

Webometric Analysis of Odisha Universities' Websites through Google Search Engine

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Abstract

Webometrics deals with measuring aspects of the Web like websites, webpages, parts of webpages, words in webpages, hyperlinks, and Web search engine results. An attempt has been made to analyse Odisha universities' websites or web portals by applying the webometric indicators to check their existence and performance in the virtual globe and rank them according to data availability on the basis of WIF and R-WIF. Further, with Spearman's Rank Correlation it was found that WIF and R-WIF are correlated and associated, where there is very less difference between the two ranking methods.

Keywords: Universities, Webometric, Odisha, Google, Search Engine

Introduction

Nowadays, owning a website has become obligatory for everyone, especially educational institutions. Websites have become the main source of information, and attract clientele (Norusi, 2005). Websites have to be informative and rich in content to reach the end users, to satisfy their dynamic needs in time. There is a compulsion to oversee the websites recurrently, how their presence on the Web plays a vital role in the changing world. This study evaluates the Odisha universities' websites by using webometric techniques, and ranks the websites based on the results of Web Impact Factor (WIF) and Revised Web Impact Factor (R-WIF).

Review of Literature

Jeysankar and Babu (2009), conducted a study on the university websites of Tamil Nadu, India and described the outcomes of link pages, domain systems of the websites, analyse the number of webpages, and calculate the simple Web impact factor, external link Web impact factor, and self-link Web impact factor. They also explored the revised web impact factor and ranked the websites as per the WIF.

Stephen (2019) analysed the Central University websites in the north-east region of India, based on seven Alexa indexes, including: search percentage, bounce percentage, Indian and foreign users, traffic rank, pages viewed, links, and time on site.

Beerappa (2017) analysed NIT libraries' websites by applying the webometric indicators to check their existence status globally and ranked them based on R-WIF and WIF.

Pechnikov and Nwohiri (2012) explored the Web communicator of the university websites of the National Universities Commission, the sole body that approves the establishment of higher educational institutions in Nigeria; the study explored all academic programmes run by them, and analysed the average number of HTML pages and out-links by region and webgraph on a set of units of analysis, including the site of the National Universities Commission.

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Need of the Study

The study was conducted to know about the websites of the universities, Web structure, length of the websites, and links of the universities in Odisha. So there is a need for researching the location of Web objects in different universities. An attempt has been made to investigate the location of common Web objects or links in the home university websites of Odisha, and rank them based on the results in terms of Web Impact Factor (WIF) and Revised Web Impact Factor (R-WIF).

Objectives of the Study

The objectives of the study are as follows:

- To find out the number of Web pages, number of link pages, number of self-link pages, external link pages, and in-link pages of Odisha universities' websites.

- To measure the Web impact factor and revised Web impact factor, and rank them as per the WIF.
- Calculate WIF and R-WIF of Odisha universities' websites.
- Calculate the correlation between WIF and R-WIF of Odisha universities' websites through Spearman's Rank Correlation.

Methodology

Google search engine is used to calculate the WIF and R-WIF of Universities' Websites of Odisha, which is massive and crawls more hyperlinks with advanced search facilities to sum the links possessed by the websites. The author has selected the Google search engine because of its wide popularity; it covers the required norms to assess the data. Different formulations have been used to collect the data by exploiting Boolean operators, i.e., number of web pages, number of in-links, and self-links.

Table 1: Search Strategy

Search Command	Results	Example
Site: domain-name.	Total number of webpages extracted in Google (WP)	Site: www.utkaluniversity.nic.in
Site: domain-name AND link domain: domain name.	To extract number of self-links (SL)	Site: www.utkaluniversity.nic.in AND link domain: www.utkaluniversity.nic.in
Site: domain-name NOT link domain: domain-name	To retrieve the number of in-links (IL)	Site: www.utkaluniversity.nic.in NOT link domain: www.utkaluniversity.nic.in
WIF = IL + SL/WP	Web Impact Factor (WIF) can be calculated	number of in-links and number of self-links divided by total number of Web pages mined in Google
R-WIF = IL/WP	Revised Web Impact Factor (R-WIF) can be calculate	dividing number of in-links with total number of Web pages dug out in Google

Spearman's Rank Correlation shows the relationship between WIF and R-WIF, which can be established through the correlation

coefficient (r). Spearman's Rank Correlation has been used in this study, and the formula is defined in equation-1 as under.

According to this method,

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

Analysis of Data

The list of universities in Odisha has been collected from the Higher Education Department, Government of Odisha. The results have been extracted from the Google search

engine on 15.06.2021. State universities of Odisha have been investigated on the location of common Web objects or links in the home university websites of Odisha, and ranked based on the results in terms of Web Impact Factor (WIF) and Revised Web Impact Factor (R-WIF).

