Web-Accessibility Automatic Checking Tools and Evaluation in Saudi Arabia: A Systematic Literature Review

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*Abstract— **This study is aimed to systematically review the literature of Web accessibility checking tools and evaluate the Web accessibility of websites globally in general and locally in Saudi Arabia in specific. The systematic literature review is employed to achieve this aim. The study is conducted based on the Web Content Accessibility Guidelines version 2.0, using multiple web accessibility tools. Specifically, the study is aimed to answer how far the Web accessibility awareness and evaluation achievements used by experienced Web-masters and decision makers in the KSA have reached compared to other countries to verify and test Saudi websites. And do the available Web accessibility testing tools are efficient and effective for Web-masters and decision makers to verify the conformance to success criteria of WCAG checkpoints and present easy to understand results compared to manual checking depending on disabled people to crawl throw entire websites. The study showed that globally as well as in Saudi Arabia, the websites need to be improved so as to be accessible by disabled people. The practice of web accessibility checking in Saudi Arabia is very limited and need to be implemented.***

*Index Terms— **Web accessibility, automatic checking tools, WCAG.***

I. INTRODUCTION

The Internet has made social media networks, news, emails, ecommerce business, and entertainment available and accessible to all people. Among those people there are millions of people with a diverse disabilities around the world are in great need to access the internet. Therefore, the content of websites must be made accessible to people with disabilities just like the other normal people. There are many authoring and evaluation tools and studies have been conducted in regards to web accessibility. Therefore, it is very important to set a platform for the current research by conducting a literature review. The systematic literature review was chosen to be implemented in this study. The purpose of the review is to identify barriers on the page that would prevent someone who has a disability–who is using an assistive technology or some other adaptive strategy–from using or understanding the content on the web page In this review, the systematic literature review (*SLR*) is preferred to the traditional literature review (*TLR*). In this review the discrete steps of the *SLR* are employed to review the literature of Web accessibility checking tools and the SLR is review the evaluation of Web accessibility of websites globally and locally in Saudi Arabia.

II. REVIEW PLANNING

A. Research Questions

The population, intervention, comparison, outcomes, and context are the five criteria used to identify the research questions shown below.

First Review Research Question: Do the available Web accessibility testing tools are efficient and effective for Web-masters and decision makers to verify the conformance to success criteria of WCAG checkpoints and present easy to understand results compared to manual checking depending on disabled people to crawl throw entire websites?

Second Review Research Question: How far the Web accessibility awareness and evaluation achievements using the checklists of the success criteria of WCAG used by experienced Web-masters and decision makers in the *KSA* have reached compared to other countries to verify and test Saudi websites?

B. *Identify Relevant Research*

The automatic Web accessibility verification tools were developed since the commencement of *WCAG* and have evolved and utilized to assist Web masters on accessibility testing and verification for their Web sites (Bobby, 2207; UsabelNet, 2007; World Wide Web Consortium, 2007; Branjik, 2007, Choudrie, 2007). There are many tools evolved to check Web accessibility based on the WCAG guidelines. Shadi Abou-Zahra and the Education and Outreach Working group (EOWG) are the editors of the W3C WAI list of Web accessibility evaluation tools which is available online [7]. The list shows all tools maintained by WAI and contains more than 125 tools with summaries and statistics of the most important properties of these tools. The tools found on this list have been considered for the review conducted for the Web accessibility checking tools.

III. REVIEW PROCESS

The review conducted here is divided into two main parts, the first part concerns the tools and the second part concerns the evaluation of websites accessibility.

A. *Automatic Checking Tools*

Analysis:
Analysis has been conducted based on the properties of the tools provided in the list. These properties are: supported languages, automatic checking styles, guidelines: WCAG 1.0 and 2.0, format evaluated by the tools: HTML and XML, reports produced by the tools: HTML, XML, CSV, text and PDF.

