Quantifying Quality of WEB Site Based On Usability

Dr. JKR Sastry[1], NibhanupudiSreenidhi[2], SasidharKunchanapalli[3]
[1] ECE, [2] ECE, [3]CSE

Abstract- Information dissemination is taking place these days heavily using web sites which are hosted on the internet. The effectiveness and efficiency of the design of the WEB site will have great effect on the way the content hosted on the WEB can be accessed. Quality of a web site, places a vital role in making available the required information to the end user with ease satisfying the users content requirements. A framework has been proposed comprising 42 quality metrics using which the quality of a web site can be measured. However computations procedures have not been stated in realistic terms.

In this paper, computational procedures for measuring "usability" of a WEB site can be measured which can be included into overall computation of the quality of a web site

Keywords: Quality, Assessment, framework, WEB sites, Computational Methods, Usability of WEB sites

I. INTRODUCTION

Hosting information on the WEB site and disseminating the same to the required users is being following as one of the strategies these days. The quality of the information posted has been the issue since long. One has to look at the authenticity of information posted on the WEB before considering the same for use. The information posted on the WEB is comprised of different forms that include Videos, audios, 2D and 3D Graphics and Hyper marked text. The information spotted on the WEB is being used for different purpose including e-commerce and publicity. The user stratification who uses the WEB is dependent on many factors that included quick access, easy to use, minimum navigation, content readability etc. The quality of a website can be assessed using some quality factors such as Usability, Reliability, Flexibility, Functionality, Portability Maintainability, Privacy, Security, Adequacy of Information, Safety, Content, Navigation and etc.

There is a need to assess the quality of a web site so that one can check the dependability on the same. The complexity of a web site depends on the kind of data hosted. The web sites as such get complicated when animated objects, audios and videos are hosted. Hosting different variety of sources on the same site obviously will become complicated. Many approaches have been presented in literature that leads to measuring the quality of the web sites. The approaches presented are abstract, analytical and non-computational. Some of the approaches are either subjective or objective and does not lead to proper interpretation. The approaches suggested in the literature are cantered around down time and response time.

The quality of a web site can be viewed in two perspective which include programmers and end user perspective. Programmers view the quality in terms of functionality, security and maintainability. On the other hand the end users view the quality of WEB site in terms of credibility, efficiency and usability.

Users have specific needs. A WEB site designer designs the WEB sites as per their own understanding. One has to evaluate a web site to find the extent to which a designed web site meets the requirements of the end users. A web site is developed considering some characteristics. A mapping of user needs to the WEB site characteristics needs to be done. Computing quality of a web site has become important to find various aspects such as applicability, ease of navigation etc. It is quite difficult to assess the quality of complex web sites like ecommerce, animated sites, project related etc. as many of the characteristics are inter-related. The quality of some of the most important characteristics cannot be assessed.

Every embedded system is different and therefore needs to be assessed. Quality factors which can be used for assessing the quality of the WEB sites must be determined. A quality assessment model is also required and also a process is required to find suitability of the Quality factors to a specific web site. A set of 42quality factors have been proposed in the past by the authors. The overall computational method for assessing quality of the WEB site has been proposed. However computing quality in quantitative terms considering specific parameters has not been presented. In this paper a mechanism using which the quality factor "Usability could be measured has been presented.

II. LITERATURE SURVEY

Miss. Kausar Fiaz Khawaja1 et al., [1] have dealt with factors that include Usability, Privacy Security, and Adequacy of information and Appearance which can be used for evaluating the quality of a WEB site.Usability is the ease of use and learnability of a human-made object such as a tool or device. It describes the quality of user experience across websites.Appearance means the visibility of the WEB site which includes appealing, polished and professional presentation. Adequacy of Information means Putting sufficient and useful information in the website. A method has been presented paper that helps computing the quality based on the observations made while the WEB site is in use.

