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Comparative Analysis of Automated Web Accessibility Tools for Developing and Evaluating Accessible Websites

Navdeep Kaur[1] and Vijay Kumar[2]
[1]*Department of Computer Science, Chandigarh University, Gharaun, India, Navdeepk120@gmail.com*
[2]*Department of Computer Science, Chandigarh University, Gharaun, India, Vijaykumar_nrw@hotmail.com*

*Correspondence: *navdeepk120@gmail.com*

ABSTRACT- An automated web accessibility tool is software which is used to check and develop a web page, or even the entire website for web accessibility. An automated web accessibility tool acts as a base line for web accessibility in organizations. The main limitation of these tools is that the tools fail to cover all accessibility guidelines. Some tools instead of providing adequate results add **c**onfusion to developers and designers as they believe they are doing the right thing. The paper presents the comparative analysis of some automated accessibility tools.

General Terms: Web Accessibility Evaluation Tools, Web Accessibility Framework, Web Accessibility Authoring Tools
Keywords: Web Accessibility Framework, Web Accessibility Improvement Tool.

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1. INTRODUCTION

Web Accessibility refers to the practices which are used to design and develop websites in order to provide equal access of web information to all users including people with disabilities. United Nations (UN) recognized Web Accessibility a basic human right in 2006[1].

Web Accessibility has become a legal obligation in many developed countries like U.S, UK, Japan, and Canada etc. The organizations have started paying attention on web accessibility. A website must be complied with web accessibility standards. Any websites especially the government and educational websites which breach the law can be sued. Different web accessibility measures and automated tools are used to make accessible web sites. However, most of the web content still causes frustration to visually impaired people. A survey shows the main reason for inaccessibility is lack of awareness of web accessibility rules and skills [25]. The web developers and designers by using automated tools cannot make fully accessible web sites. These tools require manually effort of web developers to provide adequate results. The main inconvenient with automated tools is that these tools do not cover all requirements of web accessibility and sometimes create confusion to web developers and designers. In these paper different types of web accessibility automated tools are tested and comparative analysis is shown on the basis of the web accessibility rules supported by these tools.

The rest of the paper describes the different problems of web accessibility in *Section 2*. In *Section 3*; Web accessibility guidelines are described. *Section 4*; explains automated web accessibility tools. In *section 5*; literature survey is done. *Section 6*; results are discussed. *Section 7*; conclusion of the paper is shown.

2. WEB ACCESSIBILITY ISSUES

To access the web, visually impaired people use screen reader software which converts text information into speech. JAWS (Job Access with Speech) [28] is the world's most popular screen reader in Microsoft Windows. NDVA (Non-Visual Desktop Access) [29] is an open-source screen reader uses key strokes which help visually impaired to move around the web page content. Voice Dream Reader, is an inbuilt mobile application [31] for iPhone and iPad which helps visually impaired users to use touch screen by taking input as gesture and speech as output. If the web pages which are not well structured for e.g., ambiguous links, complex form, missing improper heading, too many links, complex data forms, inaccessible search, lack of skip, and table data without summary can cause frustration to visually impaired users. The non-text items like images, CAPTCHA [16] (Completely Automated Public Turing test to Tell Computers and Humans Apart), and inaccessible flash content are the problematic items to screen reader users. The collection of images, color and text is known as infographics [30] content. It always remains inaccessible by visually impaired people.

3. W3C GUIDELINES FOR WEB ACCESSIBILITY IMPROVEMENT

The Web Content Accessibility [1]Guidelines (WCAG) of World Wide Web Consortium (W3C) published first version of guidelines WCAG1.0 in 1999 and second in 2008 WCAG 2.0.There are mainly four web accessibility principles. For each principle several guidelines are provided. The guidelines are

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further divided into check points. The priorities are assigned for check points.

Table 1: Priority Checkpoints

Priority	Checkpoints
1	The checkpoints which must be included.
2	Checkpoints remove all the web accessibility problems.
3	Checkpoints improve accessibility of web sites

There are three levels A, AA, AAA. Level A defines all priority 1 checkpoints. In AA both priority 1 and priority 2 check points are defined, and in AAA all the three priority checkpoints are satisfied. The four principles for WCAG guidelines:

PERCEIVABLE. Make content presentable to user so that they can perceive the content easily.

