

Infringement of WCAG 2.0 Guidelines in Indian Government Websites

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Abstract -- Websites of Indian Government serves as a medium of transmission of Information. So, the websites of government agencies should be accessible to all. Since, a normal person can access the websites easily but a person with disability (PwD) who may be visually impaired could not access the websites easily. This is how Web accessibility came into picture. Normality of WCAG 2.0 guidelines by web pages is a significant factor in measuring the accessibility of websites universally. The main aim of this study is to determine whether the people with disabilities can access and use State Government websites in India easily or not. By using web accessibility evaluation tool namely PowerMapper SortSite, we have evaluated 10 websites of Indian Government and provided the results of analysis in this paper. Also, we reached to a conclusion where majority of the websites do not meet the requirements WCAG 2.0. In this paper we have identified and discussed the most violated WCAG. Our research may raise awareness to the web developer about these infringements and encourage them to build websites that can become accessible to all.

Keywords- WebAccessibility, Government Websites, PwD, WCAG, PowerMapper

I. INTRODUCTION

In modern era, Internet is playing a major role in the advancement of technology. World Wide Web is the dominating one which is the largest information repository through which people can communicate at real-time. Nowadays, sectors like educational institution, financial institution, health, etc. make use of the web for passage of Information to their clients as a token of increase in their brand value [1]. The cogent idea of World Wide Web is to provide all of its content to all type of users irrespective of their physical disabilities. However this goal has not yet been achieved successfully till date. The web resources require further improvements to make it much more accessible for person with disability. Ease of admission to websites is attained to disabled people for interacting with the web products, etc. By using web accessibility, users especially with disability can navigate between the pages and interact with it [2]. Initially the web purely a text-based medium for the passage of information; however when Web started to be used a commercial platform, style and design came into picture to attract number of people. Unfortunately, most of the web developers did not apply suitable guidelines for its access universally; thus the web became of secondary importance for people with disabilities. In the last years people got aware of this problem and the term "Web Accessibility" came into picture. If a website is built purely according to WCAG

standards, then it will not only help PwDs but also aged ones specially those who develop low vision and who also have problem in navigating between webpages due to trembling. Basically, Web Accessibility refers that people with disabilities can easily interact and navigate with web by different means.

World Wide Web consortium has developed Web Content Accessibility Guidelines (WCAG) to make the accessibility of web resources universally. If these guidelines are seriously followed by developer while designing the web pages, the web content will be more accessible [4]. The phenomenal increase in acceptance of digital medium shows rapid growth for the delivery of information in countries like India under the initiative of Digital India, where evaluation of accessibility is mandatory, for further improvements. Another key aspect of performing the accessibility study is that number of people gets benefited by such an effort is very significant. According to UN report, there are around 1 Billion people with disabilities which is 15% of the world population. Therefore necessary measures should be taken to make persons with disabilities access the information in digital ecosystem. This work is of preliminary importance for the achievement of goal.

Census 2011 states that over 26 million people are having some or the other kind of disability. In Census 2011 eight types of disabilities have been included as against five in Census 2001. These eight are: In Seeing, In Hearing, In Speech, In Movements, Mental Retardation, Mental Illness, & Multiple Disabilities and Any Other. The Percentage Decadal Growth in Disabled Population, India, 2001-11 is observed 22.4%.

In order to achieve accessibility in every website, one should follow the Web Content Accessibility Guidelines (WCAG). There are testable success criteria for WCAG, which are at three levels namely *Level A*, *Level AA*, *Level AAA*. WCAG 2.0 is approved as an ISO standard: ISO/IEC 40500:2012 and it coverage mobile accessibility and applicability to non-W3C technologies also.

We planned to do state-wise evaluation of web resources which will not only provide us feedback for further improvements of web resources but also it will become accessible to the person with disabilities. Mainly, this paper focuses on measuring the accessibility of websites belonging to various departments under different states of India. With growing emphasis of Government of India in projects like Digital India, it becomes paramount important to provide accessibility in the digital era. The main objective of this study is to find the issues in the

accessibility of web resources and providing relevant solutions to improve the quality of services for persons with disabilities, by removing the obstacle in the existing infrastructure.

II. REVIEW OF LITERATURE

When websites and web tools are properly designed and coded, people with disabilities can use them. However, currently many sites and tools are developed with accessibility barriers that make them difficult or impossible for some people to use.

Making the web accessible benefits individuals, businesses, and society. International web standards define what is needed for accessibility [4].

