

## Web Impact Factors for Iranian Universities

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### Abstract

*This study investigates the Web Impact Factors (WIFs) for Iranian universities and introduces a new system of measurement. Counts of links to the web sites of Iranian universities were calculated from the output of AltaVista search engine. The WIFs for Iranian universities were calculated by dividing link page counts by the number of pages found in AltaVista for each university at a given point in time. These WIFs were then compared, to study the impact, visibility, and influence of Iranian university web sites. Overall, Iranian university web sites have a low inlink WIF. While specific features of sites may affect an institution's Web Impact Factor, there is a significant correlation between the proportion of English-language pages at an institution's site and the institution's backlink counts. This indicates that for linguistic reasons, Iranian ([Persian-language](#)) web sites may not receive and attract the attention that they deserve from the World Wide Web. This raises the possibility that information may be ignored due to linguistic and geographic barriers, and this should be taken into account in the development of the global Web.*

### Keywords

*Webometrics, Web Impact Factor, Link analysis, Journal Impact Factor, Iranian universities*

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### Introduction

The World Wide Web has now become one of the main sources of information on academic and research activities, and therefore it is an excellent platform to test new methods of evaluating webometric activities. However the world scientific community has not yet accepted the Web as a full supplement or a complement to traditional scientific publishing.

University web sites in many countries are large multifaceted communication devices, and are increasingly used for a wide variety of purposes, from attracting new students to providing online library catalogues. In terms of research, university web sites can announce the existence and promote the achievements of individuals, research groups, institutes and departments. They can also disseminate findings, either by hosting online articles or by publishing summaries, data sets or tools. The pages themselves can be created centrally, by administrators or webmasters, or locally by individuals for themselves or their research team or projects. Potential benefits of an effective web presence include greater research impact, attracting students, media interest and commercial contacts. In this context it is logical to investigate measures of the effectiveness of web sites, both to study the communication

activity that they represent and to build useful evaluation metrics (Vaughan & Thelwall, 2005).

### **Research objectives and aims**

In this paper, we investigate the impact of Iranian university web sites as a part of the World Wide Web, and we try to answer the following research questions:

- What is the impact of Iranian university web sites on the overall information resource of the World Wide Web?
- Do the linguistic, cultural and geographic area of origin of a web site contribute to the site impact?
- To what extent are the Web information resources of the Persian-language world recognised in the largely English language world of the Web?

Many students, faculties, institutions, the government and the public in general are interested in rankings of universities for different purposes. However, the quality or reputation of universities cannot be precisely measured by mere numbers. It would be impossible to have a comprehensive qualitative and not quantitative ranking of Iranian universities, because of the huge differences in universities and the technical difficulties in obtaining comparable data across universities. On the other hand, there is no ranking of Iranian universities using multiple criteria. However, the research unit of the Iranian Ministry of Science, Research & Technology writes a report entitled "*Iran's national report on ranking universities based on their scholarly articles indexed by ISI*" every year. It is used as a national measure of research productivity among Iranian universities.

We decided to establish a kind of academic ranking of Iranian universities by evaluating their WIFs. We hope the ranking will help the reader to compare and identify Iranian universities by their WIFs. However, any ranking is controversial and no ranking is absolutely objective.

### **Literature review**

Bibliometric research methodologies of library and information science have always been used to provide tools for understanding the dynamics of disciplines, developing policy, and justifying research funding. Cronin & McKim (1996) have pointed out that the Web is becoming a significant communication medium for science and scholarship, and bibliometric studies of scholarly publishing are being extended to the Web. A growing literature has emerged that applies bibliometric measures to cyberspace. Terms applied to this new area of study include "webometrics" (Almind & Ingwersen, 1997), and "cybermetrics" (the title of a journal). Webometrics is defined as: "the study of the quantitative aspects of the construction and use of information resources, structures and technologies on the Web, drawing on bibliometric and informetric approaches" and cybermetrics is proposed as a generic term for: "the study of the quantitative aspects of the construction and use of information resources, structures and technologies on the whole Internet, drawing on bibliometric and informetric approaches" (Björneborn, 2004).

A key to webometric studies has been the use of large-scale search engines, such as AltaVista and AlltheWeb that allow measurements to be made of the total number of pages in a web site and the total number of backlinks to the web site. These search engines provide similar possibilities for the investigation of links between web sites/pages to those provided by the academic journals citation databases by the Institute of Scientific Information (ISI). But the

content of the Web is not of the same nature and quality as the databases maintained by the ISI (Noruzi, 2006).

The Web provides a fertile ground for the extension of the bibliometric techniques developed for the conventional print environment. A number of studies have been published, establishing the concept of webometrics (Larson, 1996; Almind & Ingwersen, 1997; Rousseau, 1997; Smith & Thelwall, 2002; Björneborn, 2004; Björneborn & Ingwersen, 2004). In particular, the WIF has been proposed by Ingwersen (1998) as a method of gauging the influence of web sites on each other, and of analysing links between institutions. Ingwersen proposed Web Impact Factors by analogy with Journal Impact Factors (JIF), and Mike Thelwall has developed the WIF in several papers in order to find possible correlations to traditional research productivity indicators (Björneborn, 2004).

The WIF as a useful measure of the overall influence of a web site, using the backlinks or inlinks (links coming into a site from other sites) to the web site, has been proposed independently by two bibliometric researchers. It is an interesting illustration of the dominance of English language research publishing that the concept of WIF was published first in a Spanish language journal by Rodríguez i Gairín (1997), but was not widely noticed until published in an English language journal by Ingwersen (1998).

