

## **A Study on the Feasibility of Subject Authority Control of Web-based Persian Medical Databases: An Iranian Experience**

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### **Abstract**

One of the most important factors challenging the issue of "information storage and retrieval" in the Internet environment is the lack of control on authorities, i.e. subject authority control. The present research aims at examining the feasibility of subject authority control of Persian medical databases available on the Net. Based on research methodology, we have randomly chosen 50 keywords utilized by users searching databases for articles. In the pre-test stage, these keywords were searched through Iranmedex, a database for Persian medical articles. Comparing them with Persian medical thesaurus, those keywords exactly matched to the thesaurus words were entered in a designed database using Microsoft Access software. Then, we entered these authorized keywords in Iranmedex. Findings of new search sessions revealed that control of authorities on the one hand, makes information retrieval more precise and accurate and, on the other prevents false drops. The research findings can be used for modifying the process of information storage and retrieval on the Internet. The research concludes with a model for applying thesauruses as authority control tools for other databases available at Internet.

**Keywords:** Information Storage and Retrieval, Persian Medical Databases, Iranmedex, Authority Control, Persian Medical Thesaurus, False Drops.

### **Introduction**

Organization of Information has had particular importance in the Library and Information Science Literature since long. No matter if it is produced manually and digitally. A historical glance at the process of information organization demonstrates that librarians have always been responsible for organizing information resources by means of various methods and tools such as cataloguing and indexing.

The recent decades' developments of the Internet present new challenges for library

and information professionals for organization of information. One of the most significant challenges of information storage and retrieval is to bring closer the language of information providers and users.

In the present study, we examined the issue of "authority control" in the Internet environment by concentrating on a significant Persian medical database, Iranmedex. Based on research findings, we address how to use thesaurus as a tool for authority control and correspond it with the new environments.

### ***Problem Statement***

Due to the ever-changing and developing nature of the Internet and web-based technologies, a web-based medical database has the potential to be an invaluable source for users wanting to include the most recent medical information in their work. However, regarding the relevancy of needed information, the Internet and world-wide web have caused several problems for users.

One of the main current challenges in information retrieval research is to deal effectively with information user's language and language that evolve through the literature. On the one hand, authors and information producers express their thoughts by their own language and vocabulary; on the other hand, information users / seekers look for information through their own language and words. In other words, expressions of information users/seekers are not correspondent and compatible with those of information providers'. Unlike phrase or title searching which many have a precise and clear answer such as searching for the title of a book or an article, subject and / or keyword searching, in which users look for information "about" something, do not have a given and / or direct answer. Therefore, one of the main information retrieval problems is to select relevant keywords to meet users' information needs. This gap between information providers and users can be bridged through the use of appropriate information storage and retrieval tools.

It is a long time that authority control has enabled catalogers to disambiguate library items with similar or identical headings. But, there are still unsolved problems to control the Internet environment. Designers of websites, databases and search engines can use librarians' solutions and experiences in order to provide a useful environment for access to digital information through the Internet. Using authority control tools for Persian resources is one of the solutions and an example of the way Internet information providers can employ for retrieval of more relevant information by users.

### ***Research Questions***

1. What Persian medical databases are available on the Internet?
2. Which methods are used by Persian medical databases users to retrieve relevant

information?

3. How effective is Persian medical thesaurus in retrieving information?

4. What problems may users face using the Persian medical databases?

5. What types of equipments and resources are needed for making best use of subject authority control tools in the internet environment?