Vijay Kumar Mantri et al. [2], have presented that quality of a WEB site can be computed using the factors such as Usability, Safety and Flexibility. Usability of a website must be effective, efficient and satisfactory. Safety of a Website must ensure that no interaction of a user with the WEB site could be ever revealed. Flexibility is the ability to add / modify / remove functionality affecting the WEB pages without damaging the functioning of current ongoing system. The authors have used a tool called Portal Data Quality

Assessment Tool (PoDQA) using a quality model called Portal Data Quality Model (SPDQM).

Vassilis S. Moustakis et al., [3] have used the quality factors which include Content, Navigation, Structure and Design, Appearance, Multimedia, Uniqueness.Content is the information conveyed to the end user through a user interface. Content reflects quality, completeness, degree of specialization or generalization and reliability of information included in the website. Navigation reflects the support provided to the user when moving in and around the site. Elements of navigation include easiness of moving around, easiness in understanding site structure, and availability and validity of links. Structure and Design incorporates aspects that affect order of presentation, speed and browser. Appearance and Multimedia captures aspects that relate to site's "look and feel" with special emphasis on the state of the art graphics and multimedia artefacts. Uniqueness refers to user's perception that the site carries something that makes it different in a world full of sites. A computational method called AHP (Analytical Hierarchical Process) has been used for computing quality of a web site.

AndrinaGraniü et al., [4] have presented the quality of a WEB site from the point of portability.Portability means the ability to move the website from one host platform to another and the platform that runs the site will work on the new host.

Tanya Singh et al. [5], have used quality factors that include Usability, Privacy and Security, Adequacy of information and Appearance.Usability is the ease of use and learnability of a human-made object such as a tool or device. It describes the quality of user experience across websites. Privacy is all about revealing information to those users who are identified by the owner of the user. Only selected users are provided with the information of those data elements intended to be shared by the owner of the data. Security is all about preserving the interaction of the user with the WEB site. Adequacy of information is related to making available complete data without any loose ends that suffice the actual requirements of content as the most important factors that should be considered for evaluating the Quality of a WEB site. Most of the presentation on the basement of quality framework has neither provided a framework or appropriate computational methods using which quality of a WEB site can be computed Layla Hasan and Emad Abuelrub [9] have proposed a general criterion for evaluating the quality of any website regardless of the type of service that it offers. The have contended that the dimensions of quality criteria that include content, design, organization and user-friendliness. These dimensions together with their comprehensive indicators and checklist can be used by web designers and developers to create quality websites to improve the electronic service and then the image of any organization on the Internet.

Kavindra Kumar Singh et al., [10] have expressed that the rapid growth of web applications increases the need to evaluate web applications quantitatively. WebQEM (Web Quality Evaluation Method) have been used for objectively trying to evaluate the web applications. Weighing a web attribute has been proved to be subjective and mostly dependent on the end user. Appearance of a WEB site is all about displaying the content in most understandable by using colours. Graphics, sequences etc.

Anushaet. al., [6] have considered Factors such as Portability, Reliability, Functionality, Usability, Maintainability, and Efficiency to asses quality of a WEB site. Portability means the ability to move the website from one host to another and the platform that runs the site will work on the new host.Reliability means that a WEB site shall reflect the same information any number of times it is sought in the same context. It is the probability that the intended page will be available and presented to the user. Website must be Free from errors. Functionality of a website includes accuracy, security, suitability and etc. Usability is the ease of use and learnability of a human-made object such as a tool or device Maintainability includes analyzability, changeability, stability, Testability. Maintainability implies the simplicity with which changes can be made to the WEB site while the WEB site is up and being used for other. Analyzability includes the readability of the content and the ability to intemperate the same including the tracing of navigational paths. Stability is a feature that dictates that the same content is displayed any number of times a user visits a WEB page in the same context. Testability of a WEB site includes all those features using which the proper working of the WEB site is tested while the WEB site is up and running.

Filippo Ricca et al., [7] have considered Content, Design, Organization and user friendliness as the quality factors that must be considered in evaluating the quality of a WEB site. Organization of a Web site includes the identification of WEB pages and the way the WEB pages are linked hierarchically. The linking of the WEB pages is done in such way that is easy to navigate. The WEB pages must be simple and user friendly in the sense, the content shall be presented to the user as per preferences of the user.