The Journal Impact Factor can be broadly defined as the ratio of a numerator -the citations made to a journal, to the denominator -the number of articles (or citable items) published in that journal (Garfield, 1994). For the WIF, on the other hand, the numerator is the number of link pages made to a web site and the denominator is a measure of the size of the web site. In other words, a WIF is the number of pages linking to a web site, divided by the number of pages in the web site at a given point in time.

The time periods for the WIF and the JIF are different. The JIF measures citations made in journals published during one time period to articles published in another time period while the WIF is a "*snapshot*" of a search engine database at a specific time. Compared with the content of a journal paper, the content of a web resource lacks peer review and thus lacks quality control. The WIF is therefore not exactly the equivalent of the JIF. However, the WIF was inspired by the JIF (Noruzi, 2006). Links to a web site can be made from within the web site, or from outside, giving rise to three distinct WIFs: the overall WIF, combining inlinks and self-links; the inlink (revised) WIF, reflecting the number of pages linking from outside the web site being measured; and the self-link WIF, reflecting the number of pages linking from inside the web site.

Inlinks can be seen as an indicator of the overall significance and importance of a site. The number and the source of inlinks to a site are currently being used by Google to rank the relevance of retrieved results to the search queries. Google employs a conventional text-based scan to create an index of the Web's content, but the pages recommended in response to a query are ranked according to information from the link analysis. A page is rated highly if many pages point to it, and if many other pages point to those pages, and so on (Hayes, 2000). Google uses link analysis data in its results ranking algorithm and it appears likely that other search engines include this information in their proprietary algorithms.

Webmasters also want to get links and want to know how often they are linked and who is linking them. Webmasters need to continue adding unique content to their web sites, because high quality content is everything (Noruzi, 2004) for reader attraction. It is important to

understand that the more people link a web site, the more WIF the site is getting. The importance of inlinks are threefold: (i) more visibility on the Web and potentially more traffic to the site; (ii) better coverage by search engines (Vaughan and Thelwall, 2004); and (iii) higher ranking in search results.

The most convenient way of measuring links between institutional sites is to use the advanced search facilities of large-scale search engines, several of which include link data in their databases such as AltaVista, AlltheWeb, and Yahoo. Several WIF studies (e.g. Rodríguez i Gairín, 1997; Ingwersen, 1998; Smith, 1999a,b,c; Smith & Thelwall, 2002; Thelwall, 2002; Kousha & Horri, 2004; Smith, 2004; Noruzi, 2005) have been carried out using the advanced search features of the AltaVista search engine. However, commercial search engines are restricted in their coverage (Lawrence and Giles, 1999) and are optimised for searching rather than for webometric studies.

Web link analysis of university sites is promising in general terms, but in practice web links are not entirely equivalent to citations in the scholarly literature. Whilst much of the Web content of university sites is research related, there is significant content that is administrative, teaching, and recreational in nature. This is reflected in the links made to a site. Also, links may be made to web sites for reasons other than the citation of scholarly content: often links are part of directory listings, and are to an institution as a whole rather than to a specific research output (Smith & Thelwall, 2002).

In this context, there are some important questions about the WIF. For example, is the visibility of a web site related to factors such as age of the web site, language of the site, original country of the site, academic disciplines, or information content provided on the site? One measure of the visibility of a web site is the number of links that lead to the site because the more links to a site, the more chances the site will be visited and therefore the more potential impact the site will have within the scholarly community (Vaughan & Thelwall, 2003).

In the case of Canadian universities, Vaughan and Thelwall (2005) show that faculty quality and the language of the university were the two most important factors or predictors for links to a university web site. Higher faculty quality means more links. The most important finding of their research is that cultural factors along linguistic lines are a significant factor in inlink attraction. French-language universities in Canada received a significantly lower number of inlinks to their web sites than comparable English-language universities in Canada.

For good or for bad, English is the dominant international language, in some senses a world language that many non-English researchers use to communicate for scholarly purposes. For instance, Thelwall, Tang, and Price (2003) found that English was a major web language for international linking between universities throughout the European Union, accounting for about half of pages in most cases. They also found that French was not a particularly well-used language on the Web.

Moreover, the age of a web site affects the number of inlink pages, with older ones receiving more. Caution must be exercised when interpreting WIF findings, however. In general, newly created links (e.g. links in the newest pages on the Web or new links that have been recently added to old pages) are less likely to have been indexed by AltaVista. This may introduce a confounding variable into the study (Vaughan & Thelwall, 2003). However, it is difficult to

ascertain the age of a web site. Furthermore, universities that are more productive in research attract more inlinks (Vaughan & Thelwall, 2005).

Evidence has been found to indicate that web sites with more content are more visible in that they attract more links and therefore potentially more traffic to the sites. Web site age has been shown to affect site visibility: older web sites are more visible. It could be reasoned that changes of URL are not desirable because they can have a negative effect on web site visibility and thus reduce visits to the site (Vaughan & Thelwall, 2003).

### **The Dataset and Methodology**

The Iranian web domains are relatively well organized: academic sites are all in the domain ".ac.ir", where the pages of a specific university are almost all in the same second level subdomain. For example, the pages of the University of Tehran are all in domains whose names end with ut.ac.ir. Thus, the organization is similar to the ac.uk domain in the UK or ac.jp domain in Japan.

There are about 205 universities in Iran ([see the list](#)). We measured the WIFs for the public universities, and only five non-public (private) universities. In the case of Sharif University of Technology, Azarbaijan University of Tarbiat Moallem, Bushehr University of Medical Sciences, and Jahrom University of Medical Sciences (which have mirror sites ending with ".edu" or ".com"), we ignored their mirror sites in the current study. For the current study, we used a methodology for calculating WIFs that we have developed specially to compare Iranian university web sites.

