Can I Find What I'm Looking For?

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ABSTRACT

In recent years, search engine research has grown rapidly in areas such as algorithms, strategies and architecture, increasing both effectiveness and quality of results. However, a very important aspect that is often neglected is the user interface. In this work we analyzed the interfaces of several popular search tools from the user's point of view, and collected individual feedback in order to determine whether it is possible to improve interface design

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1. INTRODUCTION

The enormous amount of information available on the Internet today necessitates the use of search tools for retrieval of useful information. People wish to find relevant information quickly. Often this is difficult, and the user navigates back and forth among search engine results, which can be both frustrating and time-consuming. Even if a user can rapidly distinguish between the useful and irrelevant pages, unless the set of results is quite small a complete exploration is practically impossible. Finding and accessing information is also very important for people with disabilities, especially for the blind, who have considerable difficulty accessing printed information. The Internet has contributed significantly to increasing the independence of visually- impaired people in their jobs, studies, and free time. Thus, it is also important to make search engines universally accessible and easy to use for visually-impaired users, who are obliged to use special devices such as screen readers. In order to improve quality of results, search engines apply various functions to assign importance to a page (i.e. page rank, similarity, back-links and mixed approaches) and give precedence to pages with high weight, supposedly indicating greater relevance. However, the user may still have difficulty performing web searches. Why? There are various reasons, including user behavior and skill, search engine interface design and web content designers:

- A user is unable to formulate the right query and restrict the results set. Using phrases with many words often produces no results. Users then prefer to specify only one or two words, which generates large sets of results.

- A user interface can be difficult or inaccessible for the unskilled or disabled user.

- Ranking functions are applied statically, i.e. the user is not able to select the criteria most appropriate for him. Some options are present in advanced searches, but are rarely applied by users.

- Information on the Internet is rarely structured and organized for easy retrieval by search engines. Web page authors do not correctly apply meta-tags such as description and keywords and do not use meaningful filenames, titles, link descriptions and alternative texts. In addition, an inappropriate use of metadata produces phenomena called "search engine spam", aimed at deviating search engine results. For this reason most search engines ignore or only partially use metadata.

This work describes the initial results of a study on search engine accessibility and usability. We have started to analyze the interface of the seven following search tools, restricting the analysis to features of interest to users:

- Google (http://www.google.com/), and Altavista (http://www.altavista.com/);

- Yahoo (http://www.yahoo.com/) and Excite (http://www.excite.com/) web directories and meta-searches. Yahoo has its own search engine.

- HotBot is a meta-search which permits customizing the user interface (http://www.hotbot.com/);

- Vivisimo is a meta-search which performs on-fly clustering of results (http://vivisimo.com/);

- Kartoo is a meta-search which represents results with a series of interactive maps (http://www.kartoo.net/).

1.1 Search engine interfaces

Considering the usefulness of search tools, it is very important to make them accessible to and usable by anyone, regardless of their physical condition or environment. Accessibility guarantees use to all; accessible design ensures graceful transformation, as well as understandable and navigable content. Usability renders Internet navigation more effective, efficient and satisfactory. In [1] and [2] a possible combination of accessibility and usability for the visually impaired is considered, since both aspects are crucial to those who must depend on the aid of special devices in order to navigate. The user interface is composed of many features such as:

- Arrangement of components. This point is very relevant because value-enhancing features are more "visible" when positioned in an area rapidly encountered by eye movement and do not require page scrolling. For example, the refinement function of Google, which allows searching into results, is not very obvious thanks to its position and font

(size and color): it is found at the end of page results, so inexpert users may not benefit from them.

- Expressive power: a visual representation can communicate certain kinds of information much more rapidly and effectively than other methods [3].

- Number of elements. Simplicity helps unskilled users navigate the interface easily. Web directories are organized according to categories of goods and services offered. Depending on the type of search it may be more appropriate to utilize a search engine or directory. On the other hand, their interfaces are quite full and can create confusion in an unskilled user who wishes to formulate a search query.

- Functions. A user typically performs a simple search and specifies one or more words, obtaining a large set of results. Further criteria selection can be specified to restrict search on the results. Preferences and commands, although very powerful, are rarely used, even by skilled persons.

- Clustering of results permits users to explore results grouped by categories. In this way users can navigate a single branch of results more efficiently.

As we mentioned before, this work in progress represents the first stage of a study concerning the usability and accessibility of popular search engines. As a first step we verified the conformity of W3C accessibility guidelines [4] by using automatic tools (validators): Bobby (http://bobby.cast.org/) and Torquemada (http://www.webxtutti.it/testa.html). The test was performed on four types of interface: home page (simple search), advanced search interface, preferences and results pages.

Concerning usability, when a user interacts using special devices such as a screen reader, there are no standard guidelines for performing an evaluation by means of an automatic tool. In [1], [2] usability criteria for improving web navigation using a screen reader have been proposed, by which a first inspection evaluation could be carried out. However, even a non-disabled user may have difficulty using search engines. Testing with different categories of users is fundamental to discovering the source of difficulties. As a second step, in order to collect user feedback, we drew up and distributed a four-part questionnaire divided into: user characterization; general knowledge of search tools; use of simple/advanced search interface and preferences; difficulties. The questionnaire was distributed to a population equally divided into women and men, age ranging from 20 – 60+ years, of whom 50% use the computer at work, and 25% are blind.

2. DISCUSSION

Of all tools analyzed, only Google conformed to priority 1 of WCAG 1.0 [4] meaning that it satisfies a minimal level of accessibility (level A), whereas other search engines, directories and meta-searches presented some priority 1 errors. Analyses showed that errors are common, not only between interfaces of the same search tools, but also between those of different search engines. For instance, tables are frequently used for the layout of page results, ignoring the needs of visually impaired persons for whom a sequential reading renders access very difficult. In some interfaces, we found that the same error was present in one part of the code but not in another. This clue suggests that various page

updates had been performed by different tools/persons, resulting in inconsistent attention to accessibility.

Questionnaire results offer some useful information: normal users declared they could find what they were looking for on nearly every search, while some visually impaired individuals have problems. In general, users insert more than one word in their queries and explore only the first two pages of results. It is remarkable that 80% of impaired people think it is not always easy to use search tools, while normal users consider it easy. On the other hand 70% of the entire population have difficulty choosing the right keywords for the queries, while visually-impaired users report difficulty reading search results.

In our opinion a driven query and results refinement may improve search engine quality. We believe that user interfaces need more interactivity: they should be more adaptable to user needs. User Centered-Design (UCD) is a philosophy that places the person (his tasks and goals) at the center of the design and a process that focuses on cognitive factors (i.e. perception, memory, learning, problem-solving) used by people when interacting with things. Thus the user interface must satisfy graphic requirements, balancing expressive power with simplicity as well as logic. To render content easily understandable and navigable is difficult, but it provides substantial advantages. An increase/decrease in customers leads to increased/loss of revenue. Investing in accessibility yields many returns in terms of the future: User-Centered Design cuts costs and increases user satisfaction and productivity.

In conclusion, web contents and search tools should be easily available to all, including the disabled. User interfaces can be improved. This should be simple for search engines in terms of code revision, and would benefit all users, making it possible to reach a larger number of people.

3. ACKNOWLEDGMENTS

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