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A Step Towards Designing a Model Academic Search Interface

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ABSTRACT

The study makes an endeavor to assess the search interfaces of leading academic databases, viz Cambridge Journals, JSTOR, Sage Journals, ScienceDirect, SpringerLink, Taylor & Francis, and Wiley Online Library. The purpose of the study is to identify various search features and subsequently determine their relative location, with a view to recommend ideal location of these features based on their utility and users' ease of mind. Data is harvested by assessing the search interfaces of seven academic databases subscribed by University of Kashmir. The select databases are individually assessed to harvest the required information. The study divulges that uniformity is observed by databases while positioning features like access points, and search box(s). However, no consistent approach is found while positioning other identified features. It is imperative to say that the study is first of its kind where an emphasis is laid on assessing the positioning of search interface features. The study can prove helpful for academic database designers while designing user-friendly academic databases.

Keywords : Information retrieval; Information retrieval systems; Search interface; Search features; Browsing; Alerting service

1. INTRODUCTION

Information Communication Technology (ICT) has revolutionised the world by producing and disseminating an endless amount of valuable and important information for every activity identified so far[1]. To find the relevant information in such a huge mass of information, an efficient and reliable information retrieval (IR) is necessary. IR is an iterative interactive process between users and a search system[2-5]. It is designed with a view that right information should be made available to the right user at the right time. Thus, the main objective of an information retrieval system (IRS) is to collect and organize information in order to provide it to users whenever they are in need of it[6]. During the early stages of IR, there was much role of an information professional than the users themselves. The professionals used to establish the information needs of users which were later satisfied using their expertise. Even though there is still some focus on intermediate searching, the present day web-based IR systems are designed in such a way where users can search themselves to fulfill their information needs[7].

Users, while performing the search process, come in contact with the front end of an information retrieval system. This front end is called as a search interface. A search interface is an important aspect of information retrieval systems. The term 'interface' is used for that part of a system which comes into direct contact of users while interacting with the system. Search interface is the medium through which users interact with an IRS. Every IRS has its own search interface characterised by a number of features which allow users to interact with the system. It aids to search, browse and explore valuable information. It also offers features which enable users to keep track of latest developments and facilitates the optimum utilisation of services offered by IRS. It is the combination of various features like display formats, search methods, and help facility. These features are created in that layer of the system which lies between the two ends of search process, i.e. user at one end and the actual searching mechanism at the other. Search interface is the translating medium for users where it translates user entries to the system and then again the system results in such a form which is understandable to the users. Furthermore, now-a-days there are provisions of customizing interface features without changing the basic structure of an information retrieval system (IRS)[8]. There are a number of search interface features such as query formulation, query reformulation, result manipulation, help mechanism, and alerting services. Besides these features, two search levels, i.e. Simple search and Advanced search, are used to perform the search processes through search interfaces. Apart from these, a number of search techniques are used while searching an information retrieval system in order to retrieve most relevant information. These include: keyword search, phrase search, Boolean search, truncation search, nesting/parentheses, proximity search, and search limiters.

The present study makes an effort to identify various search interface features and their relative positions on the search interfaces of select online academic resources. This study helps in understanding how information retrieval systems are positioning their search features on their respective

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search interfaces and whether these systems show similarity or dissimilarity in positioning these features. The study further suggests various recommendations for positioning of different features on the search interfaces of academic databases.

2. LITERATURE REVIEW

To accomplish search tasks in online information retrieval systems (IRS), a number of authors identify various sub-tasks which are realised in a search interface (SI) as functions: database selection; query formulation; query reformulation; access to help function; organisation and display of results; and delivery of results[9-11]. To carry out these tasks, Vilar and Zumer[10] stress the need for various SI functions. Furthermore, Xie and Cool[11] add four important structural elements that should support these functions:

(a) the interface should be such that users would have no problem while using it;
(b) it should have some similarities to the systems that users are used to;
(c) it should have a clear search screen; and
(d) it should allow users to customise and personalise it as per their needs.