When undertaking a WIF study, it is necessary to select a suitable search engine that will count the number of pages in the web site studied, and the number of pages linking to the web site. It should have a large database, covering as much of the Web as possible (Smith, 1999c). Currently, AltaVista satisfies these requirements most fully, with one of the largest databases (Notess, 2002) and search commands both for links and for number of pages at a web site.

It has been found in previous studies that commercial search engines such as AltaVista return inconsistent results (for instance, equivalent Boolean search statements may return different results). This appears to be due either to the algorithm of the search engine, or to the priority placed by the commercial search engine on returning useful results quickly rather than precise results at any cost in terms of processing time. As in past studies, we found AltaVista search results insufficiently consistent between different times of searching (for example in a month) and between different formulations of Boolean search statements.

Links to Iranian universities were counted using the text mode (Text-Only Search) of AltaVista (<http://www.altavista.com/web/text>). For each of the universities, a search was carried out to determine the total number of links, the number of inlinks, the number of self-links, the total number of pages and the number of English pages (in the latter case by ticking English language) at the site. The number of inlinks to the university web site was determined by:

(linkdomain:xxx.ac.ir/ OR linkdomain:www.xxx.ac.ir/) NOT (host:xxx.ac.ir/ OR  
host:www.xxx.ac.ir/)

where xxx is the domain name of the university web site. The count of inlinks to the university site and number of pages at the university site were used to calculate the inlink (revised) WIF of the university.

A search was carried out on AltaVista for total links:

linkdomain:xxx.ac.ir/ OR linkdomain:www.xxx.ac.ir/

where xxx is the domain name of the university, as above. AltaVista was set to search the worldwide for pages in all languages. Site collapse (which means that only one page from each site is displayed) was turned off. The searches and examination of sites was carried out in April 2005.

However, AltaVista does not always provide consistent Boolean results. For example,  $A \cap C$  does not always return the same result as  $C \cap A$ . The sets retrieved by commands in AltaVista sometimes include unexpected numbers. An example of the Boolean inconsistency problem is illustrated by the following search results on AltaVista:

<b>A</b>	linkdomain:ut.ac.ir/ OR linkdomain:www.ut.ac.ir/	46500
<b>B</b>	(linkdomain:ut.ac.ir/ OR linkdomain:www.ut.ac.ir/) NOT (host:ut.ac.ir/ OR host:www.ut.ac.ir/)	43100
<b>C1</b>	(linkdomain:ut.ac.ir/ OR linkdomain:www.ut.ac.ir/) AND (host:ut.ac.ir/ OR host:www.ut.ac.ir/)	421
<b>C2</b>	(host:ut.ac.ir/ OR host:www.ut.ac.ir/) AND (linkdomain:ut.ac.ir/ OR linkdomain:www.ut.ac.ir/)	422

In this case the two equivalent Boolean statements C1 and C2 differ by 2%, and the sum of C1 and B (43521) is 6.41% less than A, though by strict Boolean logic these should be the same.

Boolean inconsistencies arise because of the nature of the search engine algorithm: "the AltaVista search engine does not create full sets, so there may be inconsistencies in the total numbers - in fact the AltaVista search screen specifically states that the result is 'about n web pages'. From a relevance searching point of view this may be of little consequence: the relevancy algorithms are intended to provide the most relevant items at the beginning of the results, and the timing out only affects the less relevant items" (Smith, 1999c).

In this study, searches were carried out to determine the following:

- the total number of pages linking to the web site, A, for example  
linkdomain:ut.ac.ir/ OR linkdomain:www.ut.ac.ir/
- the number of pages at the web site, D, determined by the command:  
domain:ut.ac.ir/ OR domain:www.ut.ac.ir/
- the number of inlinks (links from pages outside the web site), B:  
(linkdomain:ut.ac.ir/ OR linkdomain:www.ut.ac.ir/) NOT (host:ut.ac.ir/ OR host:www.ut.ac.ir/)
- the number of self-links (links from pages in the same web site), C, measured in the following way:

(linkdomain:ut.ac.ir/ OR linkdomain:www.ut.ac.ir/) AND (host:ut.ac.ir/ OR host:www.ut.ac.ir/)

The observations selected were used to calculate

- the overall WIF: A/D
- the inlink (revised) WIF: B/D
- the self-link WIF: C/D

The WIFs can be used to compare the impact of web sites from individual countries on the Web, for instance by looking for links to Iranian web sites:

linkdomain:ir/

However, the "linkdomain:" command used in AltaVista does not reliably discriminate between links to a domain, such as ".ir/", and links to URLs where the character string comprising the domain name appears in other parts of the URL, for instance .../ir.html. As a result, it is not possible to reliably calculate WIFs for top-level domains (TLDs) with the currently available AltaVista searches, nor even for lower level domains, such as ut.ac.ir/. However, it is possible to calculate rough WIFs for top-level domains such as ".ir/" or ".ac.ir/" in AltaVista, by the following commands:

**Table 1. Calculating WIF for .ir (Iran) TLD (April 13, 2005)**

<b>A</b>	linkdomain:ir/	8,540,000
<b>B</b>	linkdomain:ir/ NOT domain:ir/	1,060,000
<b>C</b>	linkdomain:ir/ AND domain:ir/	7,460,000
<b>D</b>	domain:ir/	7,520,000

Total WIF = A/D= 1.14

Revised WIF = B/D= 0.14

**Table 2. Calculating WIF for ac.ir SLD (Sub-level domain) (April 13, 2005)**

<b>A</b>	linkdomain:ac.ir/	6,230,000
<b>B</b>	linkdomain:ac.ir/ NOT domain:ac.ir/	6,080,000
<b>C</b>	linkdomain:ac.ir/ AND domain:ac.ir/	207,000
<b>D</b>	domain:ac.ir/	251,000

Total WIF = A/D= 24.82

Revised WIF = B/D=24.22

It is unlikely that the string will appear in a URL other than as a reference to that web site, so the "linkdomain:" command provides a reasonable estimate of the number of pages linking to the web site. Thus, it is possible to reliably calculate WIFs for institutions in Iran, and to regard these as one indicator of the overall influence of these institutions on the overall World Wide Web.

