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PERFORMANCE COMPARISON AMONG LOCAL AND FOREIGN UNIVERSITIES WEBSITES USING SEO TOOLS

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Abstract:

Websites are the main contributors of today's businesses and assisting the users to surge business throughout the world by the search engine optimization (SEO) techniques are endlessly losing. In order to get greater business values and results website optimization is very indispensable. Websites that are not optimized their visitors and successively losing business. SEO is a process to increase a prominence of website on search engine and test whether user are contented or not with our content (Websites or Blogs). Most of the search engines (like Google Yahoo, Baidu and Ask.com) deliver instructions to the website owner/developers to craft their content according to their search engine philosophy. The objective of this paper is to scrutinize and compare overall website's performance of the five Foreign and local universities. For this study, we used two different SEO tools named as Nibbler and SEOPTIMER. We evaluated websites with seventeen parameters of Nibbler and five of the SEOPTIMER. Some of the parameters are Social Interest, URL formats, Internal Links, Heading, Images, Page titles, Social media pages (Twitter, Facebook). This work will benefit us in achieving idea about the strength and weaknesses of these websites, and whose websites are enhanced and optimized. In this study we have enlightened essential SEO features for developing an academic websites for achieving better SERP ranking.

Keywords:

SEO Tools Testing, SEO Tracking Tools, Website Performance Testing, Foreign vs. Pakistan Universities Websites Testing

1. INTRODUCTION

The evolution of the Internet has provided countless benefits and opportunities to common people. Nowadays, a well majority is heavily relying on Internet to flourish their businesses through placing their business contents on World Wide Web (www) which is considered to be the world largest repository to store data. The people who realizes the paybacks of using the web are applying the practices of Information Technology (IT) to maximize the potential of his/her organization. Website is one of the vital tool for achieving diversified marketing goals of business owners and to reach global audience. These early technologies of web were simple, but with passage of time the web has been incorporated with sophisticated tools to cater end user needs. Mr. Tim Berners Lee, the founder of www has introduced three core technologies i.e. HTML, URL and HTTP to build web platform. We have witnessed that web has been consistently evolving from read medium to a read/write transmission mode and, lately, to execute or ontology based platform. Web 1.0, Web 2.0 and Web 3.0 are different implementation stages of Web [3]. We summarized these technologies in Table.1.

Table.1. Classification and Functionalities of Web

Classification	Key idea	Tools
1.0	2.0	3.0
Reading Information	Reading/Writing Interactive web	Executing mode Semantic web
HTML, HTTP, URL	AJAX, Wikis, Blogs	XML, 3D

Web 1.0 can be described as read only web communication mode, where contents were static and websites were developed through html code, simply, there is no link between reader and content [3]. The Web is busy place where the number of websites are increasing with fast pace. In this era a good website is an indispensable for business growth [7] reveal that the total numbers of indexed websites are 4.59 billion as on 17th July 2017, another source live internet stats [8] which provide live statistics on different technologies like number of internet user and websites, number of email sent and video viewed on YouTube and total searches on Google, reported that there were over 1 billion active websites in third quarter of 2014. The websites have experienced a dramatic progression in last two decades. The Fig.1 illustrates that the web is enriched with single indexable webpage in August 1999 to more than 1 billion active websites in September 2014 [8]. The exponential growth of web is shown in Table.2.

Table.2. Global websites and Internet Users growth on web

Year	Number of Website	Number of Internet Users
2015	863 million	3 billion
2012	697 million	2.5 billion
2009	238 million	1.7 billion
2006	85 million	1.1 million
2003	40 million	778 million
2000	17 million	413 million
1997	1 million	120 million
1994	2738	25 million
1991	1	

These all values are shown in Fig.1.

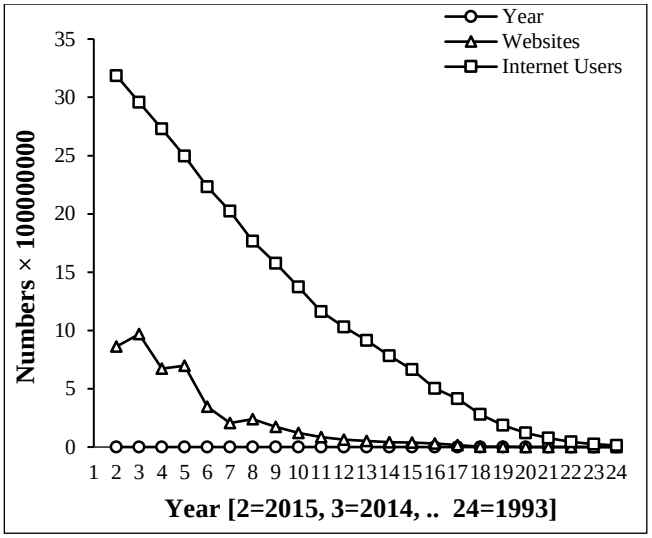


Fig.1. Global Internet users and websites growth

SEs are the workhorses of the Web, returning billions of responses against end users queries every day. At present the SEs are become an important tool to reach large number of audience on the websites even though they do not know the address of specific website. A study conducted by the bizztor [11] discussed the following interesting facts.

- Google enjoying with roughly 70% of the search engine market share
- Around 70% SERP entries are from organic results
- About 75% of users never visit second page of SERP
- There are over 1.4 billion searches every hour on SEs
- More than 80% end users use SEs for information retrieval

The Search Engines (SE) are playing a key role to retrieve user's information from web and majority of website owners are always in a struggle to remain visible on SERP Golder Trianage (Top 3 results of SERP). The business owner comprehend that through top rank position on SERP will benefit him/her in increasing customer base and subsequently generating more reviews. In order to dominate SERP results the website developers mostly choose different SEO methods.

The key challenge, and the foremost goal of this study is to objectively measure and find the important performance parameters of SEO. Obtain a prominent rank in a SERP is a core challenge for website creators and normally they employed different practices to achieve their targets. This study only covers SEO practices.

This paper is organized as follows. In section 2, related theory is presented. In section 3, tools that are being used in the work are discussed. In section 4, all used parameters are discussed. In section 5 overall results of both Pakistan and foreign universities are presented. In section 6, complete parametric results are shown in the form of graphical representation of the data accessed by SEO tools for all universities. In section 7 Second SEO tool SEOPTIMER results are shown, in section 8. Comparative results of both universities are depicted and finally section 9 includes conclusion of the work.

2. RELATED THEORY

The successful websites should be user friendly and hold essential features of good business website. A research conducted by Rinaldi [31] reveals that 48% of end users feel irritated and annoyed when on websites that are poorly optimized for mobile devices. In many studies the researchers have concentrated on user's experience on personal and business website traffic. For example, Madleák et al. described in [4] the consequences of poor performing website leads to experiences less promotion in search results. Simply a good user experience is a key of getting prominent ranking score from SEs.

Due to consistent changes in web technologies, the SEs are also persistently introducing new ranking factors(a.k.a ranking signals) to produce SERP page against user query for retrieval of information, but the degree of influence to manipulate SERP results by web spammers is constantly monitored and fixed by SEs. SEs are the practical application of Information Retrieval System (IRS) and mainly comprises of 4 essential elements i.e. 1) Document processor, 2) Query processor, 3) Search and Matching Function, 4) ranking capability. The Fig.2 depicts the visual working of IRS.

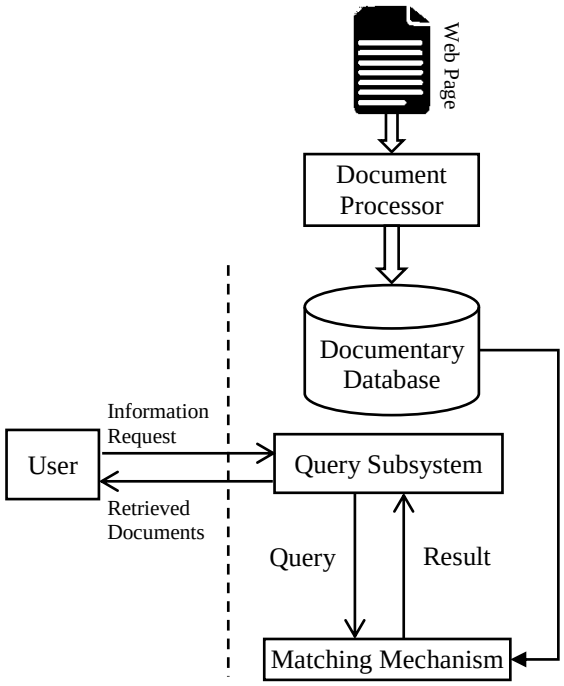


Fig.2. Information Retrieval System

The rank of the website in a SERP depends upon different metrics and website developers are always eager to know the most influential ranking factors to boost their page ranking in SERP. Mostly SEs return two types of results i.e. organic (natural) and inorganic (paid). Organic approach is more feasible to website creators because of inexpensive and long term visibility on SERP listing. Search Engine Optimization (SEO) is a process of getting free traffic from organic search results. Thus, a website developers looks toward SEO to achieve their targets. Generally three SEO methods are discussed in literature i.e. white hat, grey hat and black hat.

