An Automated Tool for Web Site Evaluation

Sukhpal Kaur
Department of computer science
Lovely Professional University
Phagwara (PB), India

Abstract- **Web is becoming more and more important each day for business, education, sharing information and for communication. Every passing day the number of companies, organizations and individuals publishing their web sites is increasing. Everyone wants their web site is of good quality. Some quality metrics may affect indirectly on the popularity through their effect on the performance or the usability of websites. So it is necessary to evaluate a website so that it can satisfy the users. 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 implementation of an automated tool for web site accessibility evaluation. Firstly, web site evaluation tools are reviewed and compared. Then an enhanced automated evaluation tool, named as SITECHECKER is developed. Developed tool is capable of doing the work of HTML validator as well as it can be evaluate other contents such as dead links, hidden files, java scripts, CSS, extra comments in the HTML code and code to text ratio in a web site.**

Keywords- **Website accessibility, website usability, automated evaluation, web metrics, crawling, website evaluation.**

I. INTRODUCTION

Internet and World Wide Web have become more popular with in short period. It has been grown rapidly in their scope and extent of use affecting all aspects of our lives. Every passing day the number of companies, organizations and individuals publishing their web sites is increasing [1]. Companies want to know what their competitors do and what products they offer using the web. By 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 putting necessary information, media and software. After designing of the website, we have to test and evaluate the website for customer satisfaction. Evaluation gives the good quality to our website. We can attract more users if our website is of good quality.

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. [4]

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 hard task to find out all the potential errors. Since Web applications are distributed, heterogeneous, concurrent, and free-of-platform, Web testing is much more complex than traditional software testing. [11]. So we should pay more attention for website testing. The developing cycle of a website is shorter than its life cycle. At present, researchers have done much research in researching web testing and proposed some methods [3], [4], [5], [6], [11], [12]. In this paper I present a new automated tool for website evaluation. In section II & III website evaluation and evaluation types are discussed. In Section IV, existing tools are reviewed and compared .in section V proposed approach is discussed. Conclusions and future work are given in Section VI.

II. WEBSITE EVALUATION

Evaluation means to examine and judge carefully. In website evaluation we check the accessibility and usability of a website to ensure its quality.

Aim of evaluation is to assure the quality of the website or application. For the evaluation of a website the first thing which is evaluated is the quality of the website. Dimensions of quality [21] are measured in web evaluation: timeliness, structural quality, content accuracy and consistency, response time and latency and performance.
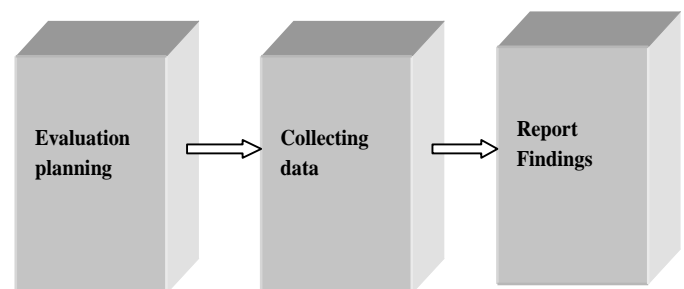

Figure 1 Website evaluation process

A. Criteria to Evaluate a Website

There are many criteria to evaluate a web site. Those may include: usability, authority, currency, objectivity, coverage, performance, traffic ranking, link popularity, functionality, accessibility, security, design patterns, HTML syntax analysis, and browser compatibility. [18]. According to ISO there are three views of quality: users'view, managers' view and developers' 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. [18][22]. 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 are 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. HTML to text ratio to Text Ratio represents the percentage of actual text in a web page. Collectively all these metrics are known as web accessibility metrics. Mainly in website evaluation process we evaluate only accessibility and usability of the website to assure the quality of the website.

III. AUTOMATED EVALUATION

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. In these tools test engineers are responsible for writing and executing test scripts. Figure 1 shows the process for website evaluation.

A. Accessibility Evaluation

Accessibility means every can easily access the website, also the people having some disabilities can be able to access the website. Visitors can access not only single page of the website but must be able to visit to whole website. The Web Content Accessibility Guidelines Working Group of WAI (Web Accessibility Initiative) in the W3C [17] Consortium provides an advanced body of guidelines for the accessibility of sites. [13] There are checkpoints for accessibility evaluation of a website. These are given below [13]:

    a.   Validate HTML and CSS
    b.   No frames, please
    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

B. Usability Evaluation

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

IV. WEBSITE EVALUATION TOOLS

There are many development tools for Web applications, current developers do not have sufficient and powerful tools to debug or test their Web applications. Existing Web testing tools, such as 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 [25]. There are many accessibility evaluation tools [1] are available

from which some are capable to check CSS, some are capable to check broken links, images etc. These tools automatically evaluate the websites. Accessibility evaluation tools reviewed in this study are: WebXM, Bobby, AChecker, and WAVE.