Saleh Alwahaishiet. al., [8] have considered playfulness,andLevel of representation of the judgements made by the experts. The authors have presented quantitative evaluation strategy to access the quality of WEB sites and Applications. The methodology proposed by them is useful to systematically assess characteristics, sub-characteristics and attributes that influence product quality. They have presented models, methods, procedures, principles and for assessing quality of a WEB site.

Long-Sheng Chen et al., [11] have presented that heavy interaction is taking place among the members especially through social WEB sites. It has become very important to consider the quality of WEB sites. The authors have attempted to define the quality factors of virtual communities and then proceeded to identify key factors by attracting new members by using feature selection technique

Naw Lay Wah et al., [12] have presented that the WEB sites must be evaluated and measured for quality. He has presented several metrics that are quite related to usability associated with good design elements such as word count, total pages, size in bytes, body text percentage, average link text count and others. He has presented the computation of WEB site quality

on basis of 16 factors. He has used support vectors to predict good and bad web pages. A quantitative analysis of WEB page attributes has been presented.

III. INVESTIGATIONS AND FINDINGS

The quality of a website can be computed by one of the metrics called "Usability". Computational methods called Usability. Usability describes the usage of a website. The extent to which a web site issues the number of users who are using the WEB and frequency of usage of a WEB site reflect the quality of a web site. The more the quality of a web site the more the WEB site is used by the Users. The usability of a web site can be computed based on number of hits to the WEN site.

Every WEB site maintains a WEB log that has the entries in it reflecting the dynamically referred user, the URL clicked, the parameters used, date and time of access etc. An access to a URL is considered to be a hit / click on the WEB site. The usability of the WEB site is dependent on response time, user friendliness, easy to understand the meaning of the content and the number elements that can be scanned at a time. The experience of the users can be refer elected in terms of number of hits, number of users and the frequency of usage over a period say day, week and a month.

The WEB log can be processed to determine the statistics based on the frequencies day wise, week wise, month wise and year wise that include the following:

1. Number of Users visited the web site
2. Number of URLs visited
3. Number of Clicks made on the URLS

The overall usability of a WEB site can be expressed as below and **the usage statistics can be tabulated as shown in the Table 1.**

Per User usage per day= (Number of URLS visited * Number of clicks made per user) / Numberusers visited the WEB site)

Per User usage per week = (Number of URLS visited * Number of clicks made per user) / Numberusers visited the WEB site)

Per User usage per Month = (Number of URLS visited * Number of clicks made per user) / Numberusers visited the WEB site)

Per User usage per Year = (Number of URLS visited * Number of clicks made per user) / Numberusers visited the WEB site)

Table 1 Statistics compilation on the usability of the web sites

Measurements/ Computations	Day	Week	Month	Year
No of users visited the website				
No of URLs visited				
Number of clicks made				
No of clicks made per URL				
Per User usage= (No of URL'S visited*No of clicks made per URL)/(No of users visited)				

The overall usage considering all the frequencies can be computed

Overall usage = (Per User usage per day) * 0.0.4 + **(**Per User usage per week) * 0.0.3 + **(**Per User usage per month) * 0.0.2 + **(**Per User usage per Year) * 0.0.1

The quality of usage can be computed based on a 4 point scale with indices been poor, Low, Average and High which are assigned with weights 0.00, 0.25, 0,50 and 1.00 respectively. Each of the indices is also assigned a bench mark that measures the overall usage of the web site. Table 2 show the benching related to WEB usage.

Quality table for Usability:

Quality Factor	Poor	Low	Average	High
Quality Weight	**0.00**	**0.25**	**0.45**	**1.00**
Bench Mark				
Overall usage per user in terms of clicked count	**<15**	**15-18**	**18-20**	**20-25**

The actual quality is assessed by matching the overall usage and then finds the quality weight achieved. If for instance if the number of clicked count is in between 600-800 the quality of the WEB site considering usability can be computed as 0.45.