Table 2: List of Universities in Odisha with URL Address

Sr. No.	Category	Name of the University	URL (Official Website)
1	State Public University	Madhusudan Law University	https://www.mslawcollege.org/
2		Utkal University	https://www.utkaluniversity.nic.in/
3		Berhampur University	http://bamu.nic.in/
4		Sambalpur University	http://www.suniv.ac.in/
5		Ravenshaw University	https://ravenshawuniversity.ac.in/
6		Maharaja Sriram Chandra Bhanja Deo University	http://www.nou.nic.in/
7		Shree Jagannath Sanskrit University	http://www.sjsv.nic.in/
8		Fakir Mohan University	http://www.fmuniversity.nic.in/
9		Rama Devi Women's University	https://www.rdwuniversity.nic.in/
10		Gangadhar Meher University	http://www.gmuniversity.ac.in/
11		Khallikote University	http://www.kub.ac.in/
12		Odisha State Open University	http://www.osou.ac.in/
13		National Law University	https://www.nluo.ac.in/
14		Rajendra University	-----
15		Kalahandi University	-----
16		Odisha University of Agriculture and Technology, Bhubaneswar	http://www.ouat.nic.in/
17		Veer Surendra Sai University of Technology (VSSUT), Burla, Sambalpur	http://www.vssut.ac.in/
18		Veer Surendra Sai Institute of Medical Sciences and Research, Sambalpur	http://www.vimsar.ac.in/
19		Utkal University of Culture, Bhubaneswar	https://uuc.ac.in/
20		Biju Patnaik University of Technology, Rourkela	http://www.bput.ac.in/
21	State Private University	Birla Global University	https://bgu.ac.in/
22		Centurion University of Technology and Management	https://cutm.ac.in/
23		Sri Sri University	https://srisriuniversity.edu.in/
24		Xavier University, Bhubaneswar	https://xim.edu.in/
25		ICFAI University	-----
26		ASBM University	https://www.asbm.ac.in/
27		GIET University	https://www.giet.edu/
28		C V Raman University	https://cgu-odisha.ac.in/
29		International Institute of Information Technology, Bhubaneswar	https://www.iiit-bh.ac.in/
30		AIPH University	https://www.aiph.ac.in/
31	Deemed to be University	Kalinga Institute of Industrial Technology, Bhubaneswar	https://kiit.ac.in/
32		Siksha 'O' Anusandhan, Bhubaneswar	https://www.soa.ac.in/
33		Kalinga Institute of Social Sciences, Bhubaneswar	https://kiss.ac.in/
34	Central University	Central University of Odisha	http://cuo.ac.in/

The WIF and R-WIF ranking patterns of Odisha University websites are calculated and shown in Table 3. It reveals that Ravenshaw University tops the list in terms of the WIF and RWIF ranking, followed by the other universities, namely, C V Raman University;

Berhampur University; Fakir Mohan University; Utkal University of Culture, Bhubaneswar; Veer Surendra Sai Institute of Medical Sciences and Research, Sambalpur; Utkal University; Rama Devi Women's University; Sri Sri University; and Kalinga Institute of Industrial

Technology, Bhubaneswar, in WIF ranking. However, in R-WIF ranking, in second place is Berhampur University, followed by Veer Surendra Sai Institute of Medical Sciences and Research, Sambalpur; Utkal University;

Utkal University of Culture, Bhubaneswar; Fakir Mohan University; Rama Devi Women's University; C V Raman University; Sri Sri University; and Biju Patnaik University of Technology, Rourkela.