It is seen that users have always been tempted by an easy access of internet and are not much concerned about the quality of information they are accessing[12]. Most of the users make use of only popular search engines (like Google, as it has the simplest search interface with a single search box) in order to find relevant information, while a small percentage of users actually explore various available advanced searches. Users mostly prefer to limit their choices to what is easily available to them. It may be because they do not want to take up the hectic path for gathering any information they might require. In other words, most of the users sacrifice quality over convenience[13-15]. Moreover, the students find it difficult and achieve less success using library retrieval systems to complete their search tasks[16]. Similarly, other studies are of the same opinion that even if information revolution and its consequent growth has made possible enormous new proficiencies, the effect on search behaviour has not been generally so promising and assuring[17,18].

Systems with complex search interfaces need an expertise of search experts so that these can be used efficiently and effectively[19-21]. Markey opines that simplicity must be given preference while making improvements to the search interfaces[22]. There are various studies in which two sets of transaction log data were used to understand the usability and user-friendliness of search interfaces, one before any modifications in the interfaces and the other after the modifications. Earlier data for interfaces without modifications reveal that the users are not fully compatible with the basic search techniques, while the later show statistically significant differences in the results revealing that the modified interfaces are more compatible and user-friendly as the users show positive effect in their search attitude while working after the interfaces are being modified[23-25].

Designers are more likely to be successful in designing interfaces if they spend time with users, observing how they work[26]. It also gives them (the designers) useful information on the usability of systems[27], or atleast enable them to make decisions about the inclusion or exclusion of specific features and functions of the system[28] which in turn is of critical importance in achieving user satisfaction[29]. According to Ahmed[30], *et al.* the information seekers who are well versed with the use of interfaces prefer more control as well as greater ease of use in their search process. In this respect, prerequisites of a user and role of a system to ease the human-computer interaction need to be considered while designing the web-based information retrieval (IR) interfaces.

3. OBJECTIVES

The study is based on the following objectives:

- To identify and determine the relative location of different features and facilities at search interface of select academic database.
- To suggest various features regarding the positioning of search interface features in select academic databases.

4. SCOPE

The study is confined to the assessment of seven full-text academic databases subscribed by University of Kashmir, Jammu & Kashmir, India, that offer content in different fields of Science and Technology. These include: Cambridge Journals, JSTOR, Sage Journals, ScienceDirect, SpringerLink, Taylor & Francis, and Wiley Online Library.

5. METHODOLOGY

Data is harvested through the assessment of search interfaces of select academic databases. Seven most popular, extensively used, and multi-disciplinary full-text databases which are subscribed by University of Kashmir are selected for the study. The subscribed databases were given due consideration because the content was accessible (to authors). Each database was manually accessed and the information regarding the positioning of search features available at the search interface was gathered.

To examine the positioning of user-specific features, search interface was divided into nine equal segments. Only that portion of interface was considered which was visible on computer/laptop screen without scrolling down when viewed in full screen mode.

(<?> Full screen mode is achieved by simultaneously pressing Function Key (fn) and F11 (fn+F11 = Full screen)).

Features that exist outside the examined nine segments, i.e., those for which one needs to scroll down in order to locate such features, were treated to hold the position called 'Scroll-Down', irrespective of whether the features were located at left, centre or right positions of the screen as shown in Table 1.

Table 1. Segmentation of search interface

	Left	Centre	Right
Top	Top-left	Top-centre	Top-right
Middle	Middle-left	Centre	Middle-right
Bottom	Bottom-left	Bottom-centre	Bottom-right

6. SEARCH INTERFACE FEATURES AND THEIR RELATIVE POSITIONS

Search interface features are broadly examined under

following five major sub-headings.

6.1 Access Point

'Sign in/Register' enables users to have access to the scholarly content and also to create their own profile. At institutional level, access to academic databases is streamed through static IP addresses which institutions register with concerned vendors at the time of their subscription. The subscribed content can be accessed by users within institutional LAN environment. Also off-campus facility is provided to users accessing internet outside the institutional campus. In both cases, Sign-in has minimal significance for users to get access to the content. However, by allowing users to build their profiles, it enables them to avail a number of services, like email updates, save articles, publications and searches to one's profile, purchase articles, book chapters, and like.

