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Evaluation of Website

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Abstract-- *The web is becoming important in all fields day by day in business, education, sharing information and for communication. Every passing day the number of companies, organizations and individuals publishing their websites is increasing. All want their website to be a good quality website. Some quality metrics may affect indirectly on the popularity through their effect on the performance or the usability of websites. With each passing day, the web is assuming greater significance in our lives, be it e-commerce, e-payments, Internet banking, e-paper, social media, etc. It becomes important to make available all electronic and information technology tools to everyone, especially for people with some kind of disabilities. It is necessary to evaluate a website so that it can satisfy the users. The Main purpose of web site evaluation is to assure the quality of the web site. Evaluation of websites can be done in many different ways. This work focuses on the study the criteria to evaluate the website and then studied the accessibility tools for website evaluation.*

Keywords-- Website evaluation, Website accessibility, Website usability, WCAG, Section 508.

I. INTRODUCTION

The Internet and World Wide Web have become popular within a short period of time. It has grown rapidly in scope and extent of use affecting all aspects of lives. The numbers of websites of companies, organization are increasing day by day. Companies want to know what their competitors do and what products they offer using the web. With the help of this information companies can modify and improve their websites to increase their competitiveness and popularity. Also, developing a website does not end with hosting necessary information, media and software. After designing the website, it has to be tested and evaluated for customer satisfaction. Good quality websites attract users as it satisfies the need of users. Compared with the traditional software, the web applications have many special properties: firstly, because of the easy accessibility to information, the web applications have a huge user population, thus propose a high demand to the server's performance and the ability of dealing with concurrent transactions, secondly, the architecture requires the web applications to fit for the heterogeneous and autonomous environments, thirdly, web applications mainly focus on the information search and index, so they have weaker functions but quicker updating rates in their contents and techniques, comparing with the traditional ones. Thus, additional efforts are needed for evaluating the website. [6] To find out errors, traditional testing methods are used i.e. by executing certain test case. In test case selection there are many possible values and their combinations. But by using these methods, it is a cumbersome task to find out all the potential errors. Since web applications are distributed, heterogeneous, concurrent, and platform free, web testing is more complex than traditional software testing [17]. So more attention should be paid toward website testing. This paper has been divided into different sections. Firstly, Section I describes the introduction of paper, Section II describes the website evaluation criteria and the introduction of tools used to evaluate them, Section III discusses automated evaluation of website, Section IV discusses the website evaluation tools used in this paper, Section V discusses the Results of the tools used in this paper. Lastly, Section VI discusses the conclusion and future scope of this study.

II. WEBSITE EVALUATION

Evaluation means to examine and judge carefully. The main purpose of a program evaluation can be to determine the quality of a program by formulating a judgment. In website evaluation, the accessibility and usability of a website should be checked to ensure its quality. Main aim of evaluation is to assure the quality of the website or application. For the website evaluation the first thing which is evaluated is the quality of the website. Dimensions of quality [15] are measured in web evaluation: timeliness, structural quality, content, accuracy and consistency, response time and latency and performance.

A. Criteria for website evaluation

There are various criteria for website evaluation. It may include: usability, authority, audience, currency, coverage, objectivity, performance, link popularity, functionality, accessibility, security, design patterns, HTML syntax analysis, and browser compatibility [13]. According to ISO there are three views of quality: user's view, manager's view and

developer's view. Users are interested in quality in use, which is an external characteristic. Managers and developers are interested in internal quality which includes: functionality, reliability, usability, efficiency, maintainability, cost, effectiveness and portability [13] [18]. Functionality metrics include links in web pages, database connection, forms used in the web pages for submitting or getting information from user. Reliability related metrics includes number of errors in pages, in scripts etc. Usability related metrics include color, ease of use, proper navigation, etc. Performance metrics include websites processing speed, and the speed of executing transactions. Compatibility evaluation determines if an application under supported configurations perform as expected, with various combinations of hardware and software packages. Structural metrics include HTML syntax, CSS, JavaScript etc. Collectively all these metrics are known as web accessibility metrics. Mainly in website evaluation process only accessibility and usability of the website are evaluated to assure the quality of the website.

B. Website Measurement Tools:

Various tools currently exist to evaluate a web site. Those tools include: usability, accessibility, currency, authority, objectivity, coverage, performance, ranking, link security, design, HTML syntax analysis, and browser suitability. Currently, there are various approaches to evaluate a web site. Here, some approaches that concerns enhancing the accuracy of an evaluation process are discussed. First, User questionnaires: These are the most commonly method used to evaluate a web site. As questionnaires based on evaluation practices they provide an evaluation form the user's point of view depending on evaluation practices. Questionnaires use the checklists to assess user perception. Second, Behavioral assessment methods are used for psychological researches for a long time. The aim of the behavioral assessment methods is to observe users behavior during tests. Third, Automated tools which are used to examine source code of web pages to determine the compatibility of web pages with specified guidelines that may accepted in a specific society. This approach is new and depends on the characteristics of HTML. In this paper focus is on automated tools.