White hat refers to those optimization tips and strategies that only target human audience rather than SEs. Apparently white hat is slow, but has permanent progress in SERP rankings. In black hat SEO, the site owners are using illegitimate and deceptive strategies to trick SEs to upturn its rankings in the SERP listings. Grey hat SEO is following some of white hat optimization tactics but additionally accumulating illegitimate methods to increase a website's rankings in the SEs. The Table.3 depicts the key characteristics of these three methods.

Table.3. Summary of SEO Techniques

White Hat	Black Hat	Grey Hat
Quality Content Development	Duplicate Contents	SEO Squatting
Title and Meta Data	Meta Keyword Stuffing	Redesign your website after routine Interval
Quality inbound Links	Meta Keywords Link Farming Gateway Pages Content Automation Cloaking Link Schemes	Excessively Placed Sharing Button Charity links Rotate Content Clicking Fraud

White hat SEO is further classified into On-Page and Off-Page SEO [10]. We summarizes the key principles of On-Page and Off-Page in Table.4.

Table.4. Description of On-Page and Off-Page SEO

On Page	Off-page
Related to inbound working of the websites	Related to out of bound of the websites
Required at Development of the web	Worked after development of the web
Mobile, Images, Titles, Internal Links are important factors	Important factors includes Social media linking, Blogs Forum and communities
If websites are optimized using On page require less working on off page	If websites are not optimal at on page it require hard work at off page side

Mostly SEs issues guidelines for website developers to follow their strategies to craft websites, and Google's Search Engine Optimization Starter Guide is one the good example in this connection [27]. The MOZ [28] proposes different on-page and off-page tips in their study to website developers to remain present with good ranking score on SERP listings.

The remainder of this section covers the some important ranking factors which we believe that could influence the SERP results [12]. Observed five core webpage factors, which we also think are an important for the website developer to obtain good SERP ranking score from SEs and are displayed in Table.5.

Table.5. Description of important webpage factors

Factor	Description
Quality Contents	Websites needs to create original and unique contents for audience
Keyword Research	Keywords are very significant because that help for connecting searchers to your site. Do Keyword research by using different available online tools before making part of your site.
Keyword Density	Defined as: Number of keywords/ Total number of words) × 100 In order to achieve good score in SERP, these searched word are to be used 3 to 5 time or to search out keyword density about 2.45%.
Freshness	Through regular updated contents, you can be rewarded stable SERP ranking by SEs.
Direct answers	If your content is exactly related to the user query than more chance are that end user will land on your website

A study conducted by Lucassen et al. [30] suggests three important factors to judge the trustworthiness of websites.

These factors are:

- Semantic features: Neutrality, accuracy, etc.
- Surface features: Design, Quality, font size, etc.
- Source of Information: Previous experience with website.

Since our study aims to be specific and domain dependent, we focus on open source SEO tools and academic websites. In this study we have selected five foreign universities [25] for our research, namely (1) California Institute of technology [15] USA, (2) Oxford University [16] UK, (3) Stanford University [17] USA, (4) Cambridge University [18]UK and (5) Massachusetts Institute of Technology [19] USA, and in order to carry out experimental work on Pakistani universities [26], we have considered highest ranking universities, namely (1) NUST University [20] Islamabad, (2) Punjab University [21] Lahore, (3) National University [22] Islamabad, (4) Lahore University of Management sciences [23], and last (5) The Agha Khan University Karachi [24].

3. METHODOLOGY

Object of this study described in this paper is to find out most influential SEO features to improve SERP ranking of academic websites. In this section, two open source tools have been described and evaluated in this paper. This study has been undertaken as a systematic flow of steps based on the guidelines proposed by waterfall model [29]. In this context we have carried out our work in three phases i.e. 1) Selection of Local and Foreign Universities, 2) Testing and finally, 3) Results and Conclusion of our work. The sequence of our study is shown in Fig.3.

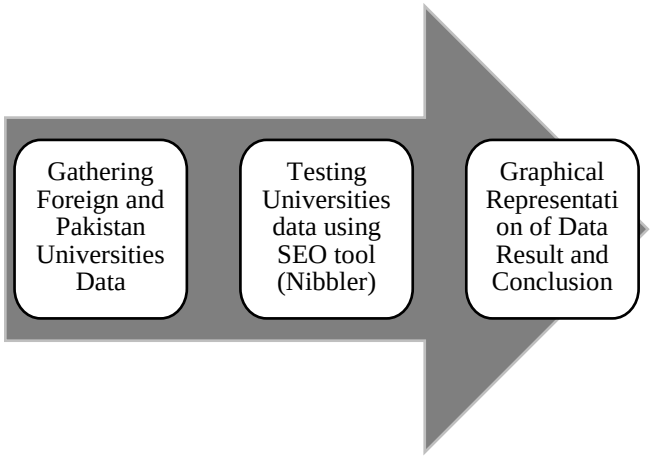


Fig.3. Methodology Steps

The tools which are used in our study are documented below.

3.1 NIBBLER

Nibbler [13] is an open source SEO tool and it is used for testing websites and it generates result about different part of the websites like heading style, page titles, Social interest, URL format, Internal links etc. We have used this tool because of its user-friendliness and richness in providing SEO related information about website. This tool only needs a URL of specific website.

3.2 SEOPTIMER

September [14] is another open source SEO tool which is used for detailed website analysis. SEOPTIMER provides a clear and actionable recommendations of steps to website owners so that of visuals can improve the usability of website. Furthermore, some sort of usability and effectiveness test through SEO tools can be helpful for website owners before publishing their websites.

Since the purpose of this experimental study is to discover prominent SEO features to improve academic website performance. Therefore, two different open source tools i.e. Nibbler and SEOPTIMER were used with different parameter list (See Table 3) to audit selected website structures. The intention to use two different SEO tools is to cross verify the results of our study.

There are total 22 parameters (see Table.6) on the basis of which we are measuring the Performance of selected websites. In order to perform our experimental work, we have used an Intel Core 2 Duo Processor machine (2.93GHz), having 4GB memory and running Windows 7 Ultimate.

4. PRECISE RESULT ANLYSIS USING NIBBLER (4 PARAMETERS)

All foreign universities got lowest marks in technology. The Fig.4.(a) which is of Caltech university results shows that it gets overall score ‘7.8’. Also achieve highest score in experience ‘9.2’ and lowest in technology ‘7.0’ whereas in marketing ‘8.7’ and accessibility ‘8.1’ respectively. Similarly, Fig.4.(b) is of Oxford University got overall marks ‘8.6’. It obtained highest marks in Experience ‘9.4’, Marketing ‘9.2’, and Accessibility ‘8.8’ and in technology ‘7.3’. The Fig.4(c) is of Stanford university which got overall result ‘8.0’, highest marks in Accessibility ‘8.7’ and lowest in Technology ‘7.0’, Experience ‘7.6’ and marketing ‘7.3’. The Fig.4.(d) is of Cambridge University that got overall ‘8.5’, highest in Experience ‘9.3’and lowest in technology ‘7.5’, Accessibility ‘8.6’ and in Marketing ‘8.8’. finally Fig.4.(e) depicts Massachusetts Institute of Technology that obtained overall ‘7.8’, highest and lowest in Accessibility ‘7.9’, Technology ‘7.1’ respectively, Marketing ‘7.7’ and finally Experience ‘7.6’

The Fig.5 is Pakistan University. In Fig.5.(a) results of Nust University has been displayed which got overall ‘6.3’, highest and lowest in ‘Marketing ‘8.3’ and Technology ‘5.0’ respectively Similarly in Fig.5.(b) results of Punjab university are displayed which achieve overall marks ‘6.9’. Also got highest marks in Marketing ‘8.6’ while lowest in Technology ‘5.7’, Accessibility ‘6.4’ and in Experience ‘8.4’. The Fig.5.(c) depict National university which got overall result ‘7.0’, highest and lowest score in Experience ‘7.3’ and lowest in Technology ‘5.2’ respectively, Marketing ‘6.4’ and Accessibility ‘7.2’. The Fig.5.(b) is of LUMS University that got overall ‘7.9’, highest in Experience ‘9.3’and lowest in technology ‘6.8’, Accessibility ‘8.3’ and in marketing ‘8.0’. Finally, Fig.5.(e) display Agha khan university that score ‘7.6’ overall, highest and lowest in Experience ‘8.6’ Technology ‘6.1’ respectively, Marketing ‘7.7’ and lastly Accessibility ‘7.2’.