All databases are found to display access point at Top-right position of their respective search interfaces, except for Taylor & Francis, where it is positioned at Top-Middle position as shown in Table 2. To access the contents of databases, users have to first locate the access point where from they can verify their credentials. It should be easily sighted within the visible screen space of the search interface.

Table 2. Positioning of access point

Academic database	Access point location
Cambridge Journals	Top – right
JSTOR	Top – right
Sage Journals	Top – right
ScienceDirect	Top – right
SpringerLink	Top – right
Taylor & Francis	Top – middle
Wiley Online Library	Top – right

6.2 Search Options

This category allows users to key-in search queries of their interest, either in simple or advanced search mode. On interface, simple search facility is recognised by the presence of rectangular box(s), while advanced search facility is reflected as a link - 'Advanced search'.

Five out of seven databases position their search box at 'Top' of the search interface that runs horizontally across 'Left to centre'. In ScienceDirect, search boxes are spotted at Middle – 'Left to Centre' position, while Wiley Online Library places search box at Top-left position. As evident from the study, there is no specific position for advanced search link. Cambridge Journals, JSTOR, and Science Direct have the link at Middle-Left position. Sage Journals and Wiley Online Library provide the link at Top-Left position. In SpringerLink, it is placed at Top-Centre, while in Taylor & Francis, it is found at Top-Right position as shown in Table 3. Users mainly avail advanced search facility only when searches performed in simple search mode do not bring satisfactory results. As such link to Advanced Search facility should be placed in the close proximity of search box (Simple Search mode).

Table 3. Positioning of search features

Academic database	Search Box	Advanced search (link)
Cambridge Journals	Top – 'left to centre'	Middle – left
JSTOR	Top – 'left to centre'	Middle – left
Sage Journals	Top – 'left to centre'	Top – left
ScienceDirect	Middle – 'left to centre'	Middle – left
SpringerLink	Top – 'left to centre'	Top – centre
Taylor & Francis	Top – 'left to centre'	Top – right
Wiley Online Library	Top – left	Top – left

6.3 Browsing Features

Browsing features are examined with respect to location of

(a) Browsing Tab;
(b) Alphabetical Title List; and
(c) Discipline categories.

Except for ScienceDirect, all databases offer browsing tab(s) on their respective search interfaces; mostly at Top-left position. Sage Journals is found to place browsing tabs at three different positions (each performing same function), while Cambridge Journals places it at two separate positions. In case of SpringerLink, one has to scroll down to see the browsing tab.

At Centre-left position, Wiley Online Library displays all alphabetical characters including '0-9'. On clicking any character; it lists all journals beginning with the same clicked character. In ScienceDirect, alphabetical characters are displayed at Scroll-Down position.

Four databases display different disciplines under which these categorize their content. However, no uniformity is observed in positioning of discipline categories, as SpringerLink positions it at Middle-left, ScienceDirect displays four major disciplines across the Bottom (from left to right), Taylor & Francis displays all subject areas across Centre (from left to right), while Wiley Online Library positions it at Centre as shown in Table 4.

Browsing is one of the basic modes of access to information and at search interface, it guides users through hierarchy of subject headings or alphabetical listing to the resources of potential use. As such browsing features should find space within the visible screen space of search interface, most preferably in close proximity to search box.

6.4 User Assistance Features

User assistance includes those features which help users to make optimum utilisation of the collection by offering different aids to enhance their searching and browsing skills. To make information retrieval process easier, academic databases offer assistance to users either in the form of Frequently Asked Questions (FAQ), training and tutorial materials, help option,

Table 4. Positioning of Browsing Features

Academic database	Browsing tab	Alphabetical title list	Discipline categories
Cambridge Journals	1. Top – left 2. Bottom – centre	×	×
JSTOR	1. Top – left 2. Scroll-down	×	×
Sage Journals	1. Top – left 2. Middle – left 3. Top-centre	×	×
Science Direct	×	1. Scroll-down	1. Bottom – 'left to right'
Springer Link	1. Scroll-down	×	1. Middle – left
Taylor & Francis	1. Top – middle	×	1. Centre – 'left to right'
Wiley Online Library	1. Top-left	1. Centre – left	1. Centre

× = Feature not available

or by providing contact information on their search interfaces.