A. Comparison of Tools

WebXM is website accessibility as well as website usability evaluation tool. It is used to automate inspection of some page defects (broken links, spelling errors, slow loading pages, poor search and navigation) to help improve the usability of the web site. Accessibility evaluation includes check for appropriate text and background color contrast or the presence of text equivalent .alt. tags on images.
Bobby collects all pages of a website and evaluates them at a time. It means Bobby evaluates the whole website at a time. It evaluates the HTML code and accessibility of a web page.
WAVE and AChecker evaluate only single page of a website at a time. Both WAVE and AChecker evaluate the accessibility of the page. AChecker also has options of HTML validator and CSS validator. These options are not present in WAVE.

B .Drawbacks of Existing Tools

Above tools have some drawbacks:
1. Bobby cannot evaluate the java scripts used in the code.
2. WAVE and AChecker evaluate only one page at a time.
3. WebXM can evaluate usability as well accessibility of a website. But in accessibility evaluation it can only evaluate text and background color contrast.
4. Above tools cannot find dead links and extra comments in the code.
5. Above tools cannot be able to calculate code to text ratio.

V. PROPOSED TOOL

I developed a website accessibility evaluation tool named as SITE CHECKER which can overcome the shortcomings of existing tools and also adding some other features in the tool. Working of proposed tool is shown in figure 2. Its evaluation is based on W3C's Web Content Accessibility Guidelines (WCAG).

A .Crawling

Crawling mean create an index of the website. A crawler is a program which can automatically traverses web sites. By using crawler we can visit all pages of a website.

B.HTML Validation

An HTML validator is a program used to check HTML elements for syntax errors. There are coding standards guidelines which must be follow while developing a website. HTML validation is a process that analyzes an HTML document in comparison to standard HTML rules, identifying errors and non-standard codes. [17]

C. Missing Links/Dead Links

Sometimes there is link on web page, but when we click on it, we getting useless response e.g. 404 not found or we cannot reach on any other page. Users cannot tolerate these types of response.

D. Extra Comments

Extra comments in the code make a site heavy. As a result its performance is affected.

E. Code to Text Ratio

The Code to Text Ratio calculates the percentage of actual text in a web page. Sometimes amount of code use in developing a website is much higher than amount of actual text in the website. This may result in slow down the speed of the website. So it is very important to evaluate this.

In first step we enter the URL of the website, in next step tool will automatically check the syntax of the HTML/XML, missing links and images, java scripts, CSS, hidden fields, extra comments and text to HTML ratio. Then result will displayed as shown in figure 2.
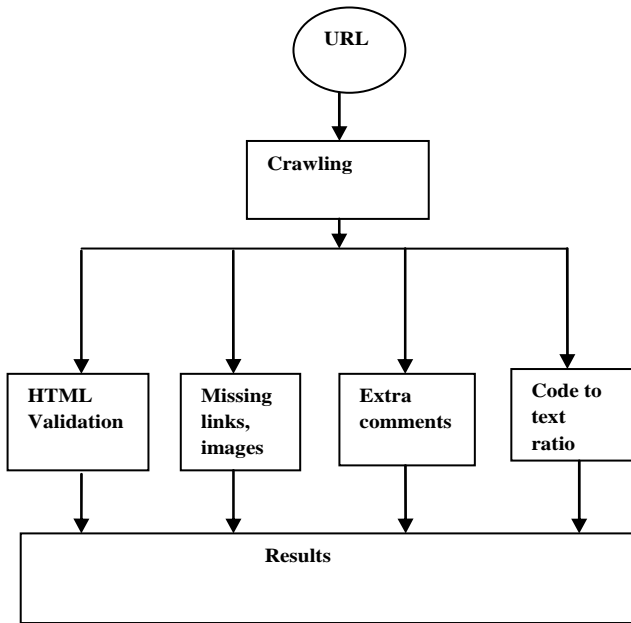

Figure 2 Working of Proposed Tool

IMPLEMENTATION

For the implementation of proposed tool C#.NET with ASP.NET is used. ASP.NET is a Web application framework that helps us create standards-based Web solutions. ASP.NET is a server side scripting technology that enables scripts to be executed by an Internet server.