OPERABLE. Ensure that interface elements in the content are Operable by any user.

UNDERSTANDABLE. Make content and controls understandable to as many users as possible.

ROBUST. Use Web technologies that maximize the ability of the content to work with current and future accessibility technologies and user agents.

4. AUTOMATED WEB ACCESSIBILITY TOOLS

To enhance the web accessibility [7] different types of automated web accessibility tools are used by web developers and designers. These tools are mainly categorized into two types, web accessibility evaluation tools and web accessibility authoring tools.

4.1 Evaluation Tools

The evaluation tools automatically check the accessibility of entire websites or single web page. These tools are used mainly at the end of development process. Some examples of these tools are; WAVE [14], Total Validator [15], AChecker [5].

4.2 Authoring Tools

The authoring [17] tools assist web developers to create accessible web sites. Some authoring tools provide tools to evaluate the accessibility of web page. For e.g Adobe Macromedia [8] Dreamweaver 8 provides Check Accessibility tool to check the accessibility of web pages. Micro SharePoint provides accessible modes for replacement of non-accessible content. There is no authoring tool in market which creates fully accessible website

5. RELATED WORK

In order to automate the process of accessibility several tools has been proposed in literature. The Michele Kirchner [23] in this paper author explains different kind of web accessibility improvement tools. De Sousa e Silva [10] measures the capacity of Integrated Development Environment to generate accessible software. Helani Wanniarachchi et al. [9] the paper describes a web accessibility generator tool to develop accessible websites. But the web developers still need to manually correct guidelines. The paper also describes the limitations of existing web accessibility tools. Mayol, J.J [11] presents a web accessibility improvement tool. The tool covers the critical points of W3C guidelines as compared to existing web accessibility tools. G.A. Di Lucca et al. [13] represents a tool to identify and fix the web accessibility problems. Thi-Huong-Giang et al. [6] the paper presents a framework which checks the client as well as server side code

6. RESULTS

Automated web accessibility tools are the easiest way to initiate web accessibility in development process. The automated tools check the web pages against the web accessibility guidelines and provide result very fast. However the automated tools do not cover all web accessibility check points. Majority of the tools partially test the checkpoints. Sometimes these tools create confusion to web developers who are not aware of web accessibility rules. Instead of correcting the web accessibility violations they add more violations. For *e.g* alt value should be empty for decorative images but automated tools fail to recognize the given image is decorative or simple image and instruct web developers to add alt text for every image. Hence generate misleading information .The some check points are discussed as below:

- **Checkpoint 1.1** Provide a text equivalent for every non-text element
  - 1.1.1 Check alt is present
  - 1.1.2 Check alt has no white space or empty space
  - 1.1.2 Check alt has meaningful text (alt should not contain irrelevant text for *e.g* alt with only numeric values or alt with single character)
- **Checkpoint 13.1** Clearly identify the target of each link
  - 13.1.1 Check anchor has text equivalent
  - 13.1.2 Check anchor has no irrelevant text (for e.g. Click here)
  - 13.1.3 Check anchor text and title text are duplicate

Table 2: Comparative Analysis of Web Accessibility Improvement Tools

Tools Detect Critical Check Points			
Tools	**Dreamweaver**	**Total Validator**	**AChecker**
Checkpoint 1.1.1	yes	yes	yes
Checkpoint 1.1.2	yes	yes	no
Checkpoint 1.1.3	no	no	no
Checkpoint 13.1.1	no	yes	yes
Checkpoint 13.1.2	yes	no	no
Checkpoint 13.1.3	no	no	no

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7. CONCLUSION

In conclusion it has been shown that the different kinds of automated tools with different features exist to check and develop the web pages for the accessibility. These tools save large amount of time as compared to manual testing. However, the web sites which are developed by using these still lack of accessible rules. These tools do not cover all accessibility requirements. There is need of to cover more accessibility requirements by these tools.

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