Cambridge Journals and Taylor & Francis provide 'FAQ' link on their respective search interfaces. However, Cambridge Journals positions it within visible screen space, at Top-Right position, while in Taylor & Francis, one has to scroll down to locate it.

Except for Wiley Online Library, 'Help' link is visible within screen space of all other databases, located mainly at Top-Right position. JSTOR, Sage Journals, SpringerLink, and Taylor & Francis, each offer two 'Help' links on their respective interfaces.

Link to 'Contact Us' is visible within screen space in four databases, while in other three, it is situated at scroll-down position. JSTOR, Sage Journals and Taylor & Francis place the link at two different locations, one within visible screen space and the other in Scroll-Down position.

Regarding link to 'Training & Tutorial' materials, no uniformity is observed. Sage Journals places it at Bottom-Centre position; Taylor & Francis displays it at Bottom-Right position, while Wiley Online Library positions it at Middle-Right. In case of ScienceDirect, it is located at Scroll-Down position.

Databases which offer 'Feedback' facility, are found to display its icon at one static position even if users scroll down through search interface, i.e., it does not move, whether users scroll up or down. In Sage Journals, 'Feedback' icon is located at Middle-Right position; SpringerLink features it at Middle-Left, while Science Direct positions it at Bottom-Right. However, in case of Cambridge Journals, it is available at Scroll-Down position as shown in Table 5.

Except for 'Contact Us' and Feedback, user assistance facilities should be visible within the screen space of search interfaces, while Scroll-down positions should be avoided. Links to FAQ and training & tutorial materials should be placed near to search box and browsing tabs as they demonstrate optimum utilisation of these facilities. Help/Support, as found in most studied databases should be placed at Top-right position. There is common practice among websites to place 'Contact us' and Feedback facilities at the bottom of website. Search interfaces should also follow the same practice.

6.5 Alerting Services

There are many options which enable users to remain abreast with latest developments in the collections of database providers preferably pertinent to the fields of users' interest. It includes email alerts, recent publication lists, news updates, RSS feeds, Social Networking Sites, and alike.

Alerting services (such as 'register for alerts', 'popular articles', 'recent publications', 'news update') find their place at respective search interfaces of select academic databases. However, irrespective of any type, alerting services are poorly represented as these are mostly located at Scroll-down or Bottom-centre positions. Only one database (Sage Journals) positions one of its alerting services (Recent Publications) at top of its interface and two databases (Sage Journals and Wiley Online Library) have positioned one of their alerting services (Register for Alerts service) in the Middle. Rest of alerting services offered by select academic databases are either situated at Bottom or Scroll-down positions as shown in Table 6.

Academic databases should follow a common practice of

Table 5. Positioning of different help facilities at search interface

Academic database	FAQ	Help/support	Contact us	Training & tutorial	Feedback
Cambridge Journals	1. Top-right	1. Top-right	1. Top-right	×	1. Scroll-down
JSTOR	×	1. Top-right 2. Scroll-down	1. Top-right 2. Scroll-down	×	×
Sage Journals	×	1. Top-right 2. Scroll-down	1. Top-right 2. Scroll-down	1. Bottom-centre	1. Middle-right
Science Direct	×	1. Top-right	1. Scroll-down	1. Scroll-down	1. Bottom-right
Springer Link	×	1. Middle-left 2. Scroll-down	1. Scroll-down	×	1. Middle-left
Taylor & Francis	1. Scroll-down	1. Bottom-right 2. Scroll-down	1. Bottom-right 2. Scroll-down	1. Bottom-right	×
Wiley Online Library	×	1. Scroll-down	1. Scroll-down	1. Middle-right	×