Table.6. Description of SEO TOOLS Parameters

Parameters	Description
Printability	This parameter explains that whether website content is ready for taking printout or not.
Code quality	It shows that how much indentation and standard are used during development
Meta Tags	It include the all the tags included in the title or used
Mobile	It shows the responsiveness of the website and how web will behave when accessed through mobile
Social Interest	It represents how much people are going through the website’s social media links like (Facebook, Twitter).
Images	This shows whether the website is using right type (jpeg, png, gif, tiff or psd)
Internal Links	Internal link describes that how the pages are link to each other.
Server Behavior	This defines how server respond to every other request by the user.
Amount of content	This specify how much content (Text, images, Audio, Videos) are available on the website.
Printability	This parameter explains that whether website content is ready for taking printout or not.
Popularity	It tell how much people liking and following the website. It depends on the number of visitors
Twitter	This express that how many People are following and viewing the page of the website on the twitter.
Heading	It characterize what type of the Heading

	Style/type is being used for the development of the website?
URL Format	URL format describes the how the website is available online and how user will access the site
Facebook Page	Facebook page describes that whether website have any page on Facebook or not.
Page Titles	It report that how the title of every page is being set. What are the length of the character is used?
Incoming Links	These links defines that how many other links are pointing toward this specific site.
Analytics	On Average what are the analytics (facts & figure) that is being generated by this website is used

Security	It define how much secure a website is?
Social	This shows Is there any linking to the social media or whether has any page/group on social media
UI/Mobile	It explains How much a website is responsive and how User interface look like
Performance	It depict How website work website too much traffic arrived
SEO	It shows whether website is developed by using search engine optimization techniques or not

In order to audit the academic websites, 4 parameters data is extracted through Nibbler. The result of each parameter along with overall value is shown in Table.7.

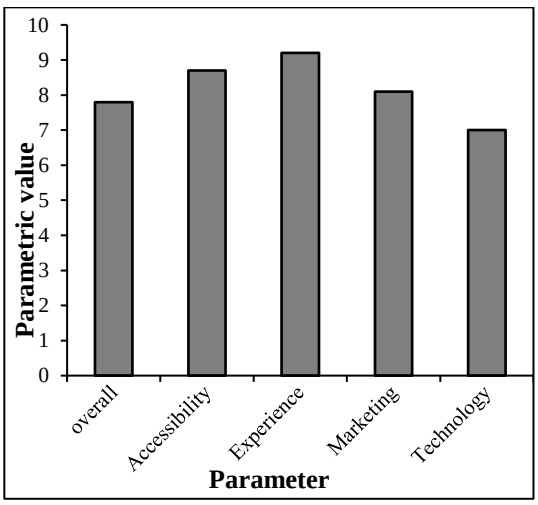
Table.7. Abstract parametric results of universities

Maximum Value: 10
Mean Value: 5
Minimum Value: 0
Analyzing Years 2016-17

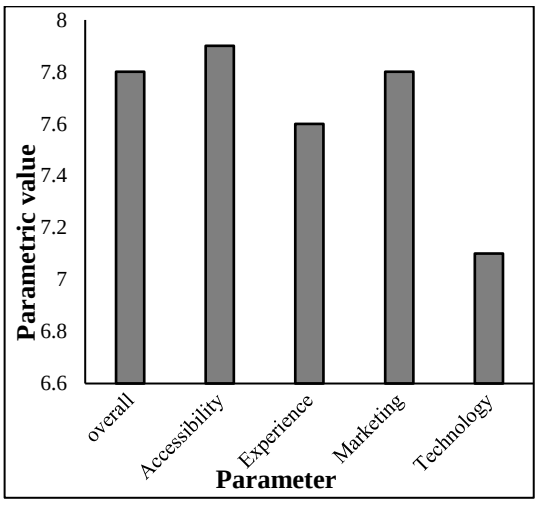
	Overall	**Accessibility**	**Experience**	**Marketing**	**Technology**
California Institute of Technology[1] (USA)	7.8	8.1	9.2	8.7	7
Oxford university[1] (UK)	8.6	8.8	9.4	9.2	7.3
Stanford university[1] (USA)	8	8.7	7.6	7.3	7
Cambridge University[1] (UK)	8.5	8.6	9.3	8.8	7.5
Massachusetts Institute of Technology[1] (USA)	7.8	7.9	7.6	7.8	7.1
Nust University[2] (Islamabad)	6.3	5.4	7	8.3	5
Punjab University[2] (Lahore)	6.9	6.8	8.4	8.6	5.7
National University[2] (Islamabad)	7	7.2	7.3	6.4	5.2
LUMS[2] (Lahore)	7.9	8.3	9.3	8	6.8
Agha Khan University[2] (Karachi)	7.6	7.2	8.6	7.7	6.1

[1]Foreign Universities
[2]Pakistan Universities

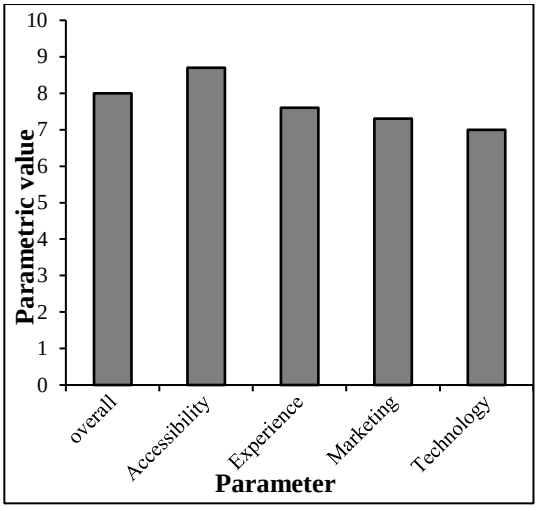
Foreign Universities



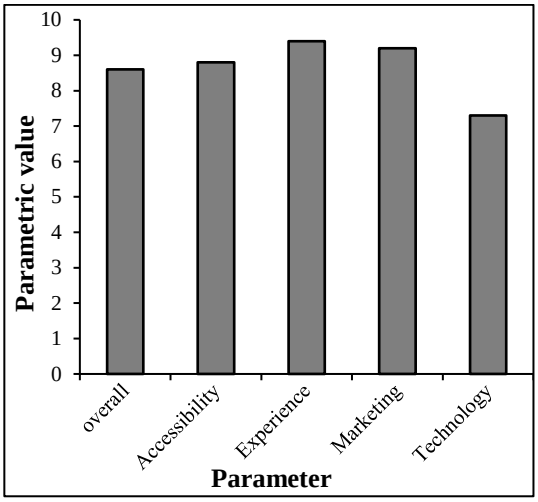
(a) Results of California Institute of Technology



