

Learning Focused Search in an Online Social Network Community

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Abstract

Current search engines satisfactorily return relevant, ranked results to most posed queries. However, when searching on a dense topic for individual or collaborative learning purposes, the highest ranked results retrieved by these engines might not be the best starting point for learners given their current level of competence. We leverage concepts and computational solutions related to peer knowledge and interaction data in order to convert ranked search results in So.cl into sequenced results that allow learners to start with sources that are accessible and understandable before moving to increasingly advanced and complex content.

Keywords: social search, collaborative learning

Introduction

Searching for information on the Internet has become a daily activity for many of us, and over the years, search engine algorithms have greatly improved in their ability to retrieve applicable results to posed queries (Purcell, Brenner, & Rainie, 2012). Many of us do not even look further than the first few returned results to find a link with the information we desire (Jansen & Spink, 2006). However, if submitting search queries for learning purposes and not for the quickest, most succinct result, then current search engines leave some things to be desired. In such instances, the best and most relevant answer may not be desired immediately as the best answer may not be comprehensible to a novice. The preferred ordering of results, however, would first include results that contain the most basic, rudimentary understanding of the topic that match the competence level of the searcher before results that are more technical and complex.

Learning a topic with the help of a search engine may not be ideal for everyone. We do not deny that learning can be more effective and perhaps more enjoyable when working directly with others who can either organize the learning experience, immediately answer questions as they arise, or demonstrate the execution of tasks as in the case with over the shoulder learning, e.g., (Twidale, 2005), or with social search engines like Aardvark (Horowitz & Kamvar, 2010). Yet in the cases when learning in a traditional setting or even a non-traditional setting like a massive open online course or an after-school program is not an option, search engines combined with the social traces created in online social network communities like So.cl can help the learning process. Guided by the notions of Vygotsky (1978) and Lave and Wenger (1991) that social interactions are integral to learning, we introduce a way for the search engine embedded in So.cl to retrieve and present search results in a way that makes it easy for learners to start with sources that are accessible and understandable before moving to increasingly advanced and complex content.

The changes that we propose to the So.cl search engine will utilize data easily provided or calculated within the So.cl community including location, peer interests, and the past search behavior of both ourselves and our peers. These changes can be made using the affordances and information already available in the So.cl community and with minimal changes to the So.cl interface.

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Related Work

Using social or collaboratively generated information to filter (e.g., (Shardanand & Maes, 1995; Bellogin, Wang, & Castells, 2011; Horowitz & Kamvar, 2010; Evans & Chi, 2008)) or retrieve information (e.g., (Kirsch, Gnasa, & Cremers, 2006; Twidale & Nichols, 2009; Hust, Klink, Junker, & Dengel, 2003; Morris & Horvitz, 2007; Pickens, Golovchinsky, Shah, Qvarfordt, & Back, 2008)) is not new. Twidale and Nichols (2009) and Hust (2003) discuss using information from users with similar interests and queries to aid subsequent users, which is a concept we propose would greatly improve the learning experience in So.cl when users perform web searches, especially if search queries include ambiguous phrases or location-specific information. Morris and Horvitz (2007) and Horowitz and Kamvar (2010) introduce SearchTogether and Aardvark respectively which both demonstrate how social and collaborative information can be utilized during search including the importance of the awareness and persistence of social data. And finally, Shardanand and Maes (1995) and Bellogin et al. (2011) discuss using or building profile data to infer the tastes of users to improve future recommendations. As a social network community, So.cl encourages users to enter personal information and preferences in their profiles and on their pages in the form of text and images. In the next section, we will discuss how we propose that this information can be used when retrieving and presenting users with search results to learning focused queries.

Learning Focused Search in So.cl

Individuals perform searches for different purposes including transactional, navigational, and informational reasons (Evans & Chi, 2008). This is probably not altogether different within So.cl. As So.cl is designed around learning about and through the interests of its community members, we would, however, anticipate even more searches that are informational. As such, supporting learning while allowing individuals to perform other types of searches as well would be opportune. So, as opposed to completely removing and/or altering the present searching functionality therein in hopes of improving the learning experience, we propose introducing two web search modes: Default and Learning (see Figure 1). As this searching is performed within the context of a social network community, the Learning search can take advantage of data that traditional search engines cannot. Below, we use an example usage scenario to explain the different types of data that can be used, how they can be used to order and assign a difficulty level to results (i.e., Beginner, Intermediate, and Expert), and ways that the results in the Learning mode will be presented that differ from the Default mode. The main factors that determine the ordering of results in Learning mode include location, the readability level of result pages, search term category, peer interests, peer link traversals, and explicitly assigned difficulty levels.