× = Feature not available

Table 6. Positioning of alerting services on search interface of academic databases

Academic Database	Register for Alerts	Popular Articles	Recent Publications	News Updates
Cambridge Journals	×	×	Bottom-centre	Bottom-right
JSTOR	×	×	×	Bottom-left
Sage Journals	Middle-right	×	Top-right	×
ScienceDirect	Scroll-down	Scroll-down	Scroll-down	×
SpringerLink	×	×	Bottom-centre	×
Taylor & Francis	Bottom-centre	×	×	×
Wiley Online Library	Middle-left	×	×	×

× = Feature not available

providing alerting services at a particular place. Since alerting services are not the main focus of users when they access any IRS, thus keeping this facility at scroll-down position does not have a negative effect on user's information retrieval processes.

7. SUGGESTIONS

Search interface designers should follow a common practice regarding the location of features on the search interface. Position of a feature on search interface should be consistent with the location of similar feature of other prominent websites/ information retrieval systems. Since users are familiar with the layout of popular websites, like Google, they would expect the similar layout of search interfaces (JSTOR Support, personal communication, December 30, 2015). With similar designs, users will face least difficulty to locate features on the search interface. It will eventually save time and energy of users which they could exploit for the primary task for which they have consulted the academic database.

Below given are some of the suggestions regarding the positioning of different user-specific features that should be offered by a Model Search Interface as depicted in Fig. 1, which shall add to the usability and user-friendliness of an efficient and effective search interface.

7.1 Access Point

'Sign in' feature is meant for verifying user credentials before he/she can get seamless access to the contents of IRS. Mainly represented by hyperlinked text (Login or Sign-in), access point is found to occupy the extreme Top-Right position (of studied academic databases), which remains prominent within the screen space of their respective search interfaces. Major Service providers, be it Google, MSN and like, also provide access point at the Top-Right position[31,32], thus it is reasonable for database providers to offer access point feature at the same position. With this, users need not to exert extra efforts to locate this feature.

7.2 Search Box

The basic purpose of search interface of any academic database is to facilitate discovery and optimal use of its resources. The first task users perform at search interface is to scan and locate the search box so that they can express their needs in the form of query term(s). Thus, search box occupies the central position on the search interface, and as such needs to be placed at a point easily visible to users. The search box (in studied academic databases) is mainly available at Top-left position. Most of the scripts, in particular English, are written from left to right so it is obvious that when users want to search, they will reach the left position to locate the search box. Thus, placing search box at Top-left position adds to user-friendliness of search interface. Furthermore, width of search box should be such that it should accommodate multiple words without obscuring parts of the user's query[33,34].

7.3 Advanced Search

Advanced Search is opted in situations when users intend to enhance the precision of retrieved results, or where users are not satisfied with the results of previously executed search(s). Advanced Search is mainly represented by a hyperlink on the search interface, and on click, users are directed towards