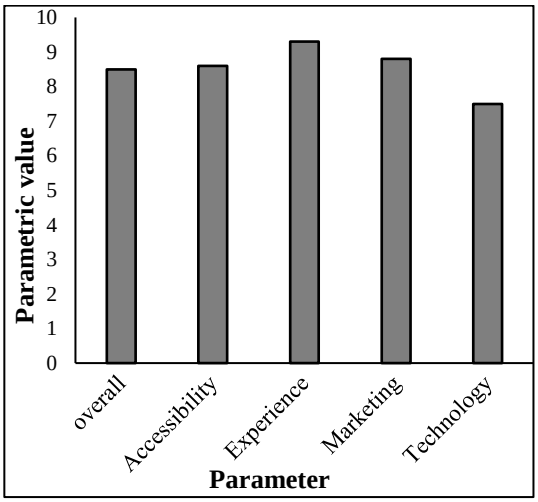
(b) Results of Oxford Universitty



(c) Results of Standford University



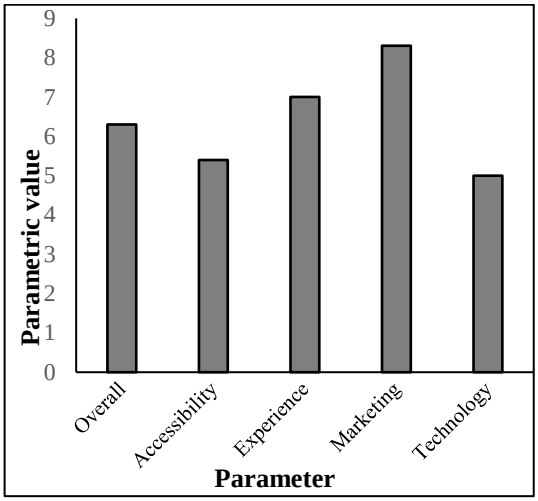
(d) Results of Cambridge University



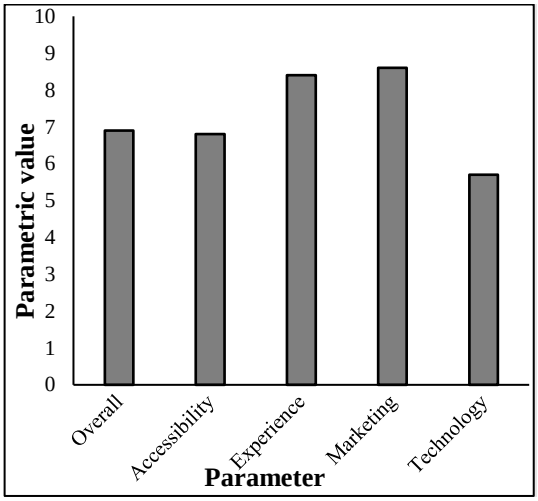
(e) Results of Massachusetts Institute of Technology

Fig.4. Abstract results of Foreign universities

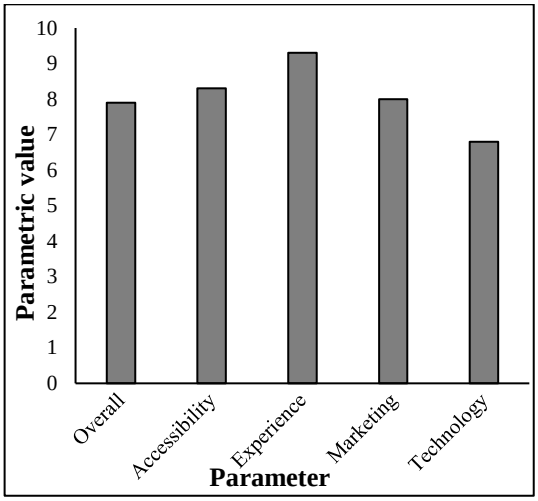
Pakistan Universities



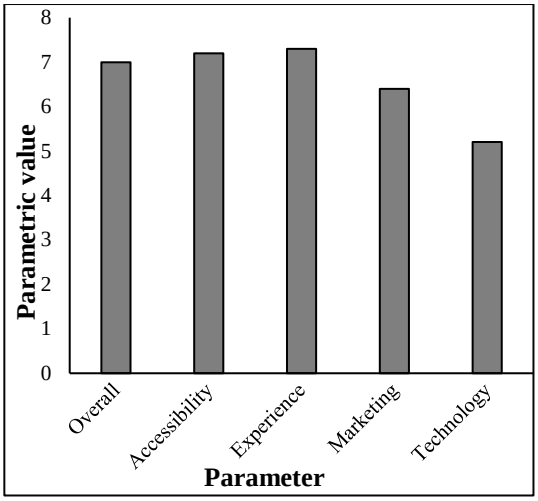
(a) Results of NUST Islamabad



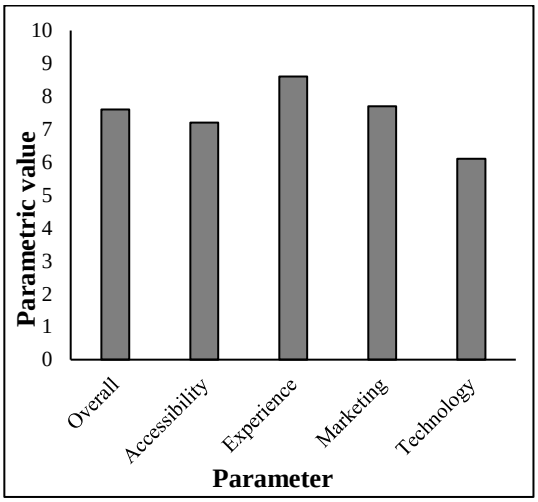
(b) Results of Punjab University



(c) Results of National University



(d) Results of Lahore University of Management Sciences (LUMS)



(e) Results of AKU

Fig.5. Abstract results of Foreign universities

5. DETAILED RESULTS ANALYSIS USING NIBBLER (17 PARAMETERS)

5.1 FOREIGN UNIVERSITIES

In Table.8, we can observe the detailed analysis of websites. All seventeen parametric results is shown in Fig.6 which includes printability, Code quality, Meta Tags, Images, Internal Links, Social Interest, Amount of Content, Popularity, Twitter, Headings, URL Format, Facebook Page, Page-Title, Incoming Links, Analytics and Freshness. The Fig.6.(a) include Caltech university results, which got greater marks in Internal Links, URL format, Page title, Incoming links and freshness that is '10' and lesser in Printability, Twitter, Facebook page that is '0', while in Meta Tags '2.0',Code quality '3.6', Amount of content '7.0', Social Interest '5.2', Server Behavior '5.2', Popularity '4.9', Heading '7.8'. Fig V-B is of Oxford university that obtained highest score in Printability, Twitter, Heading, Facebook, Social Interest, Mobile, Page title, Internal Links, Analytics and freshness that is '10' while lowest in Code quality '3.9' and Popularity that is '5.4', Meta tags '8.4', Images '8.0', Internal Links '9.9', Server Behavior '9.4' and for Amount of content '7.8'. The Fig.5.(c) is of Stanford university that obtained highest score in URL Format, Facebook Page, Social Interest, Mobile, Page title, Internal Links, Analytics that is '10' while lowest in Twitter 0.0, Printability and popularity that is '2.9', Code quality '3.8', Meta Tags '5.4', Meta tags '8.4', Images '9.8', Internal Links '9.9', Server Behavior '4.9', freshness 7.0 and for Amount of content '7.0'. The Fig.5.(d) is of Cambridge university that obtained highest score in Printability, Amount of content, URL Format, Facebook Page, Social Interest, Page title, Internal Links, Heading, Analytics, freshness that is '10' while lowest in Server Behavior '3.3'. While in Code quality '5.0', Meta Tags '5.2', Mobile '7.9', Images '9.7', Internal Links '8.2'popularity '8.9' and for Twitter'8.8'. The Fig.5.(e) is of Massachusetts university that obtained highest results in Twitter, Heading, Facebook, Social Interest, Meta tags, Page title, Internal Links, and freshness that is '10' while lowest in Popularity '2.0', Mobile '4.4', Code quality '5.3' and Popularity that is '4.0', Images '8.7', Internal Links '9.9', Server Behavior '9.0', Analytics '8.0' and for Amount of content '7.9'. For complete details see Table.8.

5.2 PAKISTAN UNIVERSITIES

The Fig.7.(a) include NUST university results. Which got greater marks in Internal Links, Freshness, Facebook that is '10' and lesser in Analytics '0.0', URL '4.0', Mobile '3.0', Code quality '1.0', Meta tags '8.0', Twitter '9.3', while in Meta Tags '8.0', Amount of content '7.0', Social Interest '8.5', Internal Links '8.5' Server Behavior '6.8', Popularity '6.4', Heading '5.4'. The Fig.7.(b) is of Punjab university that got highest score in Twitter, URL, Facebook page, Incoming link, Analytics and Freshness that is 10 and lowest score in Code quality that is '0.8', Meta tags '1.2', Amount of content '5.1', Printability '6.0', Page title '6.0', Mobile '7.2', Server Behavior '7.4', Popularity '9.2', Images '9.5', Social Interest '9.3', Internal Link '9.5', Heading '7.0'. The Fig.6.(c) is of National university that got highest score in Images, Mobile, URL, Page title, Incoming Links, Facebook page Analytics, Freshness that is 10 and lowest score in Twitter and Facebook page '0.0', Code quality that is '0.3', Meta tags '2.0', Heading '3.0', Amount of content '9.2', Printability '8.9', Server Behavior '3.6',Popularity '8.9', '9.5', Social Interest '8.5', and Internal Link '9.8'. The Fig.6.(d) is of LUMS university that got highest score in Printability, Heading, Mobile, URL, Page title, Incoming Links, Facebook page Analytics that is 10 and lowest score in Code quality that is '1.9', Meta tags '6.8', Freshness '6.7', Images '7.9', Amount of content '7.5', Printability '8.9', Server Behavior '9.4', Popularity '4.8', Social Interest '6.1', and Internal Link '8.1' Twitter '9.9'. The Fig.6.(e) is of Agha Khan University that got highest score in Printability, Meta tags, Mobile, Facebook page, Page title, Incoming link, Analytics and that is 10 and lowest score in Code quality that is '0.4', Amount of content '7.7', URL '4.0', Server Behavior '8.0', Twitter'9.5', Popularity '5.0', Images '9.8', Social Interest '4.5', Internal Link '6.8', Heading '9.6', Freshness '8.9'. These all seventeen parameters result are displayed in Table.8.

