

Web Application Accessibility Testing

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Abstract- Web Accessibility is about making web accessible to users with impairments. More specifically, users with disabilities can understand and commune with web. Web page is accessible if it can be used efficaciously by users with and without disability.

The paper focuses on the tests carried to verify the accessibility of a Web Page.
It discusses the underneath areas:

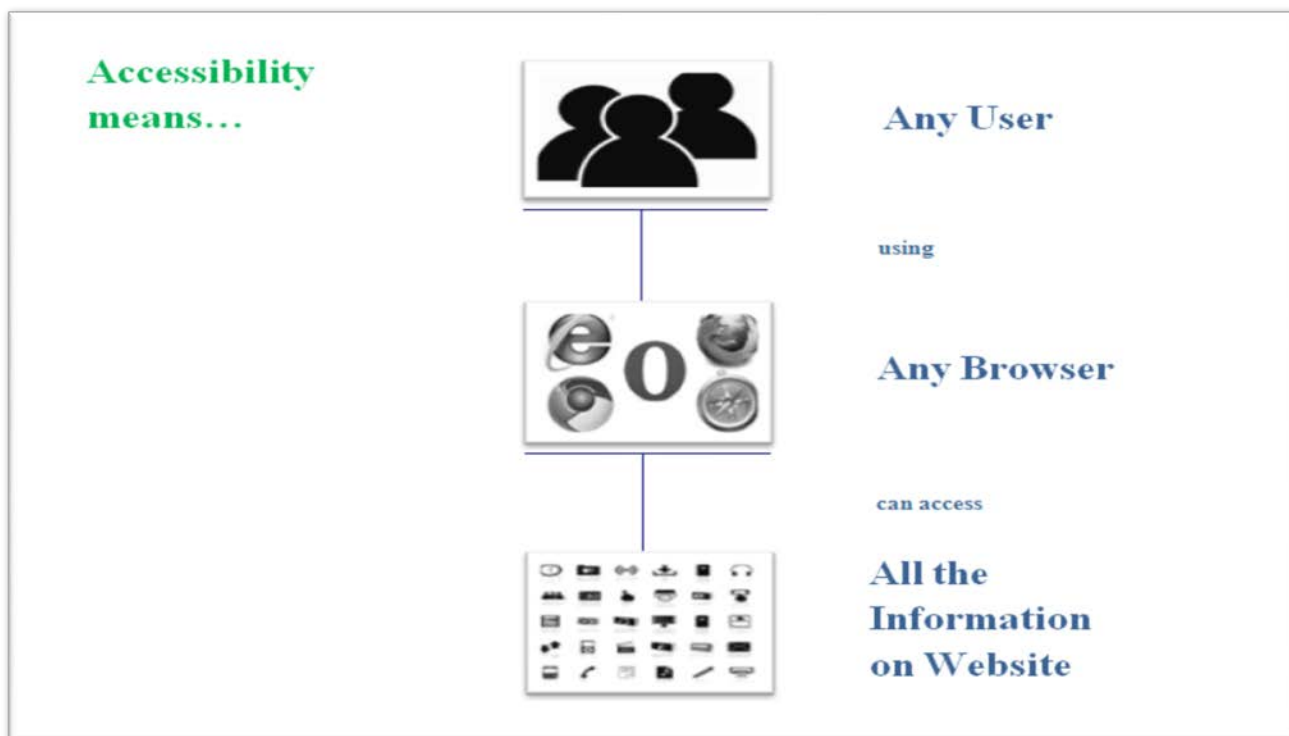
- Web Accessibility Testing Introduction
- Categories of Disabilities
- Web Accessibility Standards and Guidelines
- Web Accessibility Testing Techniques
- Web Accessibility Testing Tools

Index Terms- Web Accessibility Testing, Web Accessibility Standards and Guidelines, Web Accessibility Testing Techniques, Web Accessibility Testing Tools

I. INTRODUCTION

Accessibility Testing ensures the accessibility of a Website.

Web Accessibility Testing makes web products usable & accessible to people who have any form of disability. It intends smooth access of web to people with disablements.



II. CATEGORIES OF DISABILITIES

Categories of Disabilities:

- **Visual**
- **Hearing/ Auditory**
- **Mobility**
- **Cognitive**

Visual Disability comprises blindness, weak vision, tunnel vision, Dimness, Extreme near- or far-sighted and color blindness.

Auditory Disability comprises deafness, hard of hearing and High/low frequency hearing loss.

Mobility Disability is a physical impairment that considerably limits movement such as lifting, walking, and typing. It comprises of Repetitive Stress Injuries (RSI), Arthritis, Stroke, Spinal Cord Injuries, ALS and Loss of limbs or digits.

Cognitive Disability is a category of mental health disorder that affects learning, memory, perception, and problem solving. It comprises dyslexia and short-term memory deficit.

III. WEB ACCESSIBILITY STANDARDS AND GUIDELINES

- **WCAG 1.0 Web Content Accessibility Guidelines 1.0**
 - <http://w3.org/TR/WCAG10>
- **Section 508 Standards**
 - <http://www.access-board.gov/508.htm>
- **WCAG 2.0**
 - <http://w3.org/TR/WCAG20/>
- **IBM web guidelines**
 - <http://ibm.com/able/guidelines/web/accessweb.html>

IV. WEB ACCESSIBILITY TESTING TECHNIQUE - MANUAL TEST

Manual Tests

Manual test is usually actioned by an accessibility test expert who is technically cognizant of all the accessibility compliances and nitty-gritty. This approach helps to attain end-to-end testing of any website.