### ***Authority Control***

Determining name variants; problems of misspelling, etc., may seem insignificant, but libraries are trying to create a permanent record of works produced by an author. Inaccuracies in the name mean that users may not be able to identify all of the works that the library has by the author, or that by using the catalogs of multiple libraries; a library user may locate all of the works by a particular author. Insuring this uniformity is done through what is called authority control or authority records. Authority control is defined as “the consistent use and maintenance of the forms of names, subjects, uniform titles, etc., used as headings in a catalog. Since this process creates a link between bibliographic records and the authority file, authority control provides the underlying structure of the catalog” (Greenbelt, 1995). In fact, authority control is a method for eliminating shortcomings and deficiencies affecting information retrieval using natural language and /or vocabulary. In general, authority control fulfills two important functions. First, it enables catalogers to disambiguate items with similar or identical headings. For example, two authors who happen to have published under the same name can be distinguished from each other by adding middle initials, birth and/or death (or flourished, if these are unknown) dates, or a descriptive epithet to the heading of one (or both) authors. Second, authority control is used by catalogers to collocate materials that logically belong together, although they present themselves differently. For example, authority control enables a catalog to index all manifestations of a given book (including translations) together. Authority control is a way of assuring a catalog’s maximum usefulness to both library staff and patrons. It is affected by such factors as how people communicate and the need for standardization. The main purpose of authority control is to allow diverse people with diverse needs to find information in one organized place. In general, authority control has the following goals:

1. In order to retrieve a subject or name easily and fast, always one fixed and uniform term is used;

2. Related concepts and their relationship type are somehow distinguished;

3. Users always become familiar with the more idiomatic and fixed form of a subject or a name;

4. Words and terms which have two or more meanings are controlled so that when information is retrieved conceptual disorders are prevented;

5. Retrieving all of a certain author's works through the same access points (or under the same headings) is ensured;
6. Entering only this same author's works under a given heading is ensured;
7. Saving time and energy needed for cataloguing this same author's new work and so creating a new heading is prevented (Haji Zeinolabedini, 2005).

### ***Authority Control in the Digital Environment***

Considering authority control goals and functions, there are particular issues that present challenges in the new digital environment. For instance, some librarians reject the importance of creating name authority file in the new environment, while others argue that creating name authority file in the digital environment is still a necessity. Although many search tools and strategies such as "Boolean operators" and "Keyword searching" have been created, none of them can replace authority control.

In recent decades, Library of Congress and many large libraries have made their authority files machine-readable. In addition, in many automated systems, authority files are linked to bibliographic files and in all records, obsolescent headings are automatically replaced by new headings and its cross-references are created or reviewed. However, various studies on authority control and its compatibility with new environment indicate the significant role of authority control in organizing information (Asadi, 1999). One of the most important authority files which are provided based on users' need, is LC name authority file that is accessible online via OCLC, RLIN. Most of US libraries do their authority control activities based on file creation (Haji Zeinolabedini, 2005).

### ***Basic Authority Control Tools***

Among the most common and standard tools for authority control function, the *Library of Congress Subject Headings* (LCSH), *Sears List of Subject Headings* (Sears), *Library of Congress Name Authority File* (LCNAF), and *Anglo-American Cataloguing Rules, Second Edition* (AACR2) are more well-known by librarians world-wide. General tools include thesauruses, subject headings, name authority files, organizations' authority files and publishers' authority files. The following is a list of some helpful Persian authority control tools:

- Persian subject headings
- Authority files of authors and well-known personalities.
- Authority files of organizations and governmental institutions.
- Different thesauruses (e.g. ASFA, Medical thesaurus, Names ...).

### Literature Review

Shiri (1999) believes that using online dictionaries and thesauruses is an effective way in promoting information retrieval systems. He adds that "the most important advantage of this approach is that we can control user's activities and reactions in a searching process. By using these tools there is no need to have deep knowledge about linguistic and / or a specific subject for entering relevant keywords in a retrieval system, although this can be an advantage. This leads to a successful searching and user satisfaction".

In an article entitled "The Internet chaos: issues in organization, search and retrieval of information available on the world-wide web ", Fattahi (1999a) mentions that "the best solution to solve information retrieval problems in the Internet environment is to review methods of designing websites as well as how search engines index and organize the content of information of web.". He believes that cataloguing and indexing standards as it is used by librarians, to a large extent, can solve current problems. As a result, Internet users can easily utilize the ocean of information instead of sinking into it.