Table.8. Complete Parametric Results comparisons of Universities

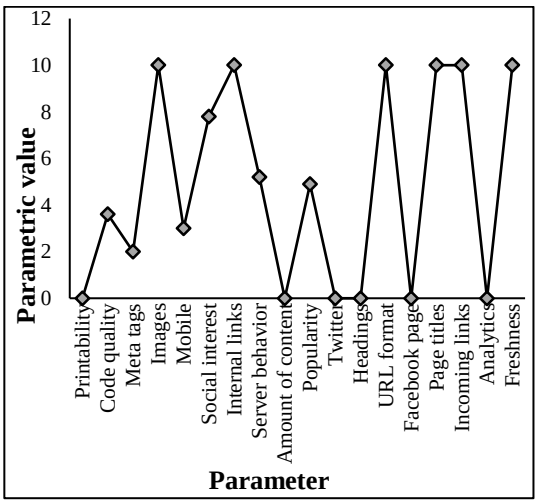
Maximum Value: 10
Mean Value: 5
Minimum Value: 0
Analyzing Years 2016-17

	P	C-Q	M-T	I	M	S-I	I-L	S-B	AOC	POP	T	H	URL	FB	P-T	I-L	A	F
California Institute of Technology[1] (USA)	0	3.6	2	10	3	7.8	10	5.2	0	4.9	0	0	10	0	10	10	0	10
Oxford university[1] (UK)	10	3.9	8.4	8	10	10	9.9	9.4	7.8	5.4	10	10	8.8	10	10	10	10	10
Stanford university[1] (USA)	2.9	3.8	3.6	9.8	10	10	9.9	4.9	7	2.9	0	9	10	10	10	10	10	0
Cambridge University[1] (UK)	10	5	5.2	9.7	7.9	10	8.2	3.3	10	8.9	8.8	10	10	10	10	10	10	10
Massachusetts Institute of Technology[1] (USA)	2	5.3	10	8.7	4.4	10	9.9	9	7.9	4	10	10	8.8	10	10	0	8	0
Nust University[2] (Islamabad)	8	1	8	8	3	8.5	8.5	6.8	7	6.4	9.3	5.4	4	10	8	10	0	10
Punjab University[2] (Lahore)	6	0.8	1.2	9.5	7.2	9.3	9.5	7.4	5.1	9.2	10	7	10	10	6	10	6	10
National University[2] (Islamabad)	8.9	0.3	2	10	10	8.5	9.8	3.6	9.2	8.9	0	3	10	0	10	10	10	10
LUMS[2] (Lahore)	10	1.9	6.8	7.9	10	6.1	8.1	9.4	7.5	4.8	9.9	10	10	10	10	10	10	0
Agha Khan University[2] (Karachi)	210	0.4	10	9.8	10	4.5	6.8	8	7.7	5	9.5	9.6	4	10	10	10	10	0

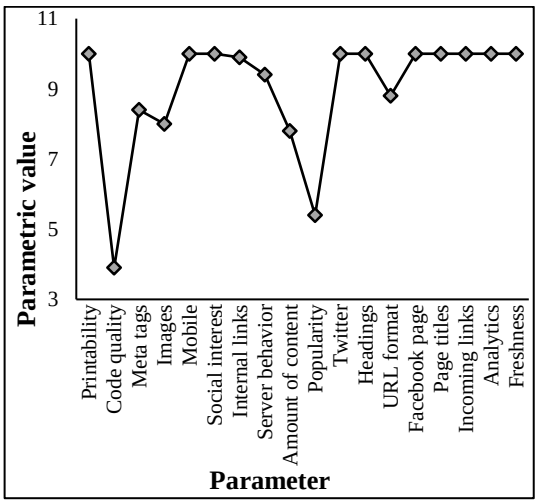
P: printability
C-Q: Code quality
M-T: Meta Tags
I: Images
I-L: Internal Links
S-I: Social Interest
AOC: Amount of Content
POP: Popularity
T: Twitter
H: Headings
URL: URL Format
FB: Facebook Page
P-T: Page Title
I-L: Incoming Links
A: Analytics
F: Freshness

[1]Foreign Universities
[2]Pakistan Universities

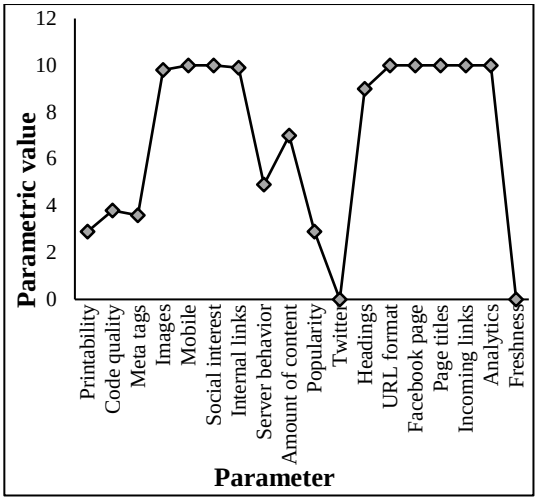
Foreign Universities



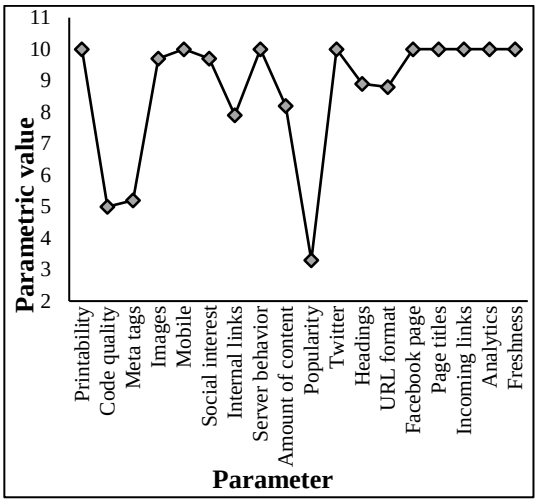
(a) Results of California Institute of Technology



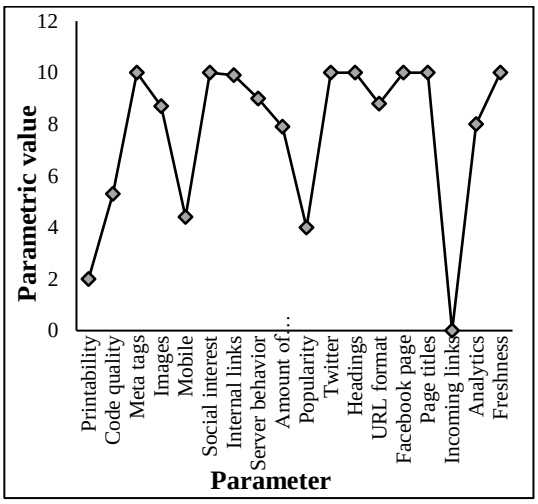
(b) Results of Oxford Universitty



(c) Results of Standford University



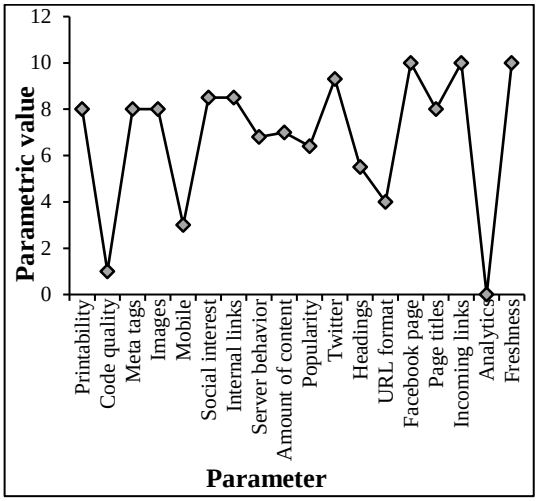
(d) Results of Cambridge University



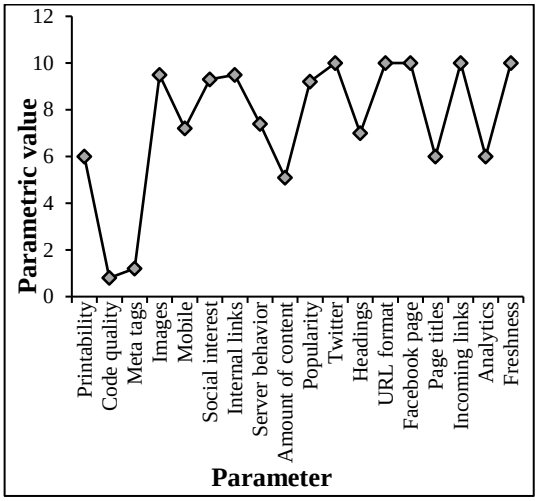
(e) Results of Massachusetts Institute of Technology