A. Results

There are three links on the evaluation tool's window: HOME, SITE CHECKER and ABOUT.
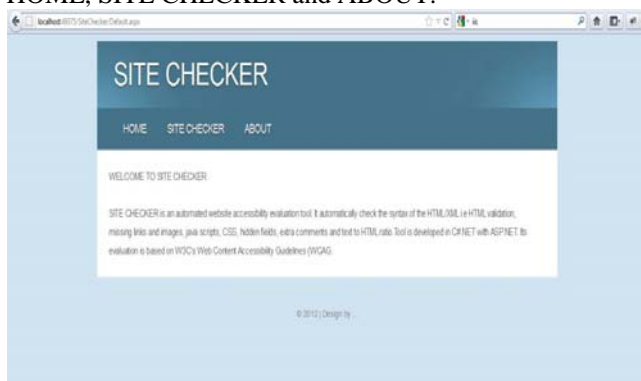

Figure 3 SITE CHECKER home page

First is home page, when we open the tool window this page will open. This page is shown in figure 3. This page gives the brief introductions about the functions of the tool. Next page is SITE CHECKER. This is the actual page which evaluates the websites. When we click on SITE CHECKER link on the home page this page will be opened. It includes a text box for entering the URL of the website which we want to evaluate and a scan button. Put URL on text button and click on scan button for evaluation. After evaluating each page of the website, a list of evaluation report will be generated and display on the screen. Window of this page is shown in figure 4.
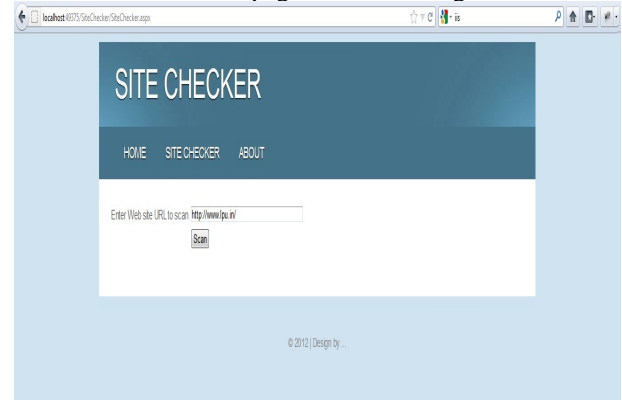

Figure 4 SITE CHECKER evaluation page

When we click on scan window, it starts evaluating the site. Then a list of errors is displayed along with line number and description. E.g. when we enter the URL ww.lpu.in results are shown in figure 5.
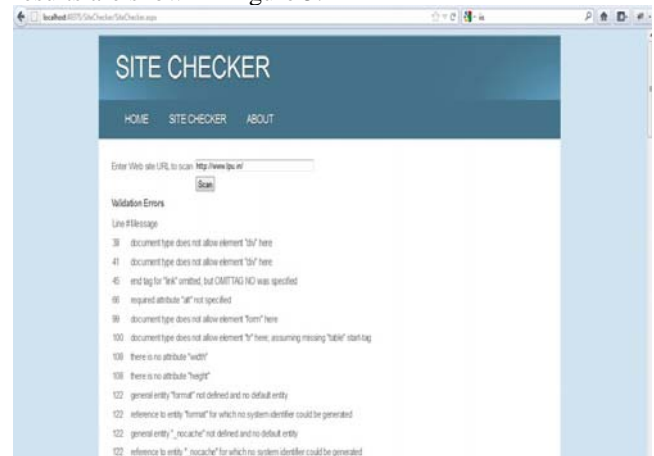

Figure 5 List of evaluation results in site www.lpu.in

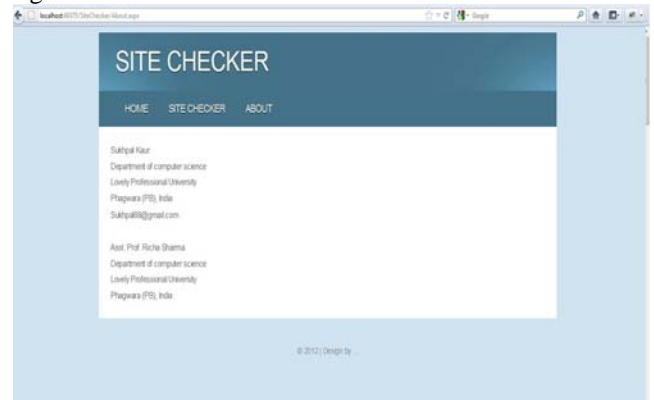Next page is ABOUT in the tool window. This is shown in figure 6.

Figure 6 ABOUT page of the tool window

These results show that tool is capable of evaluating any website. Anyone can use this tool to evaluate the website. It does not require an expert for evaluation. This tool can be used by anyone who has a little knowledge about the internet.

VI. CONCLUSIONS & FUTURE SCOPE

As Web becomes very important in all fields, it is necessary that developed web applications can satisfy the users. If we want our website give good response to users, we have to ensure its quality. Developing a website does not end with putting necessary information, media and software. Users want a good quality in website so it is necessary to evaluate a website to 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 by all type of users. So it should be of good quality. There are many tools for website evaluation. But these tools have some limitations. I reviewed and compared these tools and developed a tool which can overcomes some limitations of existing tools. By using this tool we can find validation errors, java scripts errors and code to text ratio of a website. Tool gives the error list along with their descriptions. It will help developers to remove that coding errors. As a result quality of the website can be improved.

In future we can add some other accessibility features to the tool e.g CSS validator, color combination checker etc.

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