Example Usage Scenario

Jaime and Leslie are friends searching within So.cl to satisfy two different needs. Jaime's car has mechanical issues, so she is searching for information on car engines while Leslie has learned that she is pregnant and is looking for information on baby showers and calligraphy so that she can learn how to make her own baby shower invitations. Leslie goes to So.cl and performs a series of searches on "calligraphy" (Figure 1) and "shower" while Jaime creates a post with links focused on "car engines" so that she can learn about car engines and share her findings with others (Figure 2).

Factors Utilized to Filter and Order Results in Learning Mode

Location: The location of So.cl members is explicitly provided in their profile information or can be ascertained through their IP addresses. This information can be used to return results that are geographically relevant. For example, garages in Jaime's surrounding area or local trade schools offering courses on car repair would be returned as she looks for information on car engines.

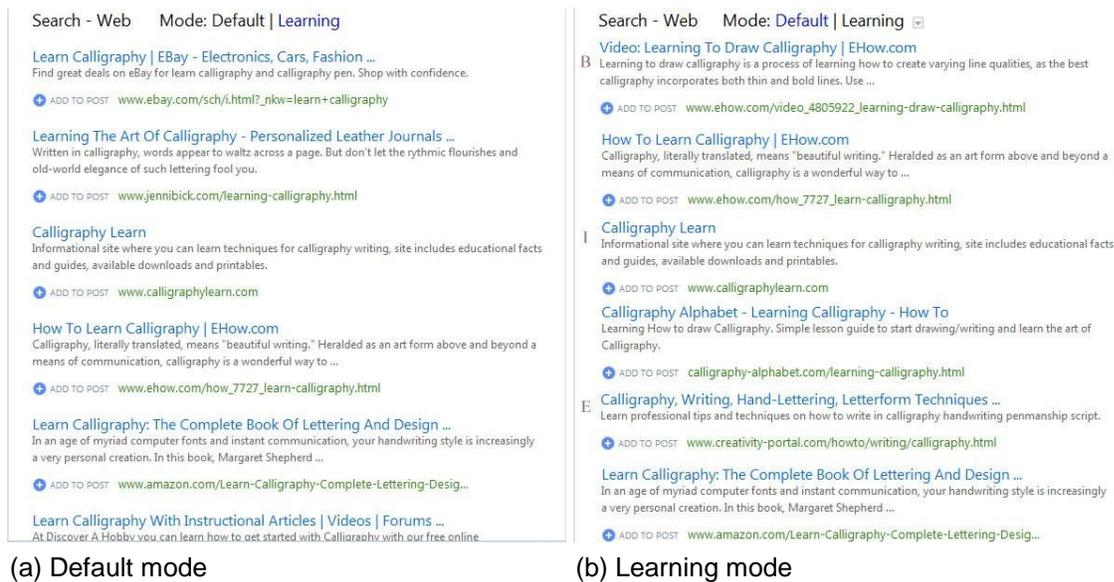
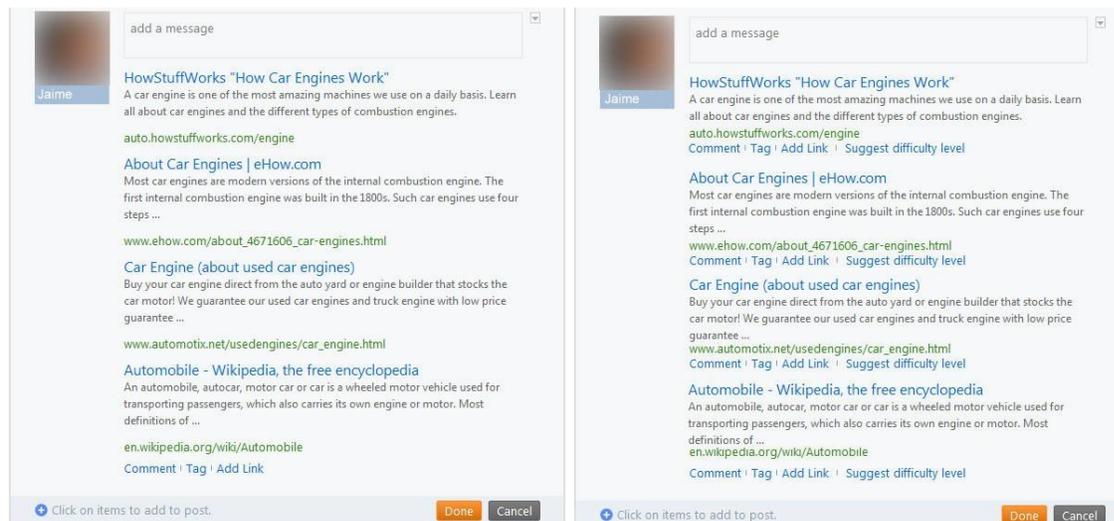


