Social Navigation Support for Groups in a Community-Based Educational Portal

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Abstract. This work seeks to enhance a user's experience in a digital library using group-based social navigation. Ensemble is a portal focusing on computing education as part of the US National Science Digital Library providing access to a large amount of learning materials and resources for education in Science, Technology, Engineering and Mathematics. With so many resources and so many contributing groups, we are seeking an effective way to guide users to find the right resource(s) by using group-based social navigation. This poster demonstrates how group-based social navigation can be used to extend digital library portals and how it can be used to guide portal users to valuable resources.

Keywords: social navigation, digital library, portal, navigation support

1 Introduction: Social Navigation in Ensemble

It has been recognized that users of digital libraries might need help locating interesting and relevant resources. In real libraries this help is usually provided by librarians but digital libraries typically rely on various automatic guidance approaches such as resource recommendation and adaptive navigation support. Social navigation [4] - a specific kind of social information access [1] - has been recognized as one approach for automatic guidance in digital libraries [2]. Social navigation collects traces of past users' interactions with the system and uses it to provide navigation support to current users. For example, a relatively simple, yet useful social navigation approach known as traffic-based social navigation [3], collects and displays the browsing behavior of past users to indicate the popularity of resources. This kind of social navigation has been used and explored in the context of our work developing the *Ensemble* educational digital library [2].

Ensemble is a portal for computing educators in the US National Science Digital Library[1] (NSDL): www.computingportal.org. The portal presents easy access to recognized collections and tools. It is also a central meeting place for communities who are interested in various aspects of computing education; over thirty communities are now active. Collections and communities are equally important for the portal. The original focus of Ensemble social navigation efforts was providing navigation support to *educational resources* in the portal collections. Since resources form a relatively

[1] http://nsdl.org/

straightforward and homogeneous space, the traditional traffic-based social navigation approach worked reasonably well. However, our attempts to expand the same social navigation approach to the *community* part of the portal faced additional challenges.

The source of these challenges was the diversity of Ensemble. Different groups feature different kinds of pages (pages, books, resources, blog posts, forums, etc.) and have very different proportions of these resources. For example, some groups are more resource oriented with a relatively large number of resource-type pages, while other groups focus more on communication with few if any resources. Also, groups have very difference sizes and activity levels. This diversity created two problems. First, the traditional approach to provide social navigation between groups (i.e., helping visitors to select most relevant or interesting groups) was not sufficient in a heterogeneous group space. Adding a traffic indicator to the top-level links leading to group pages offered too little help since it couldn't explain which type(s) of pages each group hosted, which of these pages took the majority of user visits, and how frequent were these visit with respect to the size of the groups' total postings. Second, due to very different traffic levels in different groups, a portal-level separation of pages into low-, medium-, and high-traffic pages failed to distinguish pages within group spaces. In large, active groups all page links had high traffic "dark green" annotation, while in smaller and less active groups, all links were annotated white since their traffic did not exceed a portal-level threshold for medium-level traffic. To address these two problems and to provide better support for groups within Ensemble, we developed two extensions to our social navigation approach, presented below.

2. Choosing the Right Group: Group-Level Social Navigation

Given the number of active groups and their differing styles of interaction, a newcomer might find it hard to distinguish communities by relying on the description of the group, number of members, and number of posts. Even for existing users, it may be hard to catch all the information about the communities without extensive exploration. To help portal users distinguish different groups hosted by Ensemble and pick the most appropriate groups we offered a treemap-based social navigation.

Using a treemap, we were able to uncover and visualize two levels of hierarchy for the portal group. The first level of the treemap represents different *groups* while the second shows the kinds of *information pages* that are hosted in each group's space. The treemap represents the group's information by adapting its three elements: cell size, color, and labels. Since the size and color dimensions are correlated with the number of posts and views of resources within the group, one can easily distinguish the differences among resources without any difficulty. In Fig. 1, the size of a rectangle corresponding to a specific kind of page represents the number of pages of this kind in a group space (a larger space represents more posts) and the color of the rectangle represents the average traffic-based popularity of this area (a darker color represents a greater number of views, with three levels of darkness being used). This visualization shows many important things at once.

With the treemap, users can easily recognize large groups and small groups as well as groups with high and low levels of activity. Moreover, the second level visualization points to the nature of the group by showing which type of resources dominate and which type is most actively used (e.g., it is easy to see that "book" has been posted 24 times more frequently than the other resources in the Ensemble Design and Development group). In addition, it is quite easy to recognize resource-oriented groups (such as Tech, with a large and actively used collection component and a small low-traffic blog part) and discussion-oriented groups (such as CS2013, with a large and active forum page and a small, low-traffic resource part).