In order to find accessibility errors among websites under WCAG 2.0, a study has been conducted in 2016 by Abid Ismail and K. S. Kuppusami [5]. The accessibility of Indian University’s homepage is explored by research studies. The accessibility to homepage should be taken into consideration in order to meet the requirements of WCAG and also to maintain the accessibility for persons with disabilities.

This paper mainly focuses on the improvement of the accessibility of the websites belonging to Indian Government, in order to achieve the aim of Digital India, so that people of India can easily navigate to the Indian Government websites irrespective of the disability they have. The paper presents results of accessibility analysis along with the constructive suggestions for achieving the accessibility in Indian Government websites.

III. WEB CONTENT ACCESSIBILITY GUIDELINES

The guideline of WCAG came into existence to have unhindered path for PwDs in accessing the web. The first WCAG was WCAG 1.0 which was released in 1999. And in 2008 another improved version, WCAG 2.0 was released. Recently, in June 2018 enhanced version of WCAG, i.e. WCAG 2.1 came which have seventeen success criteria additionally in comparison to WCAG 2.0. In this Paper we are making use WCAG 2.0 for our study. The guidelines of WCAG is associated with four principles which lay the foundation necessary to access and use web content. Anyone willing to use web must have content that is: Perceivable, Operable, Understandable and Robust. WCAG 2.0 guidelines are based on three levels of conformance (Level “A”, Level “AA”, Level “AAA”). These conformance guidelines are based on three priority levels which are briefed below:

Conformance Level	Website Accessibility Checkpoint
WAI-A (basic accessibility)	All priority 1 checkpoints are met. This is the minimum (basic) W3C requirement. Otherwise one or more groups of people will find it impossible to access information from the website. This is the minimum requirement and must be met.
WAI-AA (intermediate accessibility)	All priority 1 and 2 checkpoints are satisfied; otherwise one or more groups of people will find it difficult to access information from the website. This conformance level status should be met, as it will remove significant barriers to accessing Web documents.
WAI-AAA (high accessibility)	All priority 1, 2 and 3 checkpoints are satisfied; otherwise one or more groups of people will find it somehow difficult to access information from the website. Web developers to improve access to Website documents may address this conformance level status.

Table 1: WAI CONFORMANCE CLAIMS

WCAG 2.0 consists of 12 guidelines, which are general guidelines of accessible design. Each guideline defines a simple view of web accessibility. According to W3C Web Accessibility Initiative (WAI) defines three possible accessibility priority levels, as illustrated in Table 1.

III. (a) Guidelines followed in India: A brief

- Guidelines for Indian Government Websites (GIGW) has been defined to make sure that the websites that are under any constituent of Government of India at any level should be user friendly, secure, easy to maintain and are in obedience to pre-defined standards of the World by National Informatics Centre (NIC) of the Department of Information Technology (DIT), Ministry of Communication & Information Technology, Government of India (GoI), India. Also, the GIGW consists of as many as 115 guidelines grouped under various categories.
- According to National Policy on Universal Electronic Accessibility which was approved by Union Cabinet in 2013 some strategies were envisaged to eliminate discrimination on the basis of disabilities as well as to facilitate equal access to electronics and Information and Communication Technologies (ICTs) [7].
- On December, 2015 Accessible India Campaign (AIC) which is a nationwide flagship campaign of the Department of Empowerment of Persons with Disabilities (DEPwD), Ministry of Social Justice and Empowerment launched a campaign to make a barrier free and conducive environment for Divyangjans all over the country [6].
- According to “*THE RIGHTS OF PERSON WITH DISABILITY ACT, 2016*”, the Legislative Department of Ministry of Law and Justice proposed laws for persons with disabilities to support them. Under Chapter-1, 2(n) states that, “information and

communication technology includes all services and innovations relating to information and communication, including telecom services, web based services, electronic and print services, digital and virtual services” i.e. special assistantship should be provided to them as a token of accessibility [8].

IV. RESEARCH METHODOLOGY

We have performed a quantitative research method to measure the most violated WCAG 2.0 errors of level A & AA. Also, guidance to web developers is provided to avoid these infringements in future to make the web content much more accessible to the needy ones. We have encountered fifteen Indian Government Websites out of which nine are of State Government and six are of Central Government as a token of our study to detect errors. There are several automatic accessibility tools for testing purpose of web content accessibility. Some of the most well-known web accessibility tools are PowerMapper SortSite, Total Validator, AChecker, eXaminator, Accessibility Valet, WAVE 4.0, EvalAccess 2.0, A-Prompt, etc. [9]. In this research we are using PowerMapper for evaluation because of its ease of accessing the entire website in one go.