## Results

The main objective of this paper is to compare different Iranian sources of links rather than different counting methods, but this aspect is briefly addressed here to indicate the reliability of the tables obtained. The Iranian sources of link counts were tested at different times over a five month period (once by "link:" command, and once by "linkdomain:" command) and so, given the expanding nature of the Web, the result can be expected to be considerably different from each other. The issue of reliability is, therefore, of relative rather than absolute magnitude.

If counts of inlinks to an academic web site were compared over time, the changes observed could be expected to include large increases, for example, if a new large collection of pages



were to be added; and large decreases if sets of old pages were to be periodically deleted. Counts of links to the same site should be steadier, at least in relative size, depending as they do upon the contents of pages from a range of other sites. An exception to this occurs when one university introduces or removes a collection of pages with a disproportionately large collection of inlinks. Anomalies are therefore to be expected in any comparison of sources of link counts over time even if there is an otherwise linear trend (Smith & Thelwall, 2002). As proposed by Snyder & Rosenbaum (1999) and Björneborn & Ingwersen (2001) a time series WIF was calculated for the University of Tehran in order to monitor AltaVista search engine performance (see Table 3).

**Table 3. Comparison of AltaVista search engine link counts to the University of Tehran**

Date of search in AltaVista	<b>W (A/D) Web Impact Factor (overall WIF)</b>	<b>A</b> Links to web site (total)	<b>B</b> Inlinks to site, without self- links	<b>C</b> Self- links to web site	<b>D</b> Web pages indexed by AltaVista	<b>E (B/D) Revised Web Impact Factor</b>	<b>F</b> Inlinks coming from domains except IR (Iran)	<b>G</b> English pages in the web site	<b>H</b> Links to site coming from English pages
13 April 2005, 11:30 a.m.	4.60	46500	43100	421	10100	4.27	26600	7430	26100
3 April 2005, 6:30 p.m.	4.48	45200	42300	418	10100	4.19	25700	7490	24900
24 March 2005, 3:00 p.m.	2.13	40800	40100	348	19200	2.09	20700	9250	22600
16 March 2005, 4:25 p.m.	3.12	40200	39900	361	12900	3.09	21000	9870	22200
9 March 2005, 7:30 p.m.	2.95	40100	39500	367	13600	2.90	20800	10600	22100
1 March 2005, 4:45 p.m.	2.87	41300	39300	385	14400	2.73	20900	11400	22900
21 February 2005, 6:15 p.m.	2.17	41800	39500	412	19300	2.05	20900	12300	23600
4 February 2005, 6:45 p.m.	2.06	20100	19500	406	9750	2.00	10300	7990	11400
21 January 2005, 6:30 p.m.	2.14	19900	19200	388	9290	2.07	10300	8070	11600



11 January 2005, 4:25 p.m.	1.91	19900	19200	8250	10400	1.85	10600	8150	11700
7 January 2005, 2:00 p.m.	1.90	19600	19100	8140	10300	1.85	10300	8020	11400
23 December 2004, 2:10 p.m.	1.94	19200	18900	7690	9900	1.91	10500	7790	11300
14 December 2004, 4:00 p.m.	2.07	16800	16700	6030	8130	2.05	10000	6270	9730
6 December 2004, 3:40 p.m.	2.04	16900	16500	6170	8290	1.99	10000	6510	9650
30 November 2004, 12:30 p.m.	1.89	16800	16300	6870	8870	1.84	9470	7080	9620
29 November 2004, 1:00 p.m.	1.89	16800	16300	6880	8870	1.84	9460	7080	9630

The WIFs of Iranian universities are listed in the Appendix (Tables 6, 7, 8, and 9). Tables 6, 7, 8, and 9 show that Iranian universities link most to themselves, which is expectable. They also suggest that Iranian universities link to each other, with Iran being a more popular target of links. The results overall suggest that the academic web in Iran is somewhat insular; relatively well interconnected, but less well-known internationally. As shown by Kousha and Horri (2004) universities with numerous scholarly publications (number of published articles indexed by citation databases of ISI), receive numerous academic inlinks from American universities or academic institutions with domain names ending in .edu.

Interestingly, although, Iran is one of the most isolated nations, it is well connected to university web sites in the USA, Canada, UK, Germany, France, Italy, Sweden, Netherlands, Switzerland, Australia, Japan, Austria, Turkey, Brazil, Norway, Spain, and etc. As shown in Table 4, it is American and Canadian universities that link most to Iranian universities, perhaps because of the existence of Iranian professors and students in American and Canadian universities who create links on their personal homepages in American and Canadian universities to their former degree-awarding universities in Iran. We made this comparison by the following commands in AltaVista (see Table 4).