III. AUTOMATED EVALUATION

Web Accessibility testing ensures that individuals with disabilities will be able to use the system. Accessibility Testing helps to comply with legal obligations and make products usable across millions of people who have one or multiple forms of disabilities. Automatic tools examine source code of web pages to determine the compatibility of web pages with specified guidelines. These guidelines may cover universally accepted guidelines or guidelines accepted in a specific society. This approach is depends on the characteristics of HTML. Accessibility evaluation is more formalized than usability testing generally. Laws and public opinion frown upon discriminating against people with disabilities. In order to be fair to all, governments and other organizations try to adhere to various web accessibility standards, such as the US federal government's Section 508 legislation and the W3C's Web Content Accessibility Guidelines (WCAG).

A. Usability Evaluation

Usability means ease of use of an application. In usability evaluation user interface are checked (e.g. broken links, color combinations and navigation). These factors cannot directly affect the website. But they indirectly affect on the performance of the website.

B. Accessibility Evaluation

Accessibility means every user can easily access the website; also the people with some disabilities can be able to access the website. Visitors can access not only single page of the website but also must be able to visit the whole website. The Web Content Accessibility Guidelines (WCAG) Working Group of WAI (Web Accessibility Initiative) in the W3C Consortium provides an advanced body of guidelines for the accessibility of sites [17]. Below, there are various checkpoints for accessibility evaluation of a website is given [15]:

- a. Validate HTML and CSS
- b. No frames
- c. Automated accessibility checking tools
- d. Images and alternative text
- e. Make sure that JavaScript is unobtrusive
- f. Increase text size
- g. Look for semantic markup
- h. Disable CSS

Web Accessibility Guidelines are a set of defined rules to make web contents accessible to people with disabilities. There are number of guidelines defined by different countries. Section 508 standards and WCAG guidelines are most popular accessibility standard guidelines in use today as described earlier.

1. Section 508- Section 508 is the accessibility standard defined by the US government, to make sure that all US government websites can be accessed by people with disabilities. As per section 508 guidelines all electronic and information technology should be accessible to disabled users.
2. WCAG- Web Content Accessibility Guidelines define the standards for accessibility for individuals, organizations and governments worldwide. WCAG 2.0 has been accepted as an International Standards Organization (ISO) standard, and many countries have adopted WCAG 2.0 as their legal standard for web accessibility. Web Content Accessibility Guidelines includes both WCAG1.0 and WCAG2.0 specifications.

IV. WEBSITE EVALUATION TOOLS

There are many development tools for Web applications, currently developers do not have sufficient and powerful tools to debug or test their Web applications. Existing Web testing tools, namely HTML/XML validators and hyperlink checkers, can be used to validate the syntax of HTML/XML documents or to check the accessibility of hyperlinks in a set of HTML/XML documents [19]. There are many accessibility evaluation tools [1] available from which some are capable to check CSS, some are capable to check broken links, images etc. These tools automatically evaluate the websites. Automated evaluation tools generated long list of manual test (including use of headers) that overwhelmed web developers so they focused their limited resources on fixing the known problems like ALT text for images. Accessibility evaluation tools reviewed in this study are: EVALACCESS, FAE, ACCESSIBILITY VALET, and WAVE.

A. Web Accessibility Visual Evaluator (WAVE) -- a free evaluation tool that performs automated checks and highlights potential issues requiring human judgment. This tool is the result of Pennsylvania's Initiative on Assistive Technology (PIAT) and developed at the Institute on Disabilities at Temple University and WebAIM (Web Accessibility in Mind) at the Center for Persons with Disabilities (CPD) at Utah State University. Wave displays accessibility information in 3 different ways namely Styles View, No Styles View, Contrast View. Styles View presents your page with the embedded accessibility icons and indicators. No Styles View displays your page with styles disabled and tables linearized, thus revealing the unstyled HTML and the WAVE icons and indicators. Contrast View shows only contrast issues on your page, based on WCAG 2.0 guidelines. There are several option provided by WebAIM to use WAVE:

- a) URL can be entered on the WAVE webpage WAVE will show the original web page with icons and indicators which reveals the accessibility of the page. URL can be entered in `http://wave.webaim.org/` or `"http://wave.webaim.org/report#/YOUR+URL+HERE"`.
- b) WAVE provide the option to upload a file which can be uploaded or enter HTML code to check.
- c) WAVE toolbar is also available to run the WAVE reports in Firefox. WAVE toolbar can be downloaded from `"http://wave.webaim.org/toolbar/"`. [23]