In a more recent article, Fattahi (2003) points out that searching and retrieval processes are the main part of new information systems. These systems, for instance offer enhanced and advanced search capabilities to help users create more complex queries. Advanced search lets users combine a wide variety of search criteria for more precise results, search a phrase combined with other search elements, direct the search engine to the element of a web document that user wish to search- its title, URL, text, hyperlinks or all of these, select time periods for results and specify a language. In their opinion, using relational files (such as subject headings, thesaurus or name authority files) increase precision rate, usefulness and value of retrieved information. For instance, a thesaurus of terms is a useful tool for the organization and retrieval of information. It helps the information seeker to choose the most suitable terms and to use those terms consistently. In particular, a display of the hierarchical relationships of terms can help users broaden a search or make it more specific. Cross referencing to synonyms will suggest alternative search terms, as will the provision of links to other conceptually related terms. In general a thesaurus helps users define their search in the terms which are most likely to lead to retrieval of relevant information. Therefore, a thesaurus can help Internet users more fully exploit the vast amount of stored information.

Haji Zeinolabedini (2002) in his M.A. thesis examines the issue of vocabulary control. He emphasizes that vocabulary control is used to improve the effectiveness of information storage and retrieval systems. Ideally, he adds, this should be done with least human intervention. Considering the huge amount of information on the Internet,

users are able to retrieve all relevant and needed information. In his conclusion, he points out the importance of vocabulary control in accessing the relevant information available on the Internet.

An IFLA study from 1991 through 1996 on the functional requirements of bibliographic records, reported by Madison (1997), identified four generic tasks performed by catalog users: to find, to identify (i.e., collocate), to select, and to obtain access. Although Cutter identified the first three over 100 years ago as functions of the library catalog, technological advancements over the past 20 years have vastly changed the parameters of these functions.

Oddy (1996) pointed out that the second objective of the catalog, i.e., to collocate works by an author and manifestations of a given work, is becoming more important “as we move away from concentration on the published unit as the building block of the collection and of the catalog”. She observed that the card catalog has limited us to pre-coordinate linking devices. So our concepts of main and added entries basically mean that we still conceive of the access points as though they are bound by the limits of the printed catalog. The computer, however, has made these notions obsolete. The fourth use of the catalog identified in the IFLA study, i.e., *to obtain access*, is a new function that is the direct result of digital technologies. Catalog records can now contain hypertext links to digital documents, which may be held locally or on a remote server. In other words, the catalog is now able to meet the growing expectation of providing access to the full documents rather than just surrogates of those documents.

Information seekers, however, will be disappointed with the catalog if they expect to find access to the full universe of information on the World Wide Web. Clifford Lynch (1998) said that many people perceive the Web to be a worldwide digital library and expect Web search engines to be the online catalogues of the future. He said these notions were not likely to become reality because of, among other things, quality issues, both in terms of the content of the resources on the Web and the retrieval capabilities of search engines. Nonetheless, Lynch pointed out that, today, the problem was not with finding; rather it was that there was too much relevant information. He foresees personalized information and filtering services being provided both by suppliers who offer new kinds of services and by highly intelligent, personalized information access and management systems that are “the antithesis of a centralized, anonymous-use system like an online catalog”.

Mandel and Wolven (1996) point out that digital documents contain information that allows us “to exploit the content of the document itself as a means for access”. Although they acknowledged that the traditional requirements for a useful access system (i.e., author identification, controlled subject vocabulary or classification, version control, and genre identification) are likely to be lacking in many digital

documents, Mandel and Wolven suggest that software tools and new technologies may work with us in the future to locate or prepare these identifiers.