Fig.6. Parametric results of Foreign Universities

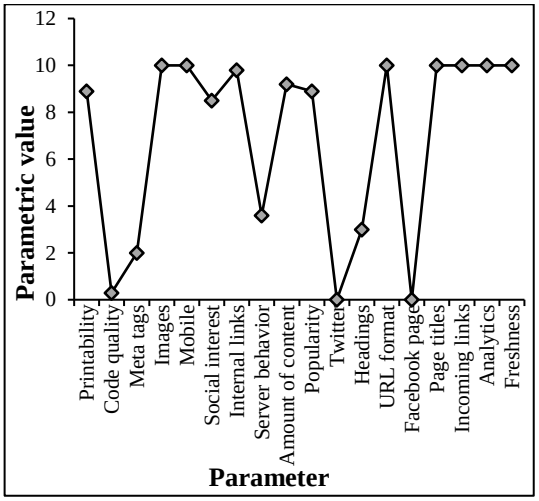
Pakistan Universities



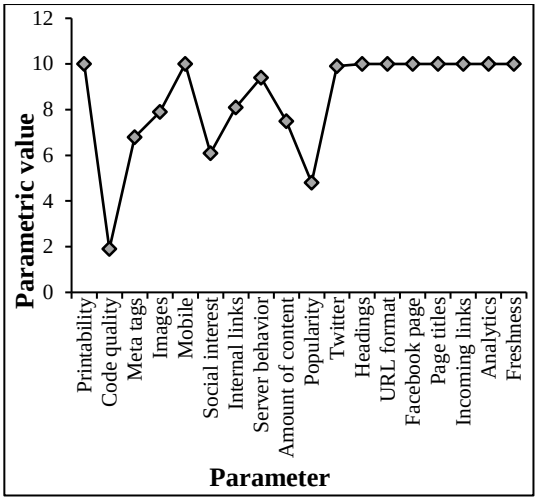
(a) Results of NUST Islamabad



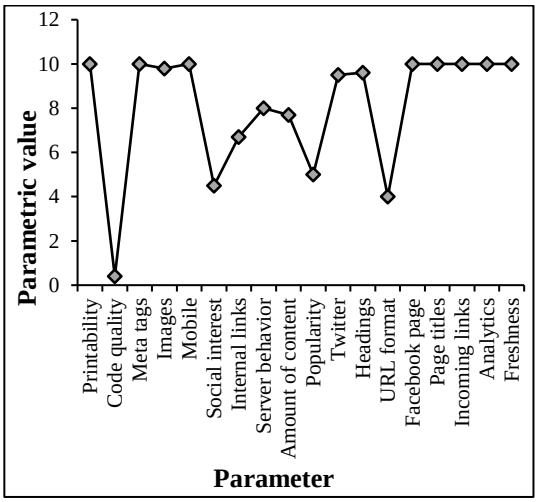
(b) Results of Punjab University



(c) Results of National University



(d) Results of Lahore University of Management Sciences (LUMS)



(e) Results of AKU

Fig.7. Parametric result of Pakistan universities

6. SEOPTIMER TOOL RESULTS

For cross checking of our result we have selected second tool for testing that is SEOPTIMER, which is also an open source tool for website performance testing. It works on 5 different Parameters like Security, social, User interface/Mobile, Performance and SEO. SEOPTIMER provide results in form of grades from A+ to F.A. Specific number is assigned to all grade. For conversion of grade to number see Table.9.

Table.9. Grade to Number Conversion

Grade	Score
A+	10
A-	9
B+	8
B-	7
C+	6
C-	5
D+	4
D	3
E+	2
E	1
F	0

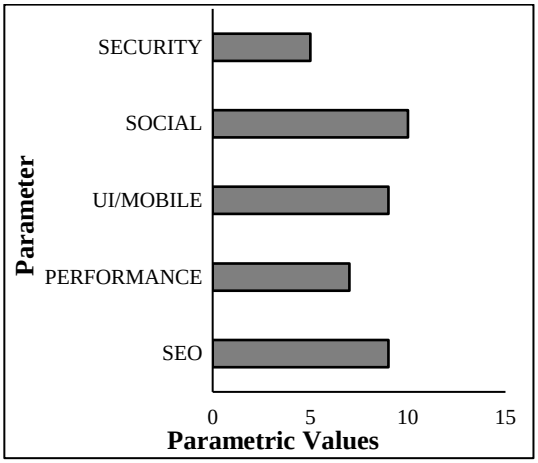
6.1 FOREIGN UNIVERSITIES USING SEOPTIMER

The Fig.8.(a) depicts the results of Caltec university which got maximum and minimum scores in social ‘10’ and security ‘5’ respectively, while in user interface/mobile ‘9’, Performance ‘7’ and last SEO‘9. The Fig.8.(b) display the results of oxford university which achieve highest SEO, Social, Security that is ‘10’ and lowest in performance ‘5’ and finally UI/Mobile ‘9’. The Fig.8.(c) points the results of stanford university which got highest in SEO and Social ‘10’ and lowest inSecurity ‘3’, UI/Mobile ‘9’ and performance ‘6’. The Fig.8.(d) displays the results of Cambridge university that got maximum and minimun in SEO, Social ‘10’ and Security ‘1’, performancr ‘5’ and finally design ‘9’. The Fig.8.(e) that is of MIT shows that it got highest score in Social and SEO ‘10’and lowest in Security ‘5’, Performance ‘7’ and UI/Mobile ‘9’. For complete results see Table.10.

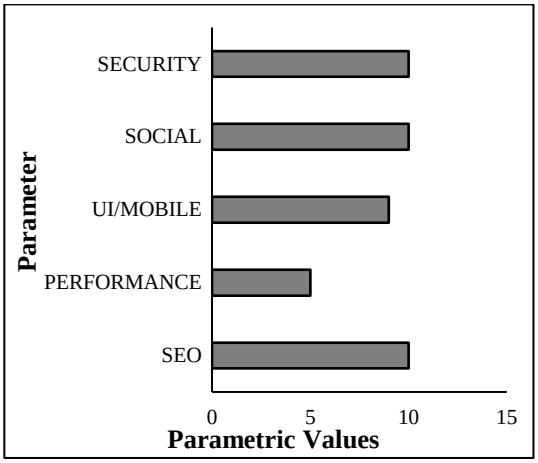
Table.10. Complete results of Universities using SEOPTIMER

Maximum Value: 10 Mean Value: 5 Minimum Value: 0 Analyzing Years: 2016-17					
	SEO	**Performance**	**UI/Mobile**	**Social**	**Security**
California Institute of Technology[1] (USA)	9	7	9	10	5
Oxford university[1] (UK)	10	5	9	10	10
Stanford university[1] (USA)	10	6	9	10	3
Cambridge University[1] (UK)	10	5	9	10	1
Massachusetts Institute of Technology[1] (USA)	10	7	9	10	5
Nust University[2] (Islamabad)	5	3	4	10	1
Punjab University[2] (Lahore)	7	3	9	10	7

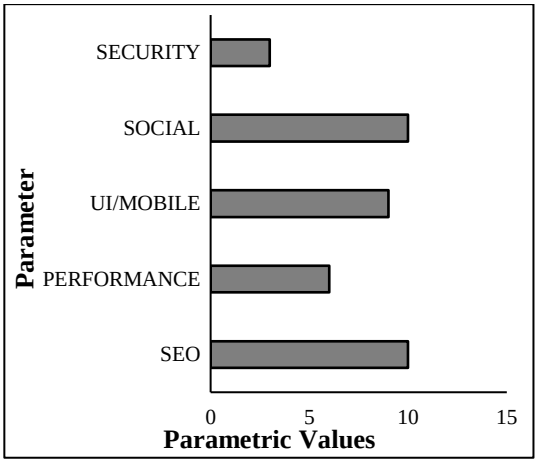
National University[2] (Islamabad)	7	5	9	3	2
LUMS[2] (Lahore)	8	3	9	10	3
Agha Khan University[2] (Karachi)	5	1	9	10	10
[1]Foreign Universities [2]Pakistan Universities					



