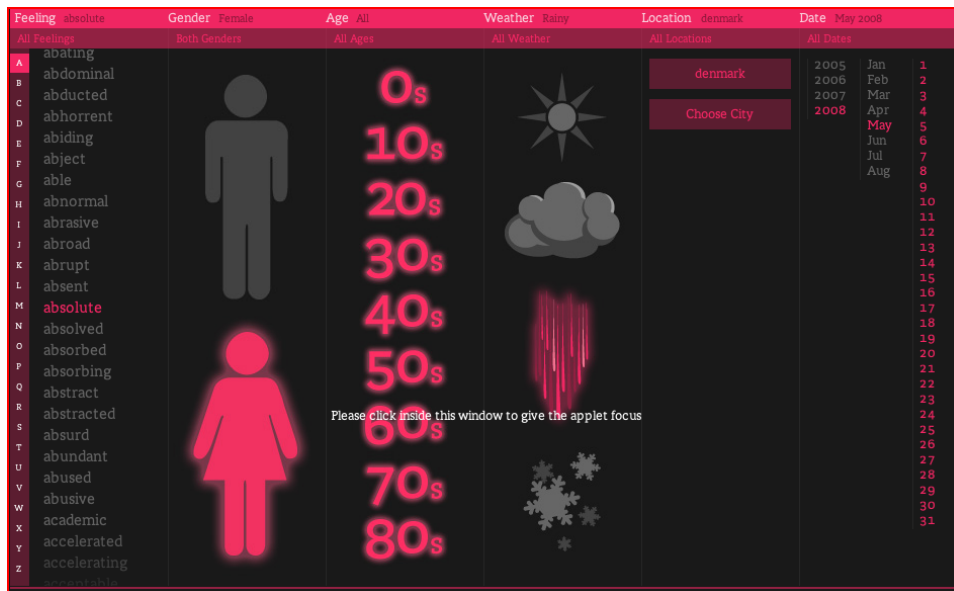


Figure 4: The whimsical faceted attribute selector from wefeelfine.org

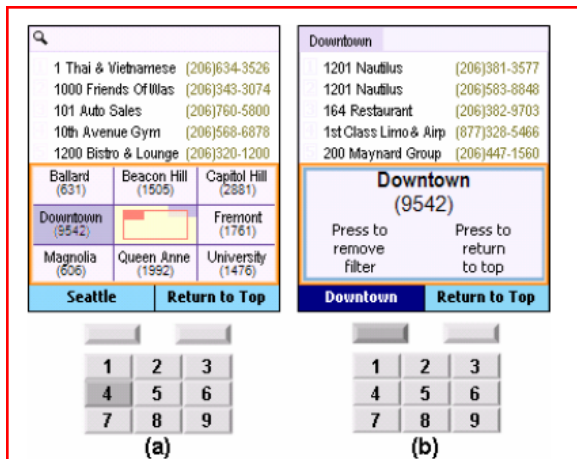


Figure 3: The FaThumb faceted interface [5] for mobile devices.



Figure 5: Tags, organized associationally and by "subject" at LibraryThing.com.

Some websites offer alternative exploration systems alongside the faceted one; Getty Images is experimenting with a design they call Catalyst. In this approach, entering one search term brings up a list of related terms in an alphabetical tag cloud. The user is asked to drag interesting terms into a selection box. The LibraryThing website shows associated terms derived from user-supplied tags, or social annotations (see Figure 6). This kind of approach might be useful for giving inspiration or brainstorming ideas, but the categories are conceptually and visually disorganized and so most likely can be improved upon.

An example of such an improvement can be seen in the work of Zelevinsky et al. of Endeca [9], who describe a promising alternative method for selecting which subject-related terms to show, in a flat list, alongside search results and conventional facets (see Figure 5). This might be further improved by adding hierarchy to the subject labels and showing more of them. It would be interesting to compare showing only the most descriptive subject terms that match the query, and then letting users navigate into relevant sub-hierarchical facets corresponding to such terms, to the standard approach of showing all the facets initially.

More recently, Huynh introduced the Parallax navigation interface over metaweb/freebase data which attempts to allow navigation of this structured data along facets as well as additional dimensions within different concept groups (see Figure 7, from <http://mqlx.com/david/parallax/>). Although a promising start, it is hard to see which combinations will yield results, and seems somewhat limited by a sparsity in the number of connections allowable. But it does seem like a good start in this general direction.

8. CONCLUSIONS

Designers continue to innovate and improve the faceted navigation paradigm. However, the large-subject-space problem continues to be a tough nut to crack. Acquisition of faceted subject metadata is also a problem, although social tagging shows promise as a means towards building such



Figure 6: Using an algorithm to select relevant subject keywords, based on author keywords, for a digital library, from [9].



Figure 7: The Parallax interface extending the faceted model to related links, using structured Freebase data from MetaWeb.

structure.

Mobile computing continues to grow in popularity, and it is still an open question if faceted navigation is well-suited for the small screen. A modified variant as seen in the Fathumb project provides an encouraging direction to follow.

Information visualization is becoming increasingly prevalent for understanding and explaining information. Faceted navigation can be made more visually appealing with enhanced graphical displays, but to date it is not clear that these views enhance usability or substantially increase the number of categories that can be easily navigated.

Finally, the time has arrived to find innovative but understandable ways to extend the faceted model while at the same time retaining its essential usability. Different designers are experimenting with this but no clear good idea has emerged yet.

9. REFERENCES

- [1] H. Bast and I. Weber. Type less, find more: fast autocompletion search with a succinct index. In *Proceedings of the 29th annual international ACM SIGIR conference on Research and development in information retrieval*, pages 364–371. ACM New York, NY, USA, 2006.
- [2] H. Bast and I. Weber. When You’re Lost for Words: Faceted Search with Autocompletion. *ACM SIGIR Workshop on Faceted Search*, 2006.
- [3] M. Hearst. Design Recommendations for Hierarchical Faceted Search Interfaces. *ACM SIGIR Workshop on Faceted Search*, 2006.
- [4] M. A. Hearst, J. English, R. Sinha, K. Swearingen, and K.-P. Yee. Finding the flow in web site search. *Communications of the ACM*, 45(9), September 2002.
- [5] A. Karlson, G. Robertson, D. Robbins, M. Czerwinski, and G. Smith. FaThumb: a facet-based interface for mobile search. *Proceedings of the SIGCHI conference on Human Factors in computing systems*, pages 711–720, 2006.
- [6] G. Smith, M. Czerwinski, B. Meyers, D. Robbins, G. Robertson, and D. Tan. FacetMap: A Scalable Search and Browse Visualization. *IEEE Transactions On Visualization And Computer Graphics*, pages 797–804, 2006.
- [7] R. White and G. Marchionini. Examining the effectiveness of real-time query expansion. *Information Processing and Management*, 43(3):685–704, 2007.
- [8] K. Yee, K. Swearingen, K. Li, and M. Hearst. Faceted metadata for image search and browsing. *Proceedings of the SIGCHI conference on Human factors in computing systems*, pages 401–408, 2003.
- [9] V. Zelevinsky, J. Wang, and D. Tunkelang. Supporting Exploratory Search for the ACM Digital Library. *Workshop on Human-Computer Interaction and Information Retrieval (HCIR’08)*, October 2008.