IV. EXPERIMENTATION AND RESULTS

A standard WEB site of department of Electronics and computer science and engineering is considered and the WEB log is processed and statistics relate to WEB usage has been computed, The results obtained are shown in the Table 3.

Overall usage = 18 * 0.4 + 18 * 0.3 + 16 * 0.2 + 17 * 0.1 = 17.5

The overall usage is mapped to the quality metric table and then the quality due to usability can be computed as low which is 0.25.

Table 3 Statistics compilation on the usability ECM web site

Measurements/ Computations	Day	Week	Month	Year
No of users visited the website	10	50	250	2900
No of URLs visited	9	9	9	9
Number of clicks made	180	900	4000	6000
No of clicks made per URL	20	100	444	49300
Per User usage= (No of URL'S visited*No of clicks made per URL)/(No of users visited)	18	18	16	17

V. CONCLUSION

Web site must be of high quality if the same are to be used effectively for information dissemination. There are number of quality factors that must be considered for assessing overall quality of web site. One such factor is related to usability of the WEB site. Usability of a web site can be computed using the WEB log. If the usability of the WEB site increases, information dissemination increases accordingly. Both are directly proportions to each other.

VI. REFERENCES

[1]. Miss. Kausar Fiaz Khawaja1, Dr.Rahat Hussain Bokhari2,Exploring the Factors Associated With Quality of Website Department of Technology Management, International Islamic University, Islamabad, Pakistan,Vol.10,Issue 14 November 2010,Pg37-45.

[2]. VijaykumarMantri, Dr. S. Kalaimagal, Dr N.Srinivasu,An Introspection of Web Portals Quality Evaluation,Vol.5, No.9,DOI:10.15693/ijaist/2016.v5i9.33-38.

[3]. Vassilis S. Moustakis1,2, Charalambos Litos1, Andreas Dalivigas1, and Loukas Tsironis1 , Website quality assessment criteria , Proceedings of the Ninth International Conference on Information Quality , 2004

[4]. AndrinaGraniü, Ivica Mitroviü* and Nikola Maranguniü , Usability Evaluation of Web Portals , Proceedings of the ITI 2008 30th Int. Conf. on Information Technology Interfaces, June 23-26, 2008

[5]. Tanya Singh, SachinMalik,Darothi Sarkar,E-Commerce Website Quality Assessment based on Usability,Department of Computer Science & Engineering Amity University Uttar Pradesh Noida, India Pg101-105

[6]. R.Anusha,A Study on Website Quality Models,Department of Information Systems Management, M.O.PVaishnav College For Women(Autonomous),Chennai,Volume 4,Issue 12, December 2014,Pg:1-5.

[7]. Filippo Ricca and Paolo Tonella,Analysis and Testing of Web Applications,Centro per la RicercaScientifica e Tecnologica, I-38050 Povo (Trento), Italy,

[8]. Saleh Alwahaishi1 and Václav Snášel2,Assessing the LCC Websites Quality,© Springer-Verlag Berlin Heidelberg 2010,F. Zavoral et al. (Eds.): NDT 2010, S I, CCIS 87,2010,pp. 556–565

[9]. Layla Hasan1 and Emad Abuelrub, Assessing the Quality of Web Sites, Applied Computing and Informatics, Volume 9, Issue 1, January 2011, Pages 11–29

[10]. Kavindra Kumar Singh, Dr. Praveen Kumar, JitendraMathur, Implementation of a Model for Websites Quality Evaluation – DU Website, International Journal of Innovations & Advancement in Computer Science IJIACS ISSN 2347 – 8616 Volume 3, Issue 1 2014

[11]. Long-Sheng Chen1, and Pao-Chung Chang, Identifying Crucial Website Quality Factors of Virtual Communities, Proceedings of the International Multi-Conference of Engineers and computer scientists, Vol 1, IMECS 2010

[12]. Naw Lay Wah , An Improved Approach for Web Page Quality Assessment , IEEE Student Conference on Research and Development,2011