B. EvalAccess -- EvalAccess is being developed by the Laboratory of HCI for Special Needs at the University of the Basque Country (UPV-EHU) [21]. EvalAccess web service checks web pages accessibility, based on the WAI's WCAG 1.0 guidelines. It has been implemented as a web service to allow any other application to use it. The implemented web service for accessibility evaluation can process a web page from its URL or its HTML mark-up. The result of the evaluation process is formatted in XML following a predefined XML Schema. EvalAccess provides following methods to test web accessibility:

- a) Evaluate Single URL- To use this method user needs to enter the URL of every page and evaluate it.
- b) Evaluate Website- Using this method entire website can be evaluated.
- c) Evaluate HTML source- This method is used to evaluate the HTML source code. Enter the HTML source code and evaluate it.

Using any of the three methods, once pressed the "Evaluate" button, EvalAccess shows a table with the non-satisfied guidelines according to the type of errors or warnings and levels of correction priority. These results will be displayed in two formats: Resume Report and Detailed Report for each level of Priority. Installation is not required for EvalAccess 2.0 tool.

C. Functional Accessibility Evaluator (FAE) -- FAE evaluates web page, it evaluates single page as well as whole website [20]. The FAE evaluates a web page for its accessibility by referencing the ITAA Web Accessibility Standards which are based on the WCAG 1.0 and Section 508 standards. FAE estimates the use of the best practices coding patterns allowing it to provide more extensive automatic validation of the web accessibility features of a web resource than traditional evaluation tools. Installation is not required in this tool.

Features of FAE tools:

- a) Reduction in the amount of time consuming and inefficient manual accessibility checks required by other accessibility evaluation tools.
- b) FAE evaluates markup to identify coding patterns required for implementation of the navigation, orientation, text equivalents, scripting, styling and standards.
- c) Reporting system of FAE provides 3 levels of reporting- summary report, site wide report and page level report.

The summary report provides an overview of a websites accessibility features and is designed to give managers and less technical people an overall evaluation of the accessibility features of a website. The site wide report provides information on the results of specific rules for all the web pages analyzed and the page level report looks at the accessibility results of an individual page.

D. Accessibility Valet Demonstrator--- Accessibility Valet is a web accessibility test tool which is designed to conform accessibility by analyzing markup for W3C Web Content Accessibility Guidelines (WCAG) or Section 508 accessibility compliance. In free subscription one URL can be verified at a time. For unlimited use paid subscription is required. Installation is not required for this tool. It can be accessed through URL `"http://valet.webthing.com/access/url.html"`. [22]

Features of this tool:

- a) Test suite: Accessibility Valet is tested on different test suites. It can be tested on various levels of WCAG and Section 508.

- b) Report Format: There are different levels of report format in Accessibility Valet tools namely, Level1, Level2 report and Clean Up format. The Level1 report format is described as compact, verbose, listed. The Level 2 report options enable you to prepare and publish Executive Summary reports for management and QA, while the Cleanup options offer a simple facility to remove bogus markup generated by defective authoring and publishing tools.

V. RESULTS

In this research paper four tools are studied for the accessibility of evaluation of website. Below, the comparison of the four tools is generated according to website submission method and accessibility guideline references used.

Table1- Comparison of accessibility tools

TOOL	Web Site submission Method			Accessibility guidelines Referenced			
	URL	File	Paste	WCAG1	WCAG2	Sec508	Other
WAVE	√	√	√	√	√	√	X
EVALACCESS	√	X	√	√	X	X	X
FAE	√	X	X	X	X	X	I
ACCESSIBILITY VALET	√	X	X	√	X	√	X

Note: X: means feature is not available.

√: means feature is available.

I = ITAA Web Accessibility Standard

Wave evaluate only single page of a website at a time. Wave has option to upload a file while others tools have not this feature.

EvalAccess Tool is used to evaluate entire website by using the WCAG1 guideline. EvalAccess will show you a table with the non-satisfied guidelines according to the type of errors and/or warnings and levels of correction priority.

Function Accessibility valet used to evaluate single page report as well as whole website report. It is referred to ITAA Web Accessibility Standard which are based on the WCAG 1.0 and Section 508 guidelines.

Accessibility Valet is tested on different test suites. It can be tested on WCAG1 and Section 508 guidelines.