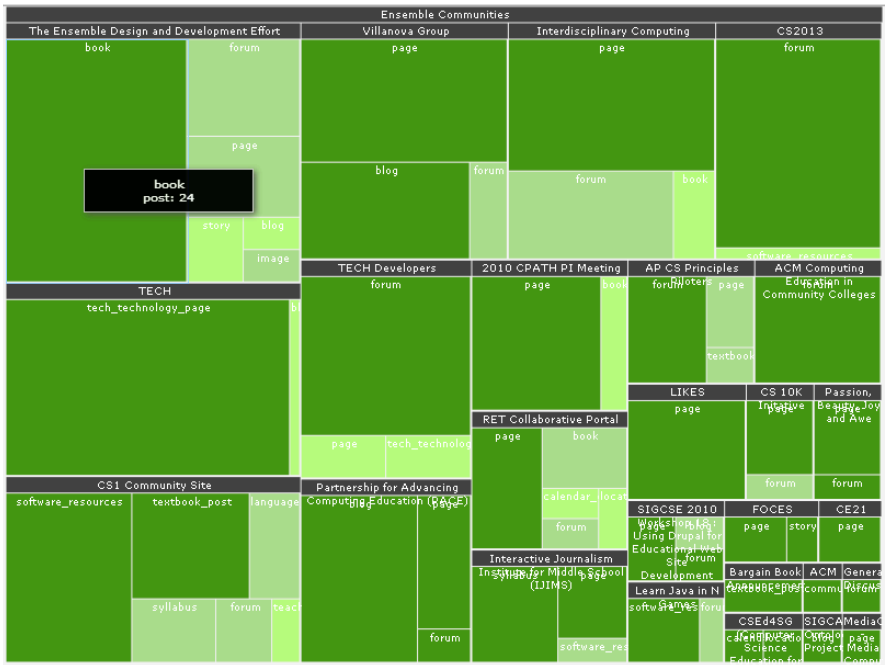

Fig. 1. An overview of TreeMap group social navigation in Ensemble

3. Navigating within a Group: Group-Adjusted Social Navigation

In the past, Ensemble provided global-level social navigation support for any list of links to resources in the portal with social visual cues. The list of links was collected and classified by the portal for each group of similar resources. Social visual cues annotated links with the popularity of the resource by color intensity. The more intense the color was, the more popular was the resource in the portal. However, we recognized that global-level social navigation was not able to provide a clear view of the local popularity within each group. Recently created communities or communities with fewer members might only get social cues with lowest color intensity since the resources in such a group are relatively new likely with fewer visits than the resources in an older or larger group. To extend the social navigation support for groups, we adjusted the original global-level social navigation support to a local-level one. The social visual cues are now generated based on the local popularity of the resources *for each group*. Fig. 2 shows the group-adjusted social navigation support in the group, *RET Collaborative Portal*. This is a relatively small group with 7 members. Within the group, we show a list of resources grouped by resource type, such as Event, Page, and Book page, inside the group. The social visual cues are applied based on the viewing frequency of each resource within the group. We assess the group-adjusted popularity of the resource by calculating the ratio of the resource's views within the group to the maximum of the group views over the group resources. Three thresholds are used to distinguish different levels of group popularity: resources with the adjusted popularity over 50% of the group maximum are considered very popular and receive dark-green visual cues, resources with popularity between 10% and 50% are

considered moderately popular and receive light-green visual cues, and resources with relative popularity lower than 10% are considered low-popularity and receive light cues. Users can easily see which resources garnered the most attention in a group.

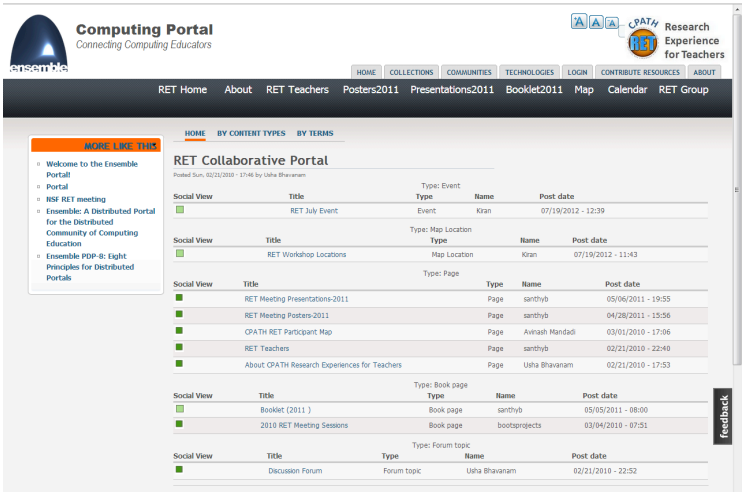

Fig. 2. Content-level group-adjusted social navigation support

4. Discussions and Conclusion

This work argues in favor of group social navigation to extend digital libraries and demonstrated two types of group social navigation mechanisms implemented in Ensemble: group-level social navigation based on a social treemap and group-adjusted social navigation within group pages shown as link annotations. We will observe two features' usage on the portal and gain more insights of how to apply group social navigation in the large educational digital library.

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