Table 3: Top 10 WIF and R-WIF Ranking of Odisha Universities Websites

Sr. No.	Name of the University	WP	IL	SL	IL+SL	WIF	R-WIF
1	Madhusudan Law University	7950	520	719	1239	0.15584906	0.06540881
2	Utkal University	272000	125000	97900	222900	0.81948529 (7 th)	0.45955882 (4 th)
3	Berhampur University	27500	22500	75000	97500	3.54545455 (3 rd)	0.81818182 (2 nd)
4	Sambalpur University	15400	2540	2720	5260	0.34155844	0.16493506
5	Ravenshaw University	58100	116000	142000	258000	4.44061962 (1 st)	1.99655766 (1 st)
6	Maharaja Sriram Chandra Bhanja Deo University	183000000	392000	227000	619000	0.00338251	0.00214208
7	Shree Jagannath Sanskrit University	8930	463	526	989	0.11075028	0.0518477
8	Fakir Mohan University	33300	11600	78500	90100	2.70570571 (4 th)	0.34834835 (6 th)
9	Rama Devi Women's University	2710	694	989	1683	0.62103321 (8 th)	0.25608856 (7 th)
10	Gangadhar Meher University	13200	1950	2260	4210	0.31893939	0.14772727
11	Khallikote University	5560000	101000	143000	244000	0.04388489	0.01816547
12	Odisha State Open University	85700	3890	4330	8220	0.09591599	0.0453909
13	National Law University	23400	2290	2310	4600	0.1965812	0.09786325
14	Rajendra University	0	0		0	0	0
15	Kalahandi University	0	0		0	0	0
16	Odisha University of Agriculture and Technology, Bhubaneswar	960000	36900	38200	75100	0.07822917	0.0384375
17	Veer Surendra Sai University of Technology (VSSUT), Burla, Sambalpur	55400	7950	8560	16510	0.29801444	0.14350181
18	Veer Surendra Sai Institute of Medical Sciences and Research, Sambalpur	33700	18600	14500	33100	0.98219585 (6 th)	0.55192878 (3 rd)
19	Utkal University of Culture, Bhubaneswar	629000	278000	344000	622000	0.98887122 (5 th)	0.44197138 (5 th)
20	Biju Patnaik University of Technology, Rourkela	152000	25600	25500	51100	0.33618421	0.16842105 (10 th)
21	Birla Global University	6480000	1010000	52600	1062600	0.16398148	0.1558642
22	Centurion University of Technology and Management	50900	4930	5970	10900	0.21414538	0.09685658
23	Sri Sri University	35000	7350	9250	16600	0.47428571 (9 th)	0.21(9 th)
24	Xavier University, Bhubaneswar	2720000	399000	375000	774000	0.28455882	0.14669118

Sr. No.	Name of the University	WP	IL	SL	IL+SL	WIF	R-WIF
25	ICFAI University	0	0	0	0	0	0
26	ASBM University	88600	4130	5320	9450	0.10665914	0.046614
27	GIET University	1830000	83900	113000	196900	0.10759563	0.04584699
28	C V Raman University	13500	2890	45800	48690	3.60666667 (2 nd)	0.21407407 (8 th)
29	International Institute of Information Technology, Bhubaneswar	1030000	62300	75100	137400	0.13339806	0.06048544
30	AIPH University	3360000	26100	3250	29350	0.00873512	0.00776786
31	Kalinga Institute of Industrial Technology, Bhubaneswar	649000	194000	101000	295000	0.45454545 (10 th)	0.04021572
32	Siksha 'O' Anusandhan, Bhubaneswar	61100000	956000	894000	1850000	0.03027823	0.01564648
33	Kalinga Institute of Social Sciences, Bhubaneswar	970000000	36700000	37600000	74300000	0.07659794	0.03783505
34	Central University of Odisha	9680000	441000	449000	890000	0.09194215	0.04555785

Here, in this study, the Spearman's Rank Correlation has been used to establish the relationship between WIF and R-WIF through the correlation coefficient (r). The correlation coefficient (r) relates the strength and direction of the linear relationship between two variables.

The coefficient of determination represents the per cent of the data that is near the line of best fit. Correlation has to always be between -1.0 and $+1.0$. If the correlation is positive, we have a positive relationship. If it is negative, the relationship is negative as shown in Table 4.

Table 4: Correlation between WIF and R-WIF of Odisha Universities' Websites through Spearman's Rank Correlation

Sr. No.	Name of the University	Y(WIF)	X(R-WIF)	x^2	y^2	xy
1	Madhusudan Law University	0.15584906	0.06540881	0.004278312	1.959061282	0.010193901
2	Utkal University	0.81948529	0.45955882	0.211194312	0.671556147	0.376601698
3	Berhampur University	3.54545455	0.81818182	0.669421488	12.57024793	2.900826446
4	Sambalpur University	0.34155844	0.16493506	0.027203576	0.116662169	0.056334964
5	Ravenshaw University	4.44061962	1.99655766	3.986242487	19.71910262	8.865953117
6	Maharaja Sriram Chandra Bhanja Deo University	0.00338251	0.00214208	4.58849E-06	1.14414E-05	7.2456E-06
7	Shree Jagannath Sanskrit University	0.11075028	0.0518477	0.002688184	0.012265625	0.005742148
8	Fakir Mohan University	2.70570571	0.34834835	0.121346572	7.320843366	0.942528114
9	Rama Devi Women's University	0.62103321	0.25608856	0.065581351	0.385682248	0.159039501
10	Gangadhar Meher University	0.31893939	0.14772727	0.021823347	0.101722337	0.047116047
11	Khallikote University	0.04388489	0.01816547	0.000329984	0.001925884	0.00079719
12	Odisha State Open University	0.09591599	0.0453909	0.002060334	0.009199876	0.004353713
13	National Law University	0.1965812	0.09786325	0.009577215	0.038644167	0.019238074
14	Rajendra University	0	0	0	0	0
15	Kalahandi University	0	0	0	0	0
16	Odisha University of Agriculture and Technology, Bhubaneswar	0.07822917	0.0384375	0.001477441	0.006119803	0.003006934