In addition, Assistive tools and technologies such as screen readers and magnifiers can help in interacting with the application in a realistic setup and real-time challenges.

Following is the list of manual tests which can be executed on different browsers (IE, Firefox, Chrome etc.) to test Accessibility:

1. Validate HTML

Validate your code using the W3C HTML Validator.

- Open the [W3C HTML Validator](#) site.
- Enter the application URL in Address and click the Check button.



2. Headings

In the W3C HTML Validator under More Options, select the “Show Outline” option and validate that headings are in the right order in the Web Application.



3. Fonts

Verify the text size and form field text size by increasing the text.

Change the browser text size to ‘Largest’ to test the large fonts by performing the below action.

- Activate large fonts in Internet Explorer, open IE > navigate to the View menu >Text Size >Select “Largest”.

4. High Contrast

Verify that changing the color scheme to High Contrast intact the page contents display and page information is not lost.

Change the high contrast in windows by performing the below action

- Open the Control Panel> navigate to “Ease of Access Center”> click on “Make the computer easier to see”. Under “High Contrast” section, select a High Contrast color scheme.
- High Contrast can also be turned on or off using keyboard shortcut keys, press left ALT + left SHIFT + PRINT SCREEN> a pop up to turn on High Contrast is displayed>click on Yes button to enable High Contrast.

5. Alternate Text

Alternate text is the text associated with an Image. Images should include AltText to make these images accessible especially by people with visual disabilities.

Screen readers can read text associated with images for the people with disable impairment. In Internet Explorer, hover the mouse over each image; the Alt text will display the image tool tip.

6. Captions and Transcripts

Web audio and video content can be accessible to people who have hearing disabilities by allowing Captions and Transcripts. Check that your videos recordings have captions and transcripts with audio.

7. Skip Navigation

Web pages having Skip Navigation Links are easily accessible to people with mobility impairments.

Verify by pressing Ctrl+Home keys to move focuses to the top of the page. Use the Tab key to start moving through links. Make sure that “Skip to Content” link is visible near the top.

8. Tab Order & Link Text

Using Tab key in right order should access Fields and links. Text linked with each link should be unique and apprehensible.

9. Form Labels

Verify that -

- Form label is accessible, check by putting the mouse on label form field; flashing cursor should appear to the linked field.
- Form field has a label. If a field label is missing, hover the mouse over the field to verify valid title attribute, which will appear as a tool tip.

10. Keyboard Operations

Verify that all the dynamic elements (drop-down menus, tab pages, Flash interfaces, etc.) are accessible using keyboard. Check using the Tab key, up/down arrows, space bar, etc. to check the accessibility of all the dynamic elements.

11. PDF Documents

Open PDF document and click on File> Save as Text>Save the text file. Open the saved text file and check that all text of pdf file is present in text file in the correct order.

12. PDF Forms

Check that each form field is accessible through keyboard and contains label, verify that putting the mouse over each form field displays label as a tool tip.

13. Disable styles and linearize tables

Verify that contents without style are displayed in order and apprehensible. Check the styles using WAVE or with the “Web Developer toolbar” extension for Firefox.

14. Test content scaling

Check the test content scaling by increasing the font size in web browser to 200% and verify that page is readable and usable. In order to enlarge the images, zoom the web page and check text in image is readable.

15. Testing with Assistive Technology

➤ Screen Readers

Screen reader tests elements which cannot be checked in any other reporting tool. These include Flash objects, interactive elements and unique plugins and documents.

Common screen reader tools include

- JAWS– used by approximately 65% of blind users
- Voiceover – free on a Mac or iPhone/iPad
- NVDA – free for Windows

➤ Screen Magnifiers

Screen magnifiers allow the user to magnify the screen many times its usual size and test the accessibility for disabled.

V. WEB ACCESSIBILITY TESTING TECHNIQUE - AUTOMATED TEST

Automated Tests

Automatic testing validates much faster, and gives a good idea of the accessibility. However, there are certain issues which automated testing cannot detect. This depends on the standards or guidelines we are testing for.

Following is the list of automated tests which can be executed on different browsers (IE, Firefox, Chrome etc.) to test Accessibility

1. aDesigner

This is a tool developed by IBM which simulates the experience of visually impaired individuals so that the designer can better understand the needs of disabled people and develop applications accordingly.

aDesigner can be accessed using URL <http://www.eclipse.org/actf/downloads/tools/aDesigner/>

2. WebAnywhere

This is a browser based tool that works similarly to the screen readers like Jaws. It assists the readers how to read the web page.

WebAnywhere can be accessed using URL <http://webanywhere.cs.washington.edu/>

3. Vischeck

This tool is used to simulate how a web page or an image will be viewed by people affected with color-blindness. This can be done by entering URL or uploading images.

Vischeck can be accessed using URL <http://www.vischeck.com/>

4. Web accessibility toolbar

WAT is an extension of Internet explorer or Opera that offers web page designers with useful features in the analysis of web page. One best feature is Grey Scale feature which helps to find low contrast spots in the design.

Web accessibility toolbar can be accessed using URL <http://www.wat-c.org/tools/>

VI. WEB ACCESSIBILITY TESTING TOOLS

1. AChecker (Accessibility Checker)