Results **Reporting:**
o The literature shows no any single Web accessibility tool found to support Arabic language in all aspects.
o There are few tools that evaluate an entire Website and multiple pages via web crawling for WCAG 1.0 compliance and evaluate web pages and sites for WCAG 2.0 compliance. Accessibility checking tools need to support entire evaluation of websites; crawling across multiples pages included in a website
o Tools need to support other documents formatting (e.g. PDF and Word) in presenting results as these formats are portable and useful for decision makers. The results provided by the tools need to be displayed in an easy-to-read report, whilst describing each error.
o The tools need to be user friendly and sufficient to help most designers and developers clean up their sites.

B. *Evaluation of Websites Accessibility*

Analysis from International Perspective
The global e-government Websites were evaluated by Choudrie (*Choudrie et al.*) using only one Web diagnostic tool namely WebXact, which is based on priority 1, 2 and 3 Accessibility problems. The national Web portals of Singapore, Finland, Canada, Hong Kong and Australia were checked. Results showed that the two portals of Canada and Hong Kong ranked the best checking results, with both portals have no priority1 errors.

The accessibility of *339* Chinese local government websites was checked with respect to *WCAG* using free Bobby online service under Mozilla Firefox 1.0 or Internet Explorer 6.0 (*Shi, 2007*). Results showed that 324 Websites were accessed by both browsers, 14 are inaccessible by both browsers and only one appeared to be under construction. The author reassessed the 15 Websites that were either inaccessible or under construction to check them again, but no changes were found. Finally, none of the 324 accessible Websites provide a text only version to homepages.

Twenty five Websites representing ministries and other agencies of Jordanian government were tested against accessibility in conformance with WCAG 1.0 using automatic testing tools and manual checking. Results showed that all tested Websites did not address the issue of accessibility (*Mustafa, 2011*).

Byerly and Chambers (*2003, Byerly*) have shown some positive results about Web accessibility evaluation of online databases for public research. Nevertheless, they have presented some recommendations for more work needed to be done. Steward et al. (*Steward, 2005*) have shown some positive results by using some disabled users employing some assistive technologies to test the accessibility of library Web site interfaces based on both Section 508 and WCAG. The interfaces have shown greater compliance with Section 508 and WCAG. Olalere and Lazar

(*Olalere , 2011*) have analyzed the accessibility of American governmental web sites. Based on the results of the study conducted by Youngblood and Mackiewicz (*Youngblood, 2012*) , there are some accessibility improvement needed in many of the Alabama municipal websites.

Friederike K. and Dirk L (*Friederike, 2012*) have introduced the key points of web accessibility and the idea of disability studies/inclusion, and illustrated a hypothetical concept of how to evaluate a web search engine's accessibility based on an interpretation of the proven WAI recommendations.

Analysis from Saudi Arabia Perspective

Abanumy et. Al [*Abanumy, 2005*] carried out partial analysis on the accessibility of e-government websites of *KSA* and Oman by adapting the *WCAG*. Their investigation showed that the government websites in *KSA* and Oman were in need for considerable efforts to become accessible. Mukhtar et. Al [*Mukhtar, 2011*] revealed that the majority of universities' websites in *KSA* could not achieve minimum accessibility conformance when tested using assistive technologies (screen readers). In addition, web designers, developers and policy makers in the KSA were unaware about website accessibility. Haifa et. Al [*Haifa, 2013*] conducted a research to evaluate the quality of Labor portal. The result of the study showed that the Labor portal quality is fairly good. Nevertheless, it needs further improvement and development.

Results Reporting

Globally as well as in Saudi Arabia, the websites need to be improved so as to be accessible by disabled people. The practice of web accessibility checking in Saudi Arabia is very limited.

IV. CONCLUSION

There is a great need for tools supporting Arabic language to check Web sites in KSA in specific and the region and globe as general. Very limited and few of works have been conducted to check the accessibility of web sites in KSA. There is a need to further check the accessibility of Web sites in KSA. The awareness of Web accessibility by disabled people in Saudi Arabia is very poor.

REFERENCES

[1] Bobby program, Center for Applied Special Technology, Retrieved February 3, 2007. From: http://www.cast.org/products/index.html.