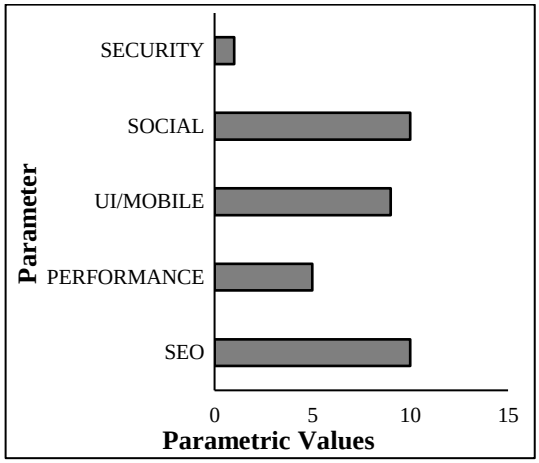
(a) Results of California Institute of Technology



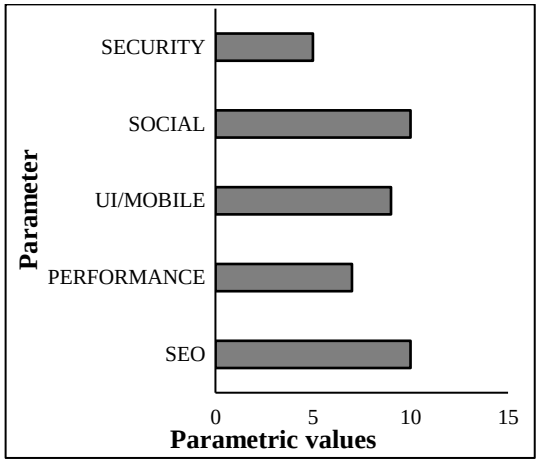
(b) Results of Oxford University



(c) Results of Standford University

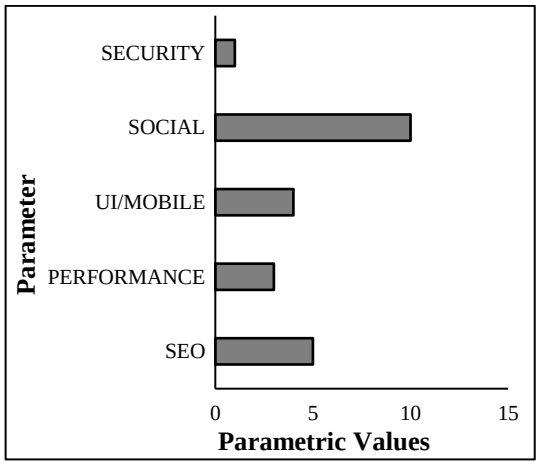


(d) Results of Cambridge University

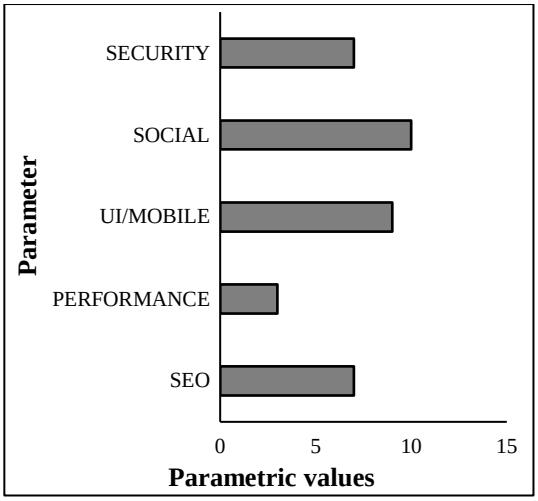


(e) Results of Massachusetts Institute of Technology

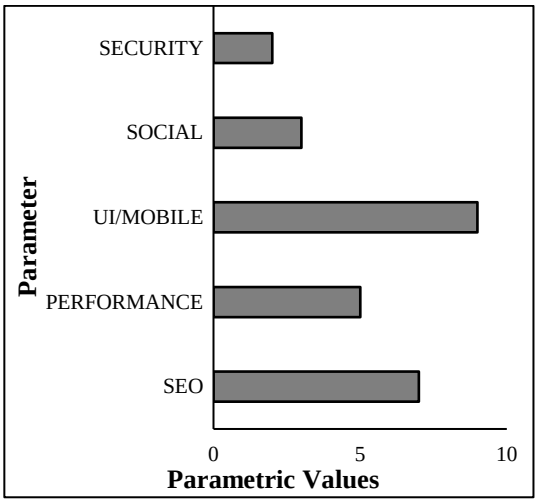
Fig.8. Foreign universities results using SEOPTIMER



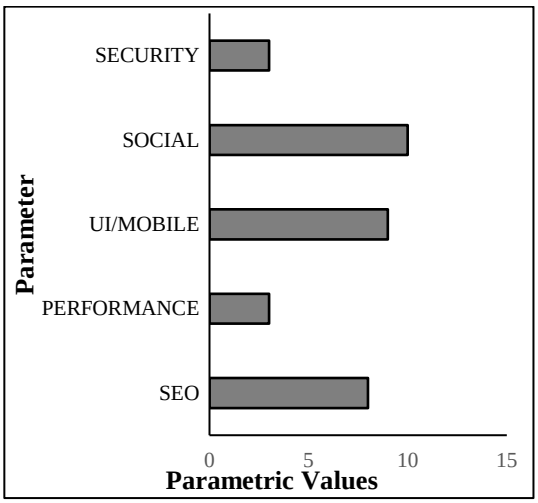
(a) Results of NUST Islamabad



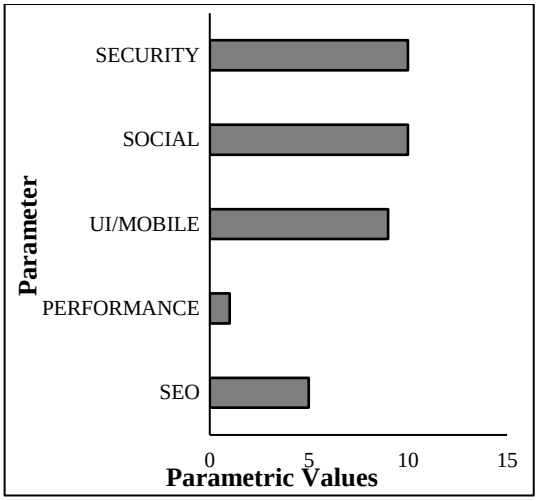
(b) Results of Punjab University



(c) Results of National University



(d) Results of Lahore University of Management Sciences (LUMS)



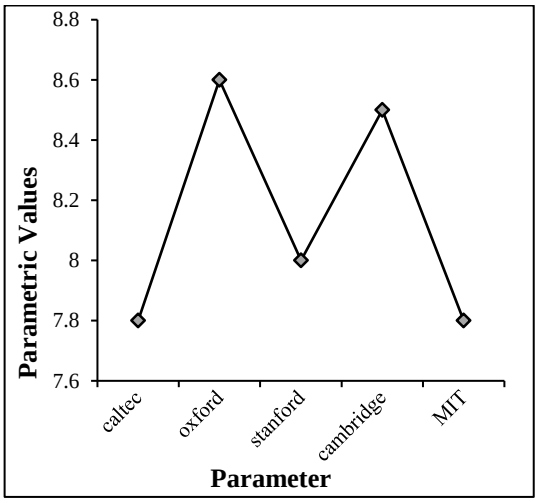
(e) Results of AKU

Fig.9. Pakistan universities results using SEOPTIMER

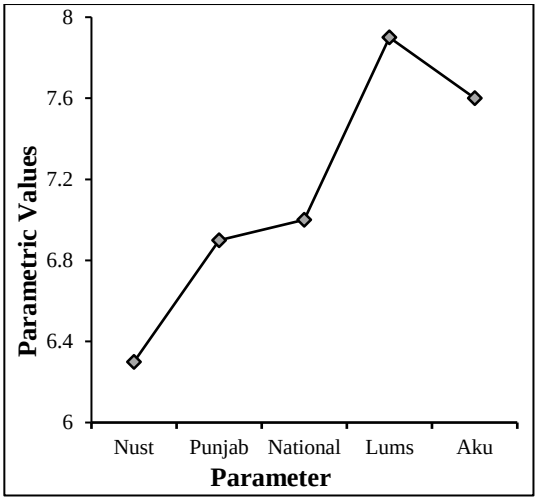
7. COMPARITIVE RESULT ANALYSIS AMONG NIBBLER AND SEOPTIMER

The Fig.10 display the final results using both SEO tools (Nibbler and SEOPTIMER) from where we can see the difference among both universities. The Fig.10.(a) and Fig.10.(b) contain foreign and Pakistan universities results respectively using nibbler Our first tool (Nibbler) result shows that the overall score of foreign universities are 8.14 and Pakistan Universities are getting 7.14 score out of 10.