Michael Gorman (2004) emphasizes on the necessity of authority control in “bibliographic architecture” and expresses concern about the lack of adequate control over most electronic resources. Web resources present a new challenge to information organizers in deciding which documents to catalog. Early in the paper, Gorman establishes that authority control, along with the vocabulary control related to it, pertains to the access point part of a catalog record and the standardization of access points. Gorman notes the two functions of access points: to enable catalog users to find records and to group records that share “a common characteristic”. He then lists six components, or aspects, of authority work. The first five of these he attributes to another author (Robert Burger), and the last is his addition: (1) “To record the standardized form of each access point” (2) “To ensure the gathering together of all records with the same access point” (3) “To enable standardized catalogue records” (4) “To document the decisions taken ....” (5) “To record all forms of the access point other than the one chosen as the normative form ...” and (6) “To record precedents and other uses of the standardized access point for the guidance of cataloguers”. With online catalogs, additional requirements include linking authority records to catalog entries and to all pertinent bibliographic records. Gorman suggests two solutions to the problem of a lack of adequate control over electronic documents: (1) If metadata is to be enhanced to meet the traditional standards of cataloging, it will require the use of skilled, experienced catalogers and the related investment of sufficient time and money to yield high-quality results. (2) Most electronic documents should not be catalogued. Decisions need to be made about how to identify documents worth cataloging and about how to preserve those documents. Gorman (2004) concludes that a system containing authority control is better than one does not have it. He also points out the creation of authority files in the internet environment.

Tillet (2004) reminds librarians "the opportunities that libraries have to now contribute to the infrastructure of the future Internet environment". She adds that "We can envision a shared international authority file being an integral part of a future “Semantic Web ... Here’s where libraries have an opportunity to contribute to the infrastructure of the future Web - we already have controlled vocabularies in our various authority files. Those would be linked with other controlled vocabularies of abstracting and indexing services, of biographical dictionaries, of telephone directories, and many other reference tools and resources to help users navigate and to improve the precision of searches, so users could find what they’re looking for". She foresees that "The availability of millions of authority records worldwide, multiple automated national and regional authority files, and the technological capabilities of the Internet

and protocols are all coming together now, and we are really at the brink of making a virtual international authority file a reality.

In a book entitled "Authority Control in Organizing and Accessing Information: Definition and International Experience" co-edited by Taylor and Tilet (2004), they examine several projects that are moving the information science profession in a direction that "International authority control will soon be a reality".

### Methodology

The first stage of the present research was to identify available Persian medical databases. Retrieving the Persian databases was not methodologically possible because the Persian domains are undivided from the rest of the Internet sites by a particular sign. Thus, we benefited greatly from the views of the experts in the field of Medicine to search the Internet environment for the target Iranian sites. Overall, we identified the following relevant databases:

1. Directory of Iranian medical articles (Iranmedex)<sup>1</sup>
2. Iranian Scientific Magazines and Articles (ISMAGES)<sup>2</sup>
3. Pars Medline<sup>3</sup>
4. Scientific information database (SID)<sup>4</sup>

The next step was to examine the features and capabilities of these databases. Table 1 compares four studied databases:

Table 1

#### *Features and Capabilities of Persian Medical Databases*

Database	Advanced search	Medical Journals	Full-text articles	User Guide	Vocabulary database	Cost	Statistics about use of site
Iranmedex	*	80	8347	*	-	*	*
Pars Medline	*	73	4000	*	-	-	-
SID	*	75	-	*	-	-	-
Ismages	-	68	-	-	-	-	-

As it can be seen in Table 1, Iranmedex has more and better capabilities. This database, compared with the rest of studied databases, covers more Persian journals, more indexed articles and provides access to more full-text articles. This is a good reason why almost all Iranian medical universities and medical information centers are subscribed to Iranmedex full-text services. It is necessary to add that Iranmedex administrators are so cooperative and willing to develop the database features based on users' feedbacks. Therefore, we selected Iranmedex as the main database for pre-test

stage. We also selected the second edition of Persian Medical Thesaurus, published in 2005, as an authority control tool.

During the research process, we had several meetings with Iranmedex administrators explaining the significance, necessity, methodology and current problems as well as shortcomings of the database. Because of the lack of access to digital version of Persian Medical Thesaurus, we had to design a database by using Microsoft Access for entering our selected keywords and their relationships.