**Table 4. Countries that link to Iranian universities (April 13, 2005)**

<b>Country</b>	<b>Link counts</b>	<b>Search command</b>
USA	846	linkdomain:ac.ir/ AND domain:edu
Canada	296	linkdomain:ac.ir/ AND domain:ca
UK	177	linkdomain:ac.ir/ AND domain:ac.uk
Germany	105	linkdomain:ac.ir/ AND domain:de
France	65	linkdomain:ac.ir/ AND domain:fr
Italy	51	linkdomain:ac.ir/ AND domain:it
Sweden	48	linkdomain:ac.ir/ AND domain:se
Netherlands	46	linkdomain:ac.ir/ AND domain:nl
Switzerland	44	linkdomain:ac.ir/ AND domain:ch
Australia	42	linkdomain:ac.ir/ AND domain:edu.au
Japan	30	linkdomain:ac.ir/ AND domain:ac.jp
Austria	29	linkdomain:ac.ir/ AND domain:ac.at
Turkey	26	linkdomain:ac.ir/ AND domain:edu.tr
Brazil	24	linkdomain:ac.ir/ AND domain:br
Norway	20	linkdomain:ac.ir/ AND domain:no
Spain	16	linkdomain:ac.ir/ AND domain:es
Finland	14	linkdomain:ac.ir/ AND domain:fi
Belgium	12	linkdomain:ac.ir/ AND domain:ac.be
Lebanon	12	linkdomain:ac.ir/ AND domain:edu.lb
Korea, Republic of	12	linkdomain:ac.ir/ AND domain:ac.kr
Hungary	9	linkdomain:ac.ir/ AND domain:hu
India	9	linkdomain:ac.ir/ AND domain:ac.in
Croatia/Hrvatska	8	linkdomain:ac.ir/ AND domain:hr
Czech Republic	8	linkdomain:ac.ir/ AND domain:cz
Israel	8	linkdomain:ac.ir/ AND domain:ac.il
Portugal	8	linkdomain:ac.ir/ AND domain:pt
Thailand	8	linkdomain:ac.ir/ AND domain:ac.th

Greece	7	linkdomain:ac.ir/ AND domain:gr
Ireland	7	linkdomain:ac.ir/ AND domain:ie
South Africa	7	linkdomain:ac.ir/ AND domain:ac.za
Denmark	6	linkdomain:ac.ir/ AND domain:dk
Mexico	6	linkdomain:ac.ir/ AND domain:mx
Argentina	3	linkdomain:ac.ir/ AND domain:edu.ar
China	3	linkdomain:ac.ir/ AND domain:edu.cn
Latvia	3	linkdomain:ac.ir/ AND domain:lv
New Zealand	3	linkdomain:ac.ir/ AND domain:ac.nz
Poland	3	linkdomain:ac.ir/ AND domain:edu.pl
Sri Lanka	3	linkdomain:ac.ir/ AND domain:ac.lk
Colombia	2	linkdomain:ac.ir/ AND domain:edu.co
Peru	2	linkdomain:ac.ir/ AND domain:edu.pe
Slovenia	2	linkdomain:ac.ir/ AND domain:si
United Arab Emirates	2	linkdomain:ac.ir/ AND domain:ac.ae
Lithuania	1	linkdomain:ac.ir/ AND domain:lt
Malaysia	1	linkdomain:ac.ir/ AND domain:edu.my
Romania	1	linkdomain:ac.ir/ AND domain:ro
Russia	1	linkdomain:ac.ir/ AND domain:edu.ru
Senegal	1	linkdomain:ac.ir/ AND domain:sn
Slovak Republic	1	linkdomain:ac.ir/ AND domain:sk
Taiwan	1	linkdomain:ac.ir/ AND domain:edu.tw
Yugoslavia	1	linkdomain:ac.ir/ AND domain:ac.yu

For each country, we searched with the [generic TLD](#) (examples being ".ca", ".de", ".it" and ".fr") and then we removed non-university sites from retrieved results. We tried to make this research as representative as possible and tried to make the data more reliable. However, we faced the following limitations in this research:

1. In the case of Canadian Universities (which have not used sub-TLDs such as 'edu' or 'ac'), the complexity of the Boolean statement required appeared to be too great for AltaVista to handle. Therefore, we have divided search query into two groups:

linkdomain:ac.ir/ AND (domain:carleton.ca OR domain:concordia.ca OR domain:dal.ca OR domain:mcgill.ca OR domain:mcmaster.ca OR domain:mta.ca OR domain:mun.ca OR domain:mun.ca OR domain:polymtl.ca OR domain:queensu.ca OR domain:sfu.ca OR domain:ubc.ca OR domain:ucalgary.ca OR domain:ulaval.ca OR domain:umanitoba.ca) = 159  
linkdomain:ac.ir/ AND (domain:umontreal.ca OR domain:unb.ca OR domain:uottawa.ca OR domain:uregina.ca OR domain:usask.ca OR domain:utoronto.ca OR domain:uwaterloo.ca OR domain:uwindsor.ca OR domain:uwo.ca OR domain:wlu.ca OR domain:yorku.ca) = 137

$$159+137 = 296$$

This is also true for other countries in which universities have not used sub-TLDs such as 'edu' or 'ac').

2. We found that the number of English pages reported by AltaVista for Iranian universities is not correct. This appears to be due either to the lack of "language meta tag" in Persian pages, which reported as English pages, or to misuse of the "English language tag" in Persian pages.

**Table 5. Persian and English pages of Iranian universities indexed by AltaVista**

Language	Web pages	Percentage
English	65901	57%
Persian	49159	43%
Total	115060	100%

3. Some Iranian universities are not indexed by AltaVista, while Google indexes them. For example:

- [Art University of Isfahan](#)
- [Imam Reza University](#)
- [International University of Iran](#) (IUI)
- [Tabriz Islamic Art University](#)

Moreover, we found that Google has a better coverage of Iranian universities.