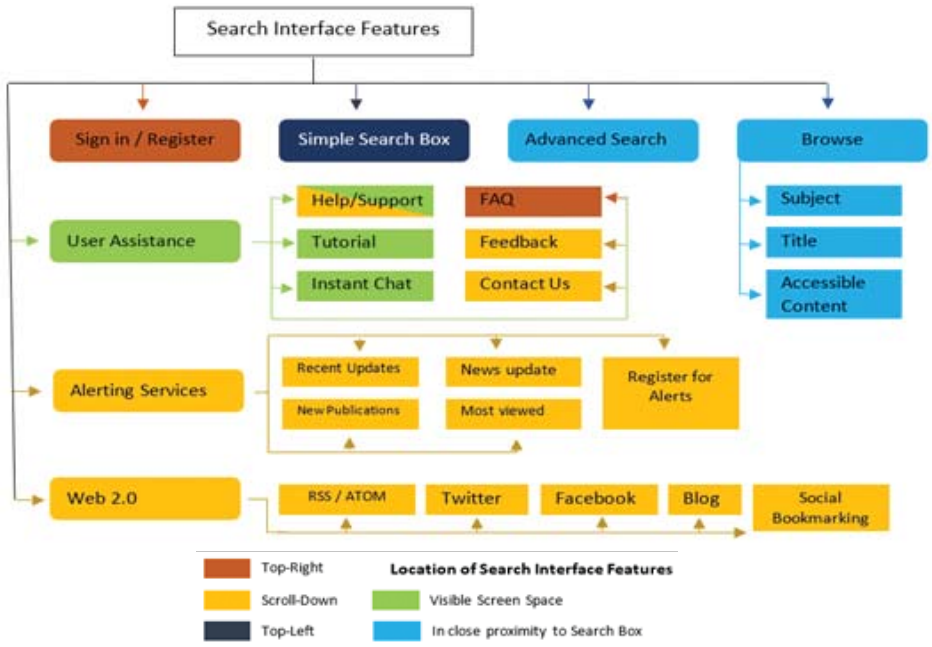

Figure 1. Diagrammatic representation of positioning of search features in a model search interface.

advanced search webpage. The study could not find the precise location of advanced search option (in select databases), however, it is found to be in close proximity to search box. The suitable position of advanced search link may either be at right side of the search box or below it. With such a coordinative position, user can easily locate the Advanced search feature.

7.4 Browsing Facility

Browsing options are represented mainly in the form of (a) Browsing tab, (b) Alphabetical listing, and (c) Subject categories. In addition to search, browsing of content is also one of the means of information discovery and use, as such it should find space on the search interface where users need not to scroll down to locate these options. All options should be kept at one place and in close proximity to search box.

7.5 Help Facilities

Help facilities are as important as searching and browsing, and are reflected in the form of FAQ, help/support, contact us, training & tutorial, and feedback in studied search interfaces. The studies show that users perform searches with higher recall and precision if they make use of IRS search functions[35-37]. As such, it is important to make users aware about different help facilities offered by IRS. It can be achieved by providing links to different help facilities on search interface.

One of the roles of Help/Support and Training & Tutorial features is to make users aware about the search techniques supported by the system, and also to emphasize their effective implementation in search queries. As such, these features should be available within the visible screen space of search interface. In studied search interfaces, Help/Support feature is mostly found at two places on the same search interface; Top-right and Scroll-down. As such it is suggested that Help/Support feature should be offered at two places on search interface. Another feasible option is to make its position static on the search interface, either on right or left vertical sides or bottom horizontal side of search interface. Irrespective of whether users scroll up or down within the search interface, Help/Support feature shall always be visible to them. Since Training & Tutorials feature is as important as Help/Support feature, it should also find a place within visible space of search interface.

FAQ feature mostly provides information related to the accessibility of content, like subscription details, rental details, and troubleshoot information. Thus, it should be in close proximity to the 'Sign in' feature.

Search interfaces, irrespective of their nature are found to follow a common practice to position 'Contact us' and 'Feedback' features at Scroll-down position. There will be less burden on users to memorize their location if academic databases also follow the same practice to position these features at Scroll-down location.

7.6 Alerting Services

Links to alerting services on search interface fulfill the purposes for both content providers and the end users. Alerting services allow IRS to showcase their products and services, and for end users, it enables them to remain abreast with the latest developments in the respective fields and areas of interest. The alerting services (in studied academic databases) have mainly occupied either Bottom-Centre or Scroll-Down positions. Since it is not feasible to position each service on the visible screen of search interface, and alerting services do not rank high in users' priority to consult search interface, it is suggested that alerting services, if any, offered by IRS should be placed mostly at Scroll-Down position.

8. CONCLUSION

The search interfaces of select academic databases were evaluated with respect to the availability of different features that aid in resource discovery and use. Various important search features were found to be common in all academic databases. However, academic databases do not always follow the common practice to display and arrange the features across the search interface. Though there was unanimity to some extent as far as the positioning of search interface features like access points, search box, etc. is concerned, but no common practice has been followed for arranging various other select search interface features. Hence, it is suggested that academic databases should follow a common practice of positioning their search features on their respective search interfaces in order to increase the user friendliness of information retrieval systems.

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