### Results

In pre-test stage, all selected keywords, without making a distinction between authorized and non-authorized keywords, only based on natural language were searched in Iranmedex and the results were recorded. We utilized "exact phrase search" capability of the database for our search sessions. Table 2 shows an example of the search results:

Table 2

*An Example of Search Results in the Pre-Test Stage*

Selected keyword	Keyword type	Articles retrieved	Number of common articles	Overlapping percent
Accidents	Authorized	44	1	2%
Calamities	Free	6	1	2%

In the Persian Medical Thesaurus, the term "accidents" is a preferred term/keyword and the term "calamities" is a non-preferred term for it. As table 2 illustrates, doing search by each of these terms leads to different results that in turn, causes false drops during the information retrieval process.

In order to calculate overlapping ratio of retrieved articles by selected keywords, we used the following formula:

$$\text{Overlapping Ratio} = \frac{\text{number of same articles}}{\text{Total retrieved articles}} \times 100$$

After pre-test stage, controlled keywords available in our designed database were transferred to Iranmedex. In this final research stage, we repeated our search sessions just as pre-test stage. Table 3 shows the results:

Table 3

*An Example of Search Results in the Final Stage*

Selected keyword	Keyword type	Articles retrieved	Number of same articles	Overlapping percent
Accidents	Controlled	49	49	100%
Calamities	Free	49	49	100%

As the results in Table 3 indicate, searching by each one of controlled and free keywords led to the same results, i.e. full overlap (100%) of retrieved articles regardless of the type of keyword used.

In Table 4, there are more controlled/preferred keywords along with common uncontrolled/ no preferred keywords utilized by users. These terms have been searched by users both in pre-test and final stages.

Table 4

*A more Comprehensive Search Results in the pre-test and the Final Stage*

No.	Keywords	Keyword type		Retrieved articles		Number of same articles		Overlapping percent	
		<i>Free</i>	<i>controlled</i>	<i>Pre</i>	<i>Final</i>	<i>Pre</i>	<i>Final</i>	<i>Pre</i>	<i>Final</i>
1	Hepatitis		*	226	226	0	226	89%	100%
2	Liver inflammation	*		2	226	0	226		
3	Parasites		*	98	98	3	98	3.07%	100%
4	Hanger-on	*		3	98	3	98		
5	Ophthalmology		*	6	117	1	117	86%	100%
6	Optometry	*		112	117	1	117		
7	Black leprosy		*	22	22	1	22	4.34%	100%
8	Hansen's disease	*		1	22	1	22		
9	Sclerosis		*	11	169	4	169	2.31%	100%
10	Induration	*		162	169	4	169		
11	Jaundice		*	48	93	6	93	6.06%	100%
12	Chlorosis	*		51	93	6	93		

Table 4 indicates that applying authority control in Iranmedex database leads users to the same results. For example, in the pre-test stage, searching "jaundice" and "chlorosis" as two synonymous keywords resulted in retrieving 48 and 51 articles, respectively. In this stage, there are only 6 articles in which both keywords (jaundice and chlorosis) appeared. Therefore, if users were unaware of the difference between two keywords, by searching each of them they could miss more than 50% of the relevant articles available in Iranmedex. Of course, this loss is unacceptable and undesirable. It is

also a sign of database retrieval system inefficiency.

After modifications made to the database, searching the same keywords in the final stage as shown in Table 4 led to a 100% retrieval efficacy, i.e. full overlap between retrieved articles by two synonymous keywords. This means that users, for example, can search either jaundice or chlorosis to retrieve all related articles.

### ***Retrieving Information from Persian Medical Databases: Issues and Problems***

The main issues and problems include, but not limited to:

1. There is no vocabulary control or authority control, therefore a significant difference exists between the results of controlled and free keyword searching.