4. It seems that the less prestigious universities are being ignored by their Iranian peers and by foreign universities when it comes to being the target of hyperlinks. In fact, the Tables (6, 7, 8, and 9) are consistent with the hypothesis that research quality, content, age, and language of university web site are the primary determining factors for links. It is evident that old and well-known universities have more backlinks (inlinks) and greater web site size than less prestigious ones. In other words, larger Iranian universities are likely to have more web pages and thus attract more inlinks to their sites (see Table 6).

## Discussion

A general-purpose search engine such as AltaVista is useful in webometric studies. However this may not be because of better coverage, but could also be due to the time factor, outdated or duplicate links being included in the search or the inclusion of non-university academic web sites. In summary AltaVista search engine:

- Uses a proprietary algorithm which is not known to the researcher;
- Covers a wide range of domains, but it is not clear to what depth it indexes a given domain;

- Is easily accessible and usable (Smith & Thelwall, 2002).

While the links between the Iranian universities are fairly predictable, there might be potential for studying the links made by universities farther afield, for example to explore if Asian universities have more links to Iranian universities because of their relative proximity. We examined the educational SLD of all Asian and Middle-Eastern countries with ".ac.ir" SLD (for example, linkdomain:ac.ir/ AND domain:edu.pk), but the above-mentioned assumption was not confirmed (see Table 4).

The current study has revealed an issue in assessing university domains, i.e. that some university domain names are not constant. For instance during the period of the study we found that the name of [Ahvaz University of Medical Sciences](#) and its domain name have officially changed.

The revised WIFs of Iranian universities also vary. While this may be a useful indication of the influence of a university on the Web, it may also indicate that, for the reasons noted previously, AltaVista is an imperfect tool for determining the total number of pages at a site; and also that the number of pages may be a poor measure of the information content of a site.

There are significantly different reasons for linking to one country rather than others. A study has shown that the quantity of research produced by academics is the main reason for attracting links (Thelwall & Harries, 2004). It can be assumed that in the case of Iran, the quantity of immigration of highly educated Iranians to continue further education or to work in American and Canadian universities is the main explanation for attracting links. It would be interesting to see how motivation for international links vary by country, especially among countries with higher brain drain rates and if there are significantly different reasons for linking to one country than others (Kousha & Horri, 2004).

## Conclusions

This study has some important lessons for webmasters of Iranian university web sites. First, web sites of Iranian universities are becoming a significant body of Persian-language web space literature. Second, webmasters of Iranian university sites need to be aware of different measures of effectiveness, and visibility of web sites. Some other, perhaps more minor, points relate to how the Iranian university web sites are constructed and managed. Webmasters of Iranian universities have been keen to have high link counts. Recognition on the Web, particularly by the Google PageRank, can be promoted by links. Links from sites that are themselves highly linked promote visibility on the Web, for example when searching Google. A methodological issue that arose in this study was the structure of university URLs: WIF studies of Iranian university sites could be aided by webmasters having a standard "root" URL for the university and faculties, and changes of URL increase the complexity of tracking links.

One objective of this paper was to ascertain whether there was any evidence for differing patterns of link creation to Iranian universities from foreign universities and between themselves. The propensity to link between Iranian universities showed that national links are much more likely than international links. Iran also appeared to be relatively insular, interlinking well, but being less well linked to. According to AltaVista retrieved results, American universities make more backlinks (approximately 846) to Iranian universities. The data was not clear enough to reveal any more specific pattern that could be linked to the type of universities considered. This study has been exploratory, and there is scope for future webometric research in this area. It would be useful to carry out a more comprehensive study,

comparing more Iranian institutions, sub-TLDs, and comparing the Web with conventional scholarly publication output and indicators of economic and technological development of Iran.

A comparison of Iranian university web sites raises interesting questions about the place of different languages and cultures on the Web. Iran is outside the main Web area, dominated by the USA, Canada, Europe, Australia, India, Japan, and etc. It appears that Iranian (Persian-language) web sites may achieve a lower visibility on the Web because their language and culture are different from the current mainstream of the Web, which is dominated by English-speaking countries. It also appears that Iranian sites which are in English may achieve greater recognition than those in Persian-language. This is a warning to cybercitizens. If the Web is dominated by English language sites, important knowledge created in non-English speaking areas may be missed, or recognition may be delayed.

Further research is needed to gain a better understanding of the nature of web links, and further research may be necessary to find reasons for the limited number of Iranian (Persian-language) university web sites.

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**Table 6. Web Impact Factors for Iranian university web sites with more than 1000 pages indexed by AltaVista**

University	W (A/D) Web Impact Factor (overall WIF)	A Links to web site (total)	B Inlinks to site, without self- links	C Self- links to web site	D Web pages indexed by Alta Vista	E (B/D) Revised Web Impact Factor	F Inlinks coming from domains except IR (Iran)	G English pages in the web site	H Links to site coming from English pages
Iran University of Science & Technology	16.19	23800	21500	367	1470	14.63	2500	1170	2370
University of Tehran	4.60	46500	43100	421	10100	4.27	26600	7430	26100
Isfahan University of Technology	12.86	19800	4620	720	1540	3.00	2690	1260	1880
Sharif	2.79	34900	33200	236	12500	2.66	27100	11000	11700