PowerMapper SortSite is available as a desktop application for Windows or Mac, and is also available as a web application. It can be used inside or outside of the firewall, including intranets and development sites. It takes only one click to analyse the entire website. Each page is checked against more than 700 standards based checkpoints, where checkpoints are Accessibility, Broken Links, Compatibility, Search Engine Optimization, Privacy, Web Standards and Usability [10].

Sometimes, results of automatic evaluation tools are not 100% accurate. So, in this case manual testing is required for better results, where manual test can be executed in different browsers (IE, Chrome, Safari, etc.). Manual Accessibility Testing is performed to check if the syntax is a valid HTML or not, Headings, Large Fonts, High Contrast, Alternative Text, Captions and Transcripts, Skip Navigation, Tab Order and Link Text, Form Labels, Keyboard Operations, PDF Documents, PDF Forms, Disable styles and linearize tables, text content scaling, etc. [11].

V. RESULTS AND DISCUSSION

Website	URL
w1	https://digilocker.gov.in/
w2	https://swayam.gov.in
w3	http://www.nvsp.in
w4	http://pensionersportal.gov.in
w5	http://law.up.nic.in
w6	http://www.dhsgoa.gov.in
w7	http://sciencetech.up.nic.in
w8	http://www.dmer.org/new
w9	http://www.mptransport.org
w10	http://www.tn.gov.in/rti/it.htm

Table 2: Website description

Website	WCAG A Errors	WCAG AA Errors
w1	9	4
w2	12	3
w3	8	6
w4	13	6
w5	10	2
w6	10	4
w7	8	3
w8	14	4
w9	13	4
w10	13	4

Table 3: WCAG A and WCAG AA errors for websites

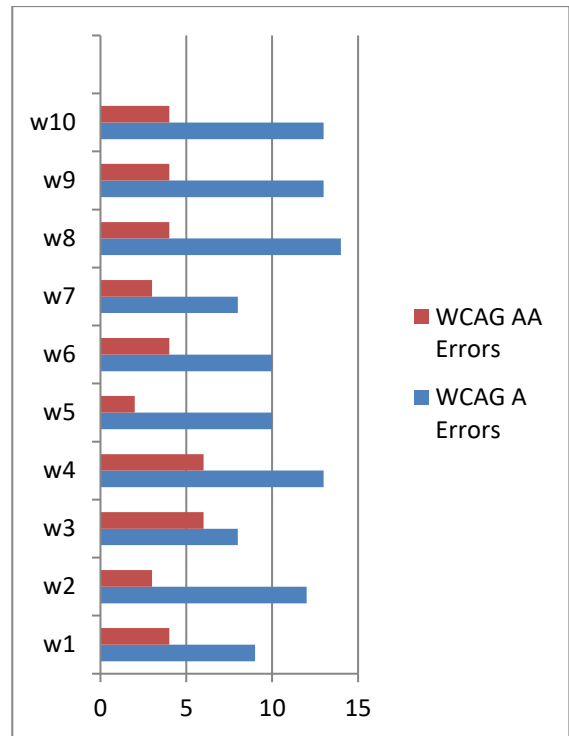


Fig: 1 Overall errors

Error name	Point name
Each A element must contain text or an img with an ALT attribute	p1
IMG elements must have an ALT attribute	p2
No TITLE attributes found for the frames on these pages.	p3
Some pages have the same title, so the title cannot be used to distinguish pages.	p4
Page uses nested tables which do not make sense when read in a screen reader	p5
This form control has no programmatically determined name	p6
This page has markup errors, causing screen readers to miss content	p7
This skip link is broken. The target anchor does not exist or is commented out.	p8

Use the LANG attribute to identify the language of the page.	p9
This page has duplicate IDs which cause problems in screen readers.	p10

Table 3: WCAG A errors

Error name	Point name
Contrast on foreground and background	p11
Empty heading	p12
Colors on the BODY or A elements you must set all of them	p13
Text-based form controls with absolute font sizes do not resize correctly.	p14
relative rather than absolute units in CSS property values	p15
relative rather than absolute units in FONT SIZE attributes	p16

Table 4: WCAG AA Errors

The two tables mentioned above describe the major errors in points (p1-p16) which occurred while checking these 10 websites, for the ease of understanding we have done classification of the number of errors that occurred in the websites and that should be rectified so that websites can become accessible to all.

