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Webometrics as a Tool for Measuring Popularity of Websites : an Analysis of Websites of IISERs in India

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ABSTRACT

Webometrics can be used to measure the popularity or web presence of websites. In the present study, websites of IISERs in India were analysed using Link Analysis to extract no of web pages, in-link pages, and self link pages thereby ranking them based on Web Impact Factor (WIF) and Revised Web Impact Factor (R-WIF). The website of IISER Bhopal came first in both types of ranking followed by the website of IISER Mohali. The website of IISER Tirupati came last in both types of ranking. Also Spearman's Rank Correlation is used to establish the relation between both the types of ranking. From the results it is clear that, the rankings based on both WIF and R-WIF are same and the Spearman's Rank Correlation Coefficient is calculated to be one. This means that there is much closeness or association between both types of ranking.

Keywords : Webometrics, Webometric Analysis, Link Analysis, IISER Websites, Spearman's Rank Correlation.

I. INTRODUCTION

Webometrics is a measure of various aspects of information contained in the World Wide Web. It can be used to conduct link analysis, user statistical analysis, content analysis, etc. Bjoneborn and Ingverson[1] defined webometrics 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." Thelwall[2] in 2009 defined webometrics as "the study of web-based content with primarily quantitative methods for social science research goals using techniques that are not specific to one field of study". The term Webometrics is a combination of two terms 'web', meaning World Wide Web and 'metrics' meaning measurement. So etymologically, the term 'Webometrics' means measurement related to World Wide Web.

The present study involves link analysis of websites of Indian Institutes of Science Education and Research (IISER). IISERs are premier institutions under the Ministry of Human Resource Development (MHRD) primarily dedicated to research and developments in the field of Science. There are seven IISERs in India till date and all the institutions are having operational websites of their own. So the study was conducted using those websites.

Indian Institutes of Science Education and Research (IISER)

The Government of India, through Ministry of Human Resource Development (MHRD), established seven IISERs in various states of India. The primary aim of establishing these institutes was to emphasis more on the developments in the field of Scientific Research. Each IISER is an autonomous institute awarding its own Masters and Doctoral degrees. The first formed institute was IISER Kolkata, followed IISER Pune, both formed in 2006. The latest was IISER Berhampur in Odisha formed in 2016. Table 1 shows the year and state wise distribution of IISERs in India

Table 1. Year and State-wise distribution of IISERs in India

Sl No	Name	Year of Establishment	State
1	IISER Kolkata	2006	West Bengal
2	IISER Pune	2006	Maharashtra
3	IISER Mohali	2007	Punjab
4	IISER Thiruvananthapuram	2008	Kerala
5	IISER Bhopal	2008	Madhya Pradesh
6	IISER Tirupati	2015	Andhra Pradesh
7	IISER Berhampur	2016	Odisha

II. REVIEW OF LITERATURE

M. Manoj[3] in his study examined the web presence of websites of Sainik Schools in India and ranked them using WIF and R-WIF. He also used Spearman's Rank Coorrelation to establish the relation between two types of ranking. R. Chakrawarthy and S. Wasan[4] studied library websites of Higher Education institutions of India using Google search engine. They also used Spearman's co-efficient to establish the relationship between WIF and R-WIF. Link analysis of websites of Central Universities in India was done by R. Babu, R. Jeyshankar and P. N. Rao[5] and ranked them whereas S. K. Jalal, S. C. Biswas and P. Mukhopadhyay[6] compared the results of link analysis of Central University websites using various search engines.

S. Thanuskodi and S Naseehath[7] conducted webometric analysis of medical tourism websites in Kerala and investigated the retrieval efficiency of different search engine on these websites. Website sponsorship, platform type and link structures were analysed by G. Darja[8] in the study involving webometric analysis of online health information whereas Web Impact Factors of Iranian Universities of Medical Sciences were analysed by A. Farzaneth and K. Payam[9].

III. OBJECTIVES OF THE STUDY

The main objectives of the study are:

(i) To find the no of web pages, in-link pages and self link pages of websites of IISERs in India

(ii) To calculate the Web Impact Factor (WIF) and Revised Web Impact Factor (R-WIF) of IISER websites and rank them respectively

(iii) Using Spearman's Rank Correlation, establish a relation between the ranking based on WIF and R-WIF

IV. METHODOLOGY

The methodology used in the present study was link analysis. This had been done by using commands in Google Search Engines. The following commands were given to extract total no of web pages, in-link pages and self-link pages.

- 'Site : www.iisertvm.ac.in' was used to retrieve total number of web pages.
- 'Site : www.iisertvm.ac.in NOT link domain : www.iisertvm.ac.in' was used to retrieve total number of in link pages.
- 'Site : www.iisertvm.ac.in AND link domain : www.iisertvm.ac.in' was used to retrieve total number of self-link pages.