2. Often, search results are less relevant or irrelevant to the search terms. There could be several reasons for this, but the most common would be as follows:

- The vast amount of information is available in the electronic form today without any standard indexing system.
- Lack of a unified indexing scheme for all of relevant materials, regardless of type or source.
- Unavailability of a standard thesaurus for indexing Persian medical databases has enforced indexers to use the same terms in the text for indexing purposes. Obviously, authors prefer to use their own favorite terms instead of a thesaurus preferred terms regardless of any relationship between terms.

### ***Subject Authority Control in Web-Based Persian Medical Databases: Needed Resources***

The major needed resources include people, equipment, and money. We will discuss these three resources more in details:

#### ***Manpower***

In order to get more useful and/or relevant results from the Persian medical databases, it is essential to employ more expert and/or knowledgeable database designers. Besides, there is a vital need to consult with more medical experts for thesaurus construction and development. Librarians and information scientists can also bridge between computer scientists, linguistic experts and subject specialists. Librarians can teach others to use thesaurus efficiently. Present research revealed that designers of the Persian medical databases have not already made any use of librarians' consultation. Therefore, they were not familiar with medical thesauruses and the way in which they can use them for authority control purposes.

### *Equipments*

Main Equipments/tools needed for subject authority control in the Persian medical databases includes:

- **Persian medical thesaurus**

There is no doubt that without a Persian medical thesaurus there is no hope for a truly subject authority control. Fortunately, a reasonable comprehensive Persian medical thesaurus was published by librarians and information scientists of the National Library of Iran a decade ago. In its second edition, published in 2005, editors resolved many drawbacks of the first edition.

- **Software**

Powerful software is necessary with "exact phrase searching" capabilities. It should also help users to retrieve relevant articles by using an updated medical thesaurus.

### *Budget*

Of course, budget is always a key consideration as well, and plays an integral role in the prioritization process. Budget is needed for developing a national subject authority database, updating the Persian medical thesaurus, and consulting the experts in various fields. Such investments can enhance the quality of scientific research and productivity.

### **Conclusion and Suggestions**

The major findings of the present research largely confirmed that there is a difference between retrieving needed information from Persian medical databases by controlled and free keywords. This difference is arisen from using various terms by information producers and information seekers. Information producers express their thoughts by means of their own terms/vocabulary while information seekers do not use the same terms necessarily. That is why; there is not a full overlapping as well as correspondence between vocabulary of information producers and users. Library and information science professionals are responsible for bringing close the vocabulary of information producers and users. Applying useful tools such as thesauruses and subject headings can help librarians to achieve this goal. Comparison between printed and electronic databases indicates that the electronic databases represent the most promising searching capabilities. In terms of comprehensiveness, the Internet is a good example, however, the precision in the Internet environment is inversely proportional to recall i.e. if precision increases recall decreases and vice versa. Lack of authority control in the Internet environment leads to retrieval of irrelevant information and misses many relevant resources. We found that using authority control tools can solve many information retrieval problems in an online environment.

If web-based information systems are indexed and stored based on a standard thesaurus, users will not face the same problems during their retrieval process. Results of the present study also showed that although the Persian medical thesaurus had not been utilized for storage and retrieval of medical information in an online and/or computerized environment, it could be used properly to apply authority control in online as well as computerized environments.

It should be noted that by authority control we can help to increase quality of databases and provide users with their needed/relevant information.

Finally, we end this paper with the following suggestions:

1. All Persian medical databases make use of Persian medical thesaurus as a subject authority control to index their information.

2. In cooperation with database designers, Iranian National Library prepares a subject authorized database based on standards which is consistent with web-based environment.

3. Regarding the role and significance of authority control in information organization, it should be included in all related academic LIS courses and/or syllabus.

4- In order to meet users' needs, designers of medical information systems can prepare an intelligent list of basic accepted vocabulary in their databases at the time of data entry so that the issue of "authority control" can be applied and executed more easily.

#### Notes

1. [www.iranmedex.com](http://www.iranmedex.com)
3. [www.parsmedline.net](http://www.parsmedline.net)

2. [www.isimages.com](http://www.isimages.com)
4. [www.sid.ir](http://www.sid.ir)

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