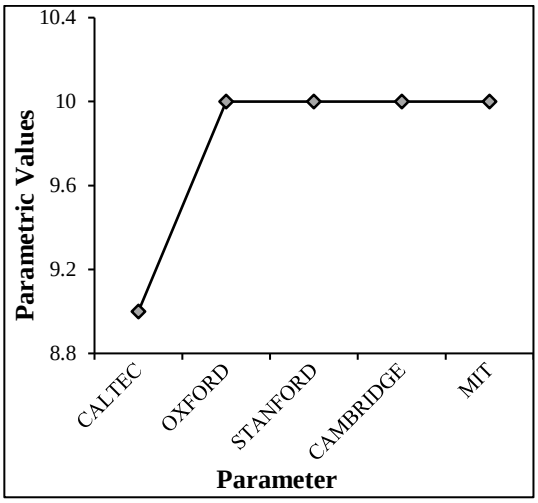
While in Fig.10.(c) and Fig.10.(d) shows results of both universities using second tool (SEOPTIMER). We are getting these overall results that are 39.6 for foreign universities and 30.6 for Pakistan universities. All above results are on the average basis. If we only consider SEO related then we get foreign universities result as 9.8 and for Pakistan universities it is only 6.4.



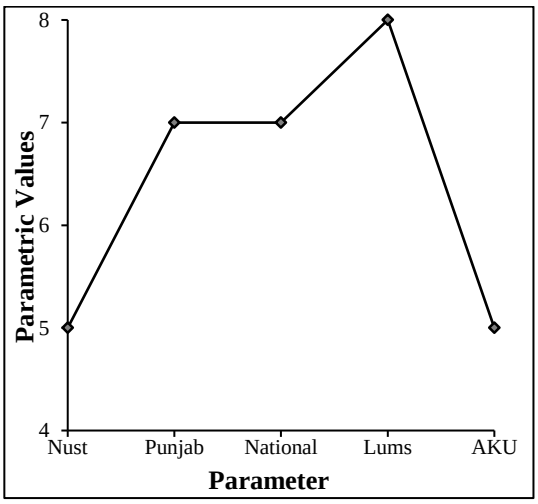
(a) Foreign Universities using NIBBLER



(b) Pakistan Universities using NIBBLER



(c) Foreign Universities using SEOPTIMER



(d) Pakistan Universities using SEOPTIMER

Fig.10. Comparative results analysis of Nibbler and SEOPTIMER

8. CONCLUSION

Nowadays, the role of SEs are extraordinary because of web evolution from static medium to semantic medium. The consistent change in Web brings new challenges to SEs for producing accurate SERP results. With this study we have contributed to SEO domain by using different open source tools to audit the different academic websites and we believe that it would be extremely helpful for academic website developers to undertake the audit process for their web pages through these SEO tools to know the strength and weakness of their websites. SEO is playing a highly significant role for achieving stable SERP position from SEs. This study suggests that the academic websites should follow White Hat SEO tips to obtain good ranking score from SEs. Concluding, we have carried out the analysis on both foreign and local universities through experimental work and it provides an opportunity to withdrawn important ranking factors of SERP ranking. The experimental results showed that foreign Universities academic websites performed better than local (Pakistan) Universities. The results highlighted the importance of diverse SEO factors such as code quality, technology, printability and accessibility to the choice of SEs for evaluating the websites for assigning rank on SERP. This work only looked into highlight the SEO important ranking signals of search engine and use of open source tools to audit the website performances. Future research may focus on to test the websites performance of different domains using different open source tools to explore new important ranking signals

REFERENCES

[1] Nupur Choudhury, "World Wide Web and its Journey from Web 1.0 to Web 4.0", *International Journal of Computer Science and Information Technologies*, Vol. 5, No. 6, pp. 8096-8100, 2014.

[2] R. Newman et al., "Web 2.0-The past and the future", *International Journal of Information Management*, Vol. 36, No. 4, pp. 591-598, 2016.

[3] Paula Miranda, Pedro Isaias and Carlos J. Costa, "E-Learning and Web Generations: Towards Web 3.0 and E-Learning 3.0", *Proceedings of 4th International Conference on Education, Research and Innovation*, Vol. 81, pp. 92-103, 2014.

[4] Radovan Madle Eak, Lucia Madle Eakova, Libor Svadlenka and Daniel Salava, "Analysis of Website Traffic Dependence on use of Selected Internet Marketing Tools", *Procedia Economics and Finance*, Vol. 23, pp. 123-128, 2015.

[5] Halina M. Dahlan, Mohamed Ali Ismail and Ab Razak Che Hussin, "Suitability of Collaborative Learning Activities in Web 2.0 Environment", *Proceedings of IEEE International Conference on User Science and Engineering*, pp. 118-121, 2010.

[6] Sheila Kinsella, AdrianaBudura, Gleb Skobeltsyn, Sebastian Michel, John G. Breslin and Karl Aberer, "From Web 1.0 to Web 2.0 and Back-How did your Grandma Use to Tag?", *Proceedings of 10th International Workshop on Web Information and Data Management*, pp. 1-8, 2008.

[7] The Size of the World Wide Web (The Internet), Available at: http://www.worldwidewebsize.com

[8] Total number of websites, NetCraft and Internet Live Stats, Available at: http://www.internetlivestats.com/total-number-of-websites.

[9] Sareh Aghaei, Mohammad Ali Nematbakhsh and Hadi Khosravi Farsani. "Evolution of the World Wide Web: From Web 1.0 TO Web 4.0", *International Journal of Web and Semantic Technology*, Vol. 3, No. 1, pp. 1-10, 2012.
[10] Jerri L. Ledford, "*Search Engine Optimization Bible*", Vol. 584, John Wiley and Sons, 2015.
[11] Some Interesting Facts about Search Engines, Available at: https://bizztor.com/some-interesting-facts-about-search-engines/.
[12] Search engine success factors, Available at: http://searchengineland.com/guide/seo/content-search-engine-ranking.
[13] SEO Tool-Nibbler, Available at: http://nibbler.silktide.com/
[14] SEO Tool 2- Seoptimer, Available at: http://www.seoptimer.com/.
[15] Caltech, Available at: http://www.caltech.edu/
[16] Oxford University, Available at: http://www.ox.ac.uk/
[17] Stanford University, Available at: https://www.stanford.edu/
[18] Cambridge University, Available at: https://www.cam.ac.uk/
[19] Massachusetts Institute of Technology, Available at: http://web.mit.edu/
[20] Nust University, Available at: http://www.nust.edu.pk
[21] Punjab University, Available at: http://www.pu.edu.pk/.
[22] National University, Available at: http://www.nu.edu.pk/
[23] Lahore University of Management Sciences, Available at: https://lums.edu.pk/
[24] Agha Khan University, Available at: https://www.aku.edu/
[25] World University Ranking 2015-2016, Available at: https://www.timeshighereducation.com/world-university-rankings/2016/world-ranking#!/page/0/length/25/sort_by/rank/sort_order/asc/cols/stats
[26] Top Universities in Pakistan, Available at: http://www.4icu.org/pk/
[27] Google Search Engine Optimization Starter Guide, Available at:http://static.googleusercontent.com/media/www.google.com/en//webmasters/docs/search-engine-optimization-starter-guide.pdf
[28] The Basics of Search Engine Friendly Design and Development, Available at: https://moz.com/beginners-guide-to-seo/basics-of-search-engine-friendly-design-and-development
[29] M. Dorfman, "*Software Engineering*", Wiley Press Home, 1996.
[30] Teun Lucassen, Rienco Muilwijk, Matthijs Noordzij and Jan Maarten Schraagen, "Topic Familiarity and Information Skills in Online Credibility Evaluation", *Journal of the American Society for Information Science and Technology*, Vol. 64, No. 2, pp. 254-264, 2013.
[31] Joe Rinaldi, "30 Eye-Opening User Experience Stats", Available at: https://www.impactbnd.com/blog/user-experience-stats-infographic