Figure 1. Results returned in both the Default and Learning modes when searching for "calligraphy"



(a) The current screen presented when making a post on "car engines" (b) The modified screen when making a post on "car engines"

Figure 2. A user-created collection of links in which the user has the ability to manually assign difficulty levels to each link

Readability level: The language used in webpages returned by searches can be a hindrance to learning if the readability levels, including vocabulary and sentence structure, are high or if they include jargon that one may not understand as a beginner. An example of this is the term "letterform", which Leslie encountered while searching for information on calligraphy. To aid with the learning process, such webpages would be automatically assigned higher difficulty levels than others with more straightforward, less jargon-filled writing.

Search term category: Not only should the readability level of the webpages returned influence order, but the type of search term should as well. Technical topics, for example, should yield results that look different than cooking topics. Results assigned a beginner difficulty level in cooking searches would probably include lots of images and videos and includes lists or steps while beginner technical results would probably include code snippets and more explanatory text.

Peer interests to help with term disambiguation: There are some instances where search terms may have the same spellings as other words. For example, "tree" can refer to the plant or the data structure. "Python" can refer to the programming language or the animal, and likewise, when Leslie searches for "shower" instead of the more specific phrase "baby shower" So.cl may not know what types of results to return. Fortunately, Leslie's friends have also recently had children and have been performing searches and building collages within So.cl looking for interesting baby shower gifts, so So.cl uses that information to help with term disambiguation and returns information about baby showers and not bathroom showers.

Peer link traversals: Awareness of what others have done and have seen can also help during collaborative web searches (Morris & Horvitz, 2007). Links that have been visited multiple times by peers in So.cl and the order in which they were traversed, especially if that path was repeated multiple times, can be utilized to help order result links for others.

Explicitly assigned difficulty levels: Morris and Horvitz (2007) note that participants in their study requested the ability to be able to manually edit and order pages visited into an order that had meaning for them. We propose allowing So.cl members to explicitly assign difficulty levels to search results included in posts (see Jaime's post in Figure 2). These explicitly assigned difficulty levels can then be used in addition to all of the other information when assigning that particular resource with a difficulty level and to organize and filter results for subsequent searches that include that resource.

Changes to the So.cl Interface

All of these changes can be implemented with minimal changes to the So.cl interface as seen in Figures 1b and 2b. The results when searching in both the Default and Learning modes can be displayed in the same place and toggled with a link (Figure 1). The biggest change seen in Figure 1b are the initials B, I, and E along the left of the screen. These designations refer to the difficulty levels of the links: Beginner (B), Intermediate (I), and Expert (E). Links in between the initials have the same difficulty level of the link preceding it (e.g., the second link in Figure 1b is a beginner link). Individuals can choose to view only the links of a particular difficulty level by choosing that level in the dropdown menu displayed when clicking on the downturned arrow to the right of the Mode options. Learners are expected to begin with the links at their current, self-identified competence level, yet they are not prevented from starting at another point if desired.

Allowing individuals to explicitly assign difficulty levels to resources can also be performed with small changes by having the "Comment|Tag|Add Link" functionality applied to each resource in a post (Figure 2b) as opposed to the entire post (Figure 2a). The ability to assign the difficulty level to each item could then be added to that list of options with a similarly styled "Suggest difficulty level" link.

Conclusions

We present a way to encourage and support learning focused searching within So.cl that involves presenting search results in a way that allows learners to start at their present competence level before moving on to more advanced content. The factors that we reference – location, peer interests, result readability level, type of search term, peer link traversals, and explicitly assigned difficulty levels – can all be utilized to filter and determine which results to return to learners and the order in which to present them. Given the interest driven focus of So.cl and the type of data collected therein, this can be easily implemented within the social network community without major changes to the experience or to the interface.

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