Sr. No.	Name of the University	Y(WIF)	X(R-WIF)	x ²	y ²	xy
17	Veer Surendra Sai University of Technology (VSSUT), Burla, Sambalpur	0.29801444	0.14350181	0.020592768	0.088812607	0.04276561
18	Veer Surendra Sai Institute of Medical Sciences and Research, Sambalpur	0.98219585	0.55192878	0.304625382	0.964708679	0.542102158
19	Utkal University of Culture, Bhubaneswar	0.98887122	0.44197138	0.094614615	0.977866298	0.437052783
20	Biju Patnaik University of Technology, Rourkela	0.33618421	0.16842105	0.028365651	0.113019823	0.056620499
21	Birla Global University	0.16398148	0.1558642	0.024293648	0.026889926	0.025558842
22	Centurion University of Technology and Management	0.21414538	0.09685658	0.009381197	0.045858245	0.02074139
23	Sri Sri University	0.47428571	0.21	0.0441	0.224946939	0.0996
24	Xavier University, Bhubaneswar	0.28455882	0.14669118	0.021518301	0.080973724	0.041742269
25	ICFAI University	0	0	0	0	0
26	ASBM University	0.10665914	0.046614	0.002172865	0.011376173	0.004971809
27	GIET University	0.10759563	0.04584699	0.002101947	0.011576819	0.004932936
28	C V Raman University	3.60666667	0.21407407	0.045827709	13.00804444	0.772093827
29	International Institute of Information Technology, Bhubaneswar	0.13339806	0.06048544	0.003658488	0.017795042	0.00806864
30	AIPH University	0.00873512	0.00776786	6.03396E-05	7.63023E-05	6.78532E-05
31	Kalinga Institute of Industrial Technology, Bhubaneswar	0.45454545	0.04021572	0.001617304	0.20661157	0.018279871
32	Siksha 'O' Anusandhan, Bhubaneswar	0.03027823	0.01564648	0.000244812	0.000916771	0.000473748
33	Kalinga Institute of Social Sciences, Bhubaneswar	0.07659794	0.03783505	0.001431491	0.005867244	0.002898087
34	Central University of Odisha	0.09194215	0.04555785	0.002075518	0.008453359	0.004188687
		21.8360448	6.93993169	5.729911227	58.70683887	15.4738981

According to this method,

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

Where, X = R-WIF, Y = WIF, Σ = Algebraic sum, and N = Number. Thus, the correlation coefficient (r) can be calculated as mentioned above. The values used in the formula are: Number (N) = 34; ΣX = 6.93; ΣY = 21.83; ΣXY = 15.47; Σx² = 5.72; and Σy² = 58.70.

$$r = \frac{34 * 15.47 - (6.93) * (21.83)}{\text{Sqrt}([34 * 5.72 - (6.93)^2][34 * 58.70 - (21.83)^2])}$$

$$r = \frac{525.98 - 151.2819}{\text{Sqrt} (194.48 - 5.72) (1995.8 - 58.70)}$$

$$r = \frac{374.6981}{\text{Sqrt} (188.76 * 1937.1)}$$

$$r = \frac{374.6981}{604.688}$$

$$r = + 0.6196552602333$$

Thus, the value shows the positive relationship (r-plus sign) between R-WIF and WIF, which indicates that there is an association or closeness between R-WIF and WIF. In general, there is very less variation and closeness between R-WIF and WIF.

Findings

- A majority of Odisha universities have .ac.in domain name for their websites; .ac.in is specially used for academic purposes in India.
- A minority of the Odisha universities have .nic.in domain name for their university websites.
- The highest total number of webpages extracted in Google is from the Kalinga Institute of Social Sciences, Bhubaneswar, website (WP = 97,00,00,000); the least total number of webpages extracted is from Rama Devi Women's University (WP = 2,710).
- Ravenshaw University has secured the 1st rank in both WIF as well as R-WIF rankings.
- The positive relationship (r-plus sign) between R-WIF and WIF indicates that there is an association or closeness between R-WIF and WIF.

Recommendations

- Some of the Odisha universities have fewer than 100 webpages. They have very less content on their websites. So, we recommend improving the number of Web pages with valuable content.
- Madhusudan Law University, Shree Jagannath Sanskrit University, and the National Law University search engines did not provide information for our logical expression. Hence, it is recommended that the universities rectify the problem.
- Newly established universities like Rajendra University, Kalahandi University, and ICAI University have no websites. It is recommended that the universities create a dynamic website.

Conclusion

The present study provides exploratory website information about 34 universities in Odisha. From this

study, we are able to provide information regarding the number of Web pages, link pages, self-link pages, external link pages, and also the different domain names of the websites (Chakravarty & Wasan, 2015). This study will help the universities improve, so the content will be accessible by their users, to get fast and reliable information from their website.

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