VI. CONCLUSIONS & FUTURE SCOPE

Today Web becomes very important in all fields, so it is necessary that developed web applications must satisfy the users. Good response from the users ensures the quality of website. Developing a website does not end with hosting necessary information, media and software. Good quality website attracts users as it satisfies the need of users, so it is necessary to evaluate the website's usability and accessibility problems. Usability is the ease of use of a website and accessibility means website can be accessible for all people also for the people having some disabilities. A website is considered as best if it can be easily used and accessible by all type of users. So website should be of good quality. There are many tools for website evaluation. In this research paper four automated tools are evaluated namely Accessibility valet, WAVE, FAE, EvalAccess tools. The evaluation of the tools is based on their theoretical analysis and is performed using the trial versions of the tools and their respective manuals. Only four tools have been used for the study but there are numbers of website tools available that provide functionalities other than the ones mentioned here. So the research can be extended by adding more tools and more functionality for evaluation.

REFERENCES

- [1] Ahmet Sakir Genc, Web Site Evaluation, M.Sc Thesis, Department of Information Systems, *Graduate School of Informatics*, 2006.
- [2] Anna Kaushik "Evaluation of internet resources: A Review of Selected Literature" *Brazilian Journal Of Information Science*, December vol.6, 2012.
- [3] Arabi Keshk and Amal Ibrahim "Ensuring the Quality Testing of Web Using a New Methodology", *IEEE International Symposium on Signal Processing and Information Technology*, pp. 1071-1076, 2007.
- [4] Brandt, D. S. "Evaluating information on the Internet." *Computers in Libraries*, vol.16, pp.44-46,1996.
- [5] B.M. Subraya and S.V. Subrahmanya, "Object driven Performance Testing of Web Applications", *Proceedings First Asia-Pacific Conference on Quality Software*, pp.17-26, 2000.
- [6] Chien-Hung Liu; Kung, D.C.; Pei Hsia and Chih-Tung Hsu "Structural Testing of Web Applications" *Proceedings.11th International Symposium on Software Reliability Engineering*, pp. 84-96, 2000.
- [7] Christopher C. Whitehead "Evaluating web page and web site usability." *Proceedings of the 44th annual southeast regional conference*, ACM, 2006.
- [8] Edson Alves, Vivian Genaro Motti, André Pimenta Freire and Renata Pontin "Supporting Web Page Accessibility by using Earl Reports, *Seventh IEEE International Symposium on Website Evolution*, pp.71-78 , 2005.
- [9] Emad Ghosheh and Sue Black "Design Metrics for Web Application Maintainability Measurement" *International Conference on Computer Systems and Applications*, pp.682-689, 2009

- [10] Fang Liu “Usability evaluation on websites” *9th International Conference on Computer- Aided Industrial Design and conceptual Design*, pp. 141-144, 2008.
- [11] F. A Torkey, Arabi Keshk, Taher Hamza and Amal Ibrahim “A New Methodology For Web Testing”, *ITI 5th international conference on Information and Communication technology*, pp.77-83, 2007.
- [12] Fritch J. W., Cromwell R. L. “Evaluating Internet resources: Identity, affiliation, and cognitive authority in a networked world.” *Journal of the American Society for Information Science and Technology*, vol.52, pp.499-507, 2001
- [13] Izzat Alsmadi, Ahmad T. Al-Taani, and Nahed Abu Zaid. “Web Structural Metrics Evaluation”, *Developments in E-systems Engineering (DESE)*, pp. 225 – 230, 2010.
- [14] [Online] <http://forecasting.tstc.edu/usability-analysis-evaluation/> Accessed on 12th February 2015 at 1000 hrs
- [15] [Online] Accessibility Solutions Available: <http://www.mitsue.co.jp/english/service/accessibility/index.html> Accessed on 15th February 2015 at 1200 hrs
- [16] [Online] World Wide Web Consortium website, Available: <http://www.w3.org> Accessed on 21st February 2015 at 1500 hrs
- [17] Sukhpal Kaur, “An Automated Tool For Web Site Evaluation”, *International Journal of Computer Science and Information Technologies (IJCSIT)*, Vol. 3, pp.4310 – 4313, 2012
- [18] Vigo, Markel, and Giorgio Brajnik. "Automatic web accessibility metrics: Where we are and where we can go." *Interacting with Computers*, vol.23, pp.137-155, 2011.
- [19] Zihou Zhou, “Evaluating Websites Using a Practical Quality Model”, MPhil Thesis, Software Technology Research Laboratory, *De Montfort University*, 2009.

TOOLS REFERENCES

- [20] [Online] Available: <http://fae20.cita.illinois.edu> Accessed on 15th February 2015 at 1500hrs.
- [21] [Online] Available: <http://supt07.si.ehu.es/evalaccess2/howto.html> Accessed on 17th February 2015 at 1600hrs.
- [22] [Online] Available: <http://valet.webthing.com/access/url.html> Accessed on 24th February 2015 at 2100hrs.
- [23] [Online] Available: <http://www.wave.webaim.org/index.jsp> Accessed on 5th March 2015 at 1700hrs.