University of Technology									
Ferdowsi University of Mashad	3.21	26700	21700	2160	8320	2.61	2210	1450	2140
Shiraz University of Medical Sciences	11.76	22000	2990	1000	1870	1.60	2190	1590	2750
Isfahan University of Medical Sciences	1.50	1550	1220	318	1030	1.18	417	746	943
Shiraz University	3.05	10600	3130	1670	3470	0.90	1610	2790	4850
University of Tabriz	1.53	2350	1250	923	1540	0.81	982	900	1050
Imam Sadiq University	1.64	1930	701	1140	1180	0.59	571	360	537
Tehran University of Medical Sciences	2.26	9950	2280	1940	4400	0.52	1350	1660	1850
Shahid Chamran University	1.04	1640	656	925	1580	0.42	518	1410	1080
Mashhad University of Medical Sciences	1.12	1380	430	904	1230	0.35	306	748	752
Tabriz University of Medical Sciences	0.97	2100	722	1280	2170	0.33	545	1110	923
University of Kashan	0.70	3490	1470	1290	4980	0.30	506	2820	2200
Shahid Beheshti University of Medical Sciences	1.43	3680	501	2430	2570	0.19	344	1760	2000
Tarbiat Modarres University	1.71	22400	2260	8900	13100	0.17	1680	7170	7440

University of Isfahan	0.93	12600	2110	5470	13600	0.16	1280	7640	8900
Payame Noor University, Tehran	0.94	8320	1430	2210	8870	0.16	1200	2560	1880
Baghyatoolah Medical Sciences University	1.12	1930	221	1640	1730	0.13	163	662	710
Arak University of Medical Sciences	1.10	1370	143	1220	1240	0.12	99	10	65

**Table 7. Web Impact Factors for Iranian university sites with 500-1000 pages indexed by AltaVista**

<b>University</b>	<b>W (A/D) Web Impact Factor (overall WIF)</b>	<b>A Links to web site (total)</b>	<b>B Inlinks to site, without self- links</b>	<b>C Self- links to web site</b>	<b>D Web pages indexed by Alta Vista</b>	<b>E (B/D) Revised Web Impact Factor</b>	<b>F Inlinks coming from domains except IR (Iran)</b>	<b>G English pages in the web site</b>	<b>H Links to site coming from English pages</b>
Khaje-Nassir-Toosi University	8.10	4530	3400	181	559	6.08	2420	459	925
Bu Ali Sina University	3.04	2430	1880	451	799	2.35	1230	785	1270
Amir Kabir University of Technology	4.04	3900	2070	814	966	2.14	1750	586	1420
Petroleum University of Technology	1.88	1390	821	524	740	1.11	650	605	723
University of Guilan	1.95	1410	743	633	724	1.03	565	150	811
Urmia University	1.82	1210	646	544	664	0.97	450	367	580
Shahid Bahonar University of Kerman	1.43	912	567	320	637	0.89	265	475	557

Kerman University of Medical Sciences	0.78	619	491	101	794	0.62	171	482	209
Zanjan University	1.12	632	330	287	565	0.58	262	417	585
Zahedan University of Medical Sciences	1.18	1130	531	562	955	0.56	396	637	595
University of Sistan & Baluchestan	1.23	918	404	497	744	0.54	292	499	416
Alzahra University	1.30	730	272	455	560	0.49	161	514	572

**Table 8. Web Impact Factors for Iranian university sites with 100-500 pages indexed by AltaVista**

<b>University</b>	<b>W (A/D) Web Impact Factor (overall WIF)</b>	<b>A Links to web site (total)</b>	<b>B Inlinks to site, without self- links</b>	<b>C Self- links to web site</b>	<b>D Web pages indexed by Alta Vista</b>	<b>E (B/D) Revised Web Impact Factor</b>	<b>F Inlinks coming from domains except IR (Iran)</b>	<b>G English pages in the web site</b>	<b>H Links to site coming from English pages</b>
Islamic Azad University, Tehran (South)	6.33	1710	1450	226	270	5.37	1190	0	787
Semnan University	4.48	484	407	70	108	3.77	325	0	140
Kermanshah University of Medical Sciences	4.08	812	730	92	199	3.67	515	90	314
Iran University of Medical Sciences	3.54	1280	940	295	362	2.60	869	331	655
Yazd University	3.28	708	477	214	216	2.21	362	178	340
Shahrood University of Technology	2.97	617	409	182	208	1.97	301	141	247

Zanjan University of Medical Sciences	2.39	667	460	54	279	1.64	339	111	164
Sahand University of Technology	2.03	268	198	64	132	1.50	116	79	150
Guilan University of Medical Sciences	2.26	1110	648	360	492	1.32	464	329	460
Shahrekord University	1.92	309	212	95	161	1.32	120	159	187
Hadith Science College	2.00	240	155	85	120	1.29	136	0	15
Kurdistan University of Medical Sciences	1.24	191	162	29	154	1.05	60	47	66
Kerman Khaje-Nasir Higher Education Center	1.84	773	383	390	419	0.91	376	384	573
Shahid Sadoughi University of Medical Sciences	1.56	289	131	152	185	0.71	78	39	91
Razi University	1.55	660	273	385	425	0.64	221	136	279
University of Mazandaran	1.28	551	258	293	429	0.60	141	216	253
Malek Ashtar University of Technology	1.43	181	75	108	127	0.59	60	67	73
University of Social Welfare & Rehabilitation Sciences	1.55	559	198	350	360	0.55	178	200	350
Babol University of Medical	1.08	373	181	191	344	0.53	113	112	145

Sciences									
Semnan University of Medical Sciences	1.03	161	81	79	157	0.52	51	124	95
Kashan University of Medical Sciences	1.50	386	127	254	258	0.49	104	77	124
Sabzevar School of Medical Sciences	0.80	117	68	51	146	0.47	47	20	20
Lorestan University	0.97	196	74	125	203	0.36	61	43	21
Ardabil University of Medical Sciences	1.08	184	58	126	170	0.34	36	68	74
Yasuj University	1.23	200	47	148	162	0.29	34	156	161
Islamic Azad University, Hamedan	1.19	531	90	433	448	0.20	76	4	38