[2] UsableNet, LIFT online, Retrieved February 3, 2007. From: http://usablenet.com/products_services/lift_online/lift_online.html.

[3] World Wide Web Consortium, World Wide Web Consortium (W3C), Retrieved February 6, 2007. From: http://www.w3.org/Consortium/.

[4] Brajnik, G., Automatic Web usability evaluation: What needs to be done? Dipartimento di Matematica e Informatica Università di Udine, Udine, Italy. Retrieved February 5, 2007. From: http://www.dimi.uniud.it/~giorgio/papers/hfWeb 00.html.

[5] Choudrie, J., Ghinea, G., and Weerakkody, V., Evaluating global e-government sites: A view using Web diagnostic tools. Electronic Journal of e-Government, V. 2, 2:105-114, 2004.

[6] Diaper, D., and Worman, L., Two falls out of three in automated accessibility assessment of World Wide Web sites: A-PromptTM vs. Bobby. In P. Johnson and P. Palanque (Eds.), People and Computers XVII. Springer: England, 2003.

[7] Abou-Zahra S. and Educational and Outreach Working Group (EOWG), Complete List of Web Accessibility Evaluation Tools, From: http://www.w3.org/WAI/ER/tools/complete, 2006.

[8] Abou-Zahra, S. e., Preliminary review of web sites for accessibility. W3C Web Accessibility Initiative: WAI: strategies, guidelines, resources to make the Web accessible to people with disabilities Retrieved, 2010.

[9] SortSite - Web Site Testing Tool, Retrieved May 20, 2010. From: http://www.powermapper.com/products/sortsite/index.htm.

[10] Mohammed A., Steve D., Osama A., A Comprehensive Analysis of E-government services adoption in Saudi Arabia: Obstacles and Challenges, *IJACSA)* International Journal of Advanced Computer Science and Applications, Vol. 3, No. 2, 2012.

[11] Abanumy A, Al-Badi A, and Mayhew P , e-Government Website Accessibility: In-Depth Evaluation of Saudi Arabia and Oman, The Electronic Journal of e-Government, V. 3, 3:99- 106, 2005.

[12] Mukhtar M. R., Mohammed F. and Uzma R., Evaluating Web Accessibility of University Web Sites in the Kingdom of Saudi Arabia, International Journal of Technology, Knowledge and Society, V. 7, 3:1-16, 2011.

[13] Hend S. A., The accessibility of Saudi Arabia government Web sites: an exploratory study, Springer-Verlag, 2010.

[14] Mustafa A.-R., Maryam N. , Abdullah W., Evaluating Accessibility of Jordanian E-Government Websites for People with Disabilities, The International Conference on Information and Communication Systems – ICICS, 2011.

[15] Choudrie J, Ghinea G. and Weerakkody V., Evaluating Global e-government Sites: A View using Web Diagnostic Tools, Electronic Journal of e-government, V. 2, 2:105-114, 2004.

[16] Shi Y., The accessibility of Chinese local government Websites:An exploratory study , Government Information Quarterly, 24 :377–403, 2007.

[17] Byerley, S.L., and Chambers, M.B., Accessibility of Web-based library databases: The vendors' perspectives. Library Hi Tech, V. 21, 3:347-357, 2003.

[18] Stewart, R., Narendra, V., and Schmetzke, A., Accessibility and usability of online library databases. Library Hi Tech, V. 23, 2:265-286, 2005.

[19] Friederike K. and Dirk L., Accessibility of web search engines Towards a deeper understanding of barriers for people with disabilities, Library Review, Emerald Group Publishing Limited Vol. 61, 8/9: 608-621, 2012.

[20] Youngblood, N.E., and Mackiewicz, J., A usability analysis of municipal government website home pages in Alabama, Government Information Quarterly, 2012.

[21] Terry T., Sheryl B., Elizabeth M., Jon G., Nicholas H., International Research on Web Accessibility for Persons With Disabilities, 2007.

[22] Nomensa, United Nations global audit of web accessibility, 2007. From: http://www.nomensa.com/resources/research/united-nations-global-audit-of-accessibility.html.