After extracting these results, WIF and R-WIF can be calculated using these formulae:

WIF = (IL + SL)/WP

R-WIF = IL/WP

Spearman's Rank correlation can be calculated using the following equation:

$$\text{Rank Correlation coefficient } (r) = \frac{N\sum XY-(\sum X) \times (\sum Y)}{\text{Sqrt } ([N\sum X^2-(\sum X)^2][N\sum Y^2 - (\sum Y)^2])}$$

Where; X = R-WIF and Y = WIF

Analysis

For the purpose of the study data were collected and compiled using Microsoft Excel 2007. Total no of webpages, in-link pages and self link pages were extracted from internet using Google Search Engine.

Ranking based on WIF and R-WIF

By analysing the data, it is clear that ranking of IISER websites based on both WIF and RWIF are same. The website of IISER Bhopal comes first in ranking based on both WIF and RWIF. Websites of IISER Mohali and IISER Kolkata come respectively in second and third positions in both type of rankings. The websites of IISER Thiruvananthapuram, IISER Pune, IISER Berhampur secured 4th, 5th and 6th ranks whereas the website of IISER Tirupati secured the last rank ie., 7th rank in both WIF (Table 2) and RWIF (Table 3) type of rankings.

Table 2. Ranking of websites based on Web Impact Factor (WIF)

Sl No	Name	Websites	WP	IL	SL	WIF	R-WIF	Rank
1	IISER Bhopal	https://www.iiserb.ac.in	31200	156,000	213,000	11.8269	5	1
2	IISER Mohali	http://www.iisermohali. ac.in	96000	53,500	52,800	1.10729	0.55729	2
3	IISER Kolkata	http://www.iiserkol.ac.in	29400	6,600	6,330	0.4398	0.22449	3
4	IISER Thiruvananthapuram	http://www.iisertvm.ac. in	41900	7,490	7,160	0.34964	0.17876	4
5	IISER Pune	http://www.iiserpune.ac.in	156000	21,000	20,000	0.26282	0.13462	5
6	IISER Berhampur	http://www.iiserbpr.ac .in	3280	131	88	0.06677	0.03994	6
7	IISER Tirupati	http://www.iisertirupati.ac.in	30400	910	843	0.05766	0.02993	7

Spearman's Rank Correlational Coefficient

Spearman's Rank Correlation is a statistical method to analyse the association or relation between two variables. Here it is used to establish the association or closeness in ranking of websites based on Web Impact Factor (WIF) and Revised Web Impact Factor (R-WIF). The value of this coefficient varies from -1 to +1.

Table 3 : Spearman's Rank Correlational Coefficient

Sl No	Websites	R-WIF (X)	WIF (Y)	X^2	Y^2	XY
1	https://www.iiserb.ac.in/	5	11.8269	25	139.876037	59.1346
2	http://www.iisermohali.ac.in/	0.55729	1.10729	0.310572	1.22609114	0.617082
3	http://www.iiserkol.ac.in/	0.22449	0.4398	0.050396	0.19342404	0.098731
4	http://www.iisertvm.ac.in/	0.17876	0.34964	0.031955	0.12224813	0.062502
5	http://www.iiserpune.ac.in/	0.13462	0.26282	0.018123	0.06907435	0.035381
6	http://www.iiserbpr.ac.in/	0.03994	0.06677	0.001595	0.00445823	0.002667
7	http://www.iisertirupati.ac.in/	0.02993	0.05766	0.000896	0.00332468	0.001726
Total ∑		6.16503	14.1109	25.41354	141.494657	59.95269

Spearman's Rank correlational co-efficient (r) can be calculated using the following formula.

$$(r) = \frac{N\sum XY-(\sum X) \times (\sum Y)}{\text{Sqrt}\left([N\sum X^2-(\sum X)^2][N\sum Y^2 - (\sum Y)^2]\right)}$$

Here, $N = 7$, $\sum XY = 59.95$, $\sum X = 6.17$, $\sum Y = 14.11$, $\sum X^2 = 25.41$, $\sum Y^2 = 141.45$, $(\sum X)^2 = 38.07$ and $(\sum Y)^2 = 199.1$

$$\text{Therefore, } r = \frac{(7 \times 59.95) - (6.17) \times (14.11)}{\text{Sqrt}\left([7 \times 25.41-38.07]\ [7 \times 141.45-199.1]\right)}$$

$$= \frac{332.55}{\text{Sqrt. }([139.8] \times [791.05])}$$

$$= \frac{332.55}{332.55}$$

$$= 1$$

V. CONCLUSION

From the analyses, it is clear that, link analysis of websites using search commands is effective in determining the web presence of websites. The results of rankings based on both Web Impact Factor (WIF) and Revised Web Impact Factor (R-WIF) are same. The websites of IISER Bhopal and IISER Mohali came in first and second positions respectively in both types of ranking followed by that of IISER Kolkata, IISER Thiruvananthapuram, IISER Pune, IISER Berhampur and IISER Tirupati in respective ranks. Further for establishing the relationship between these two types of ranking, Spearman's Rank Correlation is used and the correlation coefficient is calculated to be one. This shows that there exists much closeness or association between the rankings based on both WIF and R-WIF.

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