**Table 9. Web Impact Factors for Iranian university sites with less than 100 pages indexed by AltaVista**

<b>University</b>	<b>W (A/D) Web Impact Factor (overall WIF)</b>	<b>A Links to web site (total)</b>	<b>B Inlinks to site, without self- links</b>	<b>C Self- links to web site</b>	<b>D Web pages indexed by Alta Vista</b>	<b>E (B/D) Revised Web Impact Factor</b>	<b>F Inlinks coming from domains except IR (Iran)</b>	<b>G English pages in the web site</b>	<b>H Links to site coming from English pages</b>
Hamedan University of Medical Sciences	231.50	463	463	0	2	231.50	355	1	111
Hormozgan University of Medical Sciences	230.67	692	692	0	3	230.67	566	2	159
University of	60.00	120	117	3	2	58.50	89	2	66

Birjand									
Kurdistan University	57.00	57	57	1	1	57.00	23	0	11
Kish University	38.67	116	115	1	3	38.33	87	3	65
Shahed University	44.00	44	36	0	1	36.00	35	0	26
Shahid Beheshti University	34.62	1800	1750	29	52	33.65	1470	46	748
Allame Tabataba'ee University	32.10	321	305	18	10	30.50	296	5	126
ValiAsr University of Rafsanjan	30.00	30	30	1	1	30.00	18	0	12
Shahid Rajaei Teacher Training University	26.50	53	51	2	2	25.50	43	1	38
Mofid University	20.86	146	140	8	7	20.00	111	7	65
Imam Hossein University	18.22	164	149	0	9	16.56	110	9	60
Bushehr University of Medical Sciences	16.00	16	16	0	1	16.00	8	1	6
Gorgan University of Agricultural Sciences & Natural Resources	16.33	147	139	7	9	15.44	126	6	53
University of Zabol	18.00	54	46	8	3	15.33	39	1	15
Arak University	13.31	346	326	25	26	12.54	242	3	82
International University of Chabahar	12.70	127	119	9	10	11.90	100	10	56
Comprehensive University of	12.00	12	11	1	1	11.00	6	0	4



Applied & Practical Sciences, Khorasan									
School of International Relations	11.93	179	164	16	15	10.93	137	5	50
Qazvin University of Medical Sciences	10.14	71	67	4	7	9.57	45	4	35
University of Art, Tehran	10.77	280	237	33	26	9.12	171	24	126
Lorestan University of Medical Sciences	9.78	88	81	7	9	9.00	46	0	32
Imam Khomeini International University	9.58	230	207	22	24	8.63	168	13	54
Ilam University	7.71	131	121	9	17	7.12	92	0	33
Bagher Aloloum University	6.75	27	24	4	4	6.00	22	0	6
Islamic Azad University, Shiraz	6.00	48	43	5	8	5.38	39	7	25
Islamic Azad University, Tehran Medical Sciences	5.96	167	147	29	28	5.25	105	2	71
University of Mohaghegh Ardebili, Ardebil	13.00	13	5	0	1	5.00	1	0	0
Hormozgan University	5.71	97	81	16	17	4.76	53	17	46
Qom University of Medical Sciences	5.50	11	9	2	2	4.50	4	0	6
Qom	4.00	40	38	2	10	3.80	21	3	21

University									
Urmia University of Medical Sciences	3.38	189	144	45	56	2.57	93	43	103
Shomal University	2.73	194	152	41	71	2.14	149	33	62
Damghan University of Basic Sciences	3.00	60	40	20	20	2.00	32	0	21
Ashrafi Isfahani Academic Institute	3.00	18	12	6	6	2.00	9	0	3
Tarbiat Moallem University	2.95	271	174	87	92	1.89	152	75	130
Gonabad University of Medical Sciences	2.95	16	13	3	7	1.86	5	3	13
Islamic Azad University, Tehran (Central)	3.11	59	35	5	19	1.84	32	0	16
Tarbiat Moallem University of Sabzevar	2.18	135	109	26	62	1.76	85	24	37
School of Economic Affairs	2.09	48	40	10	23	1.74	24	19	21
Shiraz University of Applied Science & Technology	2.33	35	21	13	15	1.40	20	1	5
Mazandaran University of Sciences and Technology	1.63	13	11	1	8	1.38	6	0	3
Yasuj University of Medical Sciences	2.07	145	84	64	70	1.20	53	0	17

Rafsanjan University of Medical Sciences	2.05	78	45	33	38	1.18	29	18	29
Fasa Faculty of Medical Sciences	1.69	127	85	46	75	1.13	51	67	85
Comprehensive University of Applied & Practical Sciences, Tehran	2.03	79	43	35	39	1.10	40	0	9
Payame Noor University, Shiraz	1.84	46	24	23	25	0.96	19	9	12
Birjand University of Medical Sciences	1.43	96	59	36	67	0.88	40	18	31
Sadjad Institute of Higher Education	1.71	168	84	86	98	0.86	73	12	25
Jahrom University of Medical Sciences	1.80	36	17	13	20	0.85	6	1	15
University College of Nabi Akram, Tabriz	0.83	34	34	1	41	0.83	10	37	19
Persian Gulf University	1.47	47	25	22	32	0.78	19	27	32
Qeshm Institute of Higher Education	1.23	81	41	43	66	0.62	19	46	52
Ahvaz Jondishapour University of Medical Sciences	1.01	98	55	43	97	0.57	6	10	5
Azarbaidjan University of Tarbiat Moallem	0.96	23	13	9	24	0.54	10	11	12

Ilam University of Medical Sciences	0.63	19	5	14	30	0.17	4	0	3
Golestan University of Medical Sciences	0.69	20	5	15	29	0.17	4	1	9
Mazandaran University of Medical Sciences	1.04	85	4	80	82	0.05	2	0	0

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