With the help of this paper results of 10 websites according to their WCAG errors are shown which might help software developers in developing websites and applications which can become disabled friendly. Overall results and discussion according to websites are mentioned below.

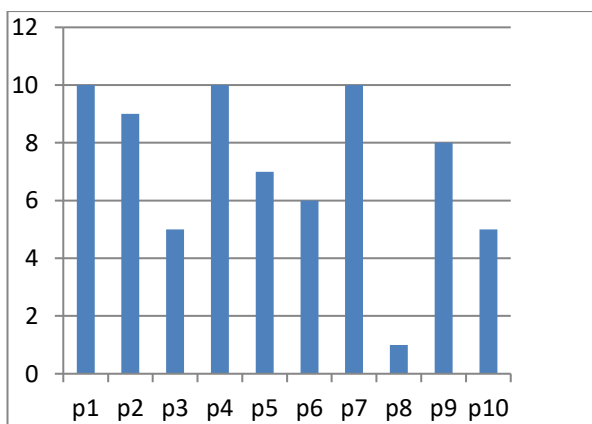


Fig: 2-WCAG A

As shown in the above figure i.e. Fig: 2 – WCAG A errors have been highlighted in which 3 errors were reported in almost each website as shown in the figure above (i.e. p1,

p4, p7) which explains the frequency of errors that have occurred in all websites taken together.

Major 3 errors are briefed below:

- Each A element must contain text or an img(i.e Image tag) with an ALT attribute.
- Some pages have the same title, so the title cannot be used to distinguish pages.
- This page has mark-up errors, causing screen readers to miss content.

Above are the 3 errors which came majorly in the websites can be resolved with ease.

Let us take error which mentions ALT text in an image which people forget to put it is the alternative text if image can't be seen so that it can become readable to people. Some minor errors which were found during this research were of JavaScript and broken link in which page path is found so throws an error which needs to be set right if a website is to made disabled friendly.

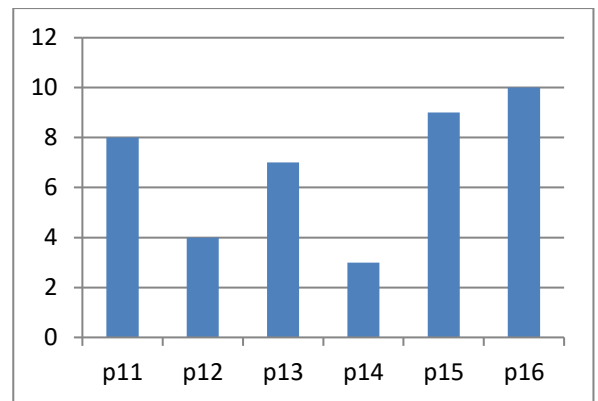


Fig: 3- WCAG AA

Above figure explains the WCAG AA errors that have occurred majorly and in a minor way in the websites mentioned in this paper.

With the help of this graph 6 were the major errors that have been identified:

- Contrast on foreground and background
- Empty Heading
- colours on the BODY or A elements you must set all of them
- Text-based form controls with absolute font sizes do not resize correctly.
- Relative rather than absolute units in CSS property values.
- relative rather than absolute units in FONT SIZE attributes

All the errors mentioned above should be avoided so that a website can be made WCAG AA compliant and be fully disabled friendly.

First point of contrast mentioned above explains the difference in the foreground and background which is required for low vision persons so that difference in the colours can help them read text.

In WCAG AA error of text size also occurred which is a major flow for people who are having low vision so that they can resize text and read the data they desire.

On the whole with the help of this paper major government website as mentioned are shown which clearly lack international standards to become accessible to all and also national standards too which deny right of disabled people to access their the content with ease.

Although a step has been taken by various government and other agencies to make websites disabled friendly and also many guidelines from Indian Government have also been issued, so that day must not be far when all websites can comply with international norms and become accessible to all and this paper can provide some brief to people who are moving forward in this direction.

I. CONCLUSION

This paper presents some violated websites of Indian Government which do not meet requirements of World Wide Web Consortium. Based on our study we reached to a conclusion that most of the websites we picked for our study shows error of WCAG A more than WCAG AA. And also based on priority level, the websites are having issue with priority level 1 most which is critical in which broken link errors occurred many times. For future scope, we would recommend the developers of Indian Government Websites to build websites according to the WCAG to have better web accessibility for all. Also, we can implement Artificial Intelligence using Machine Learning algorithms which will collect the anomalous data, predict and will take action accordingly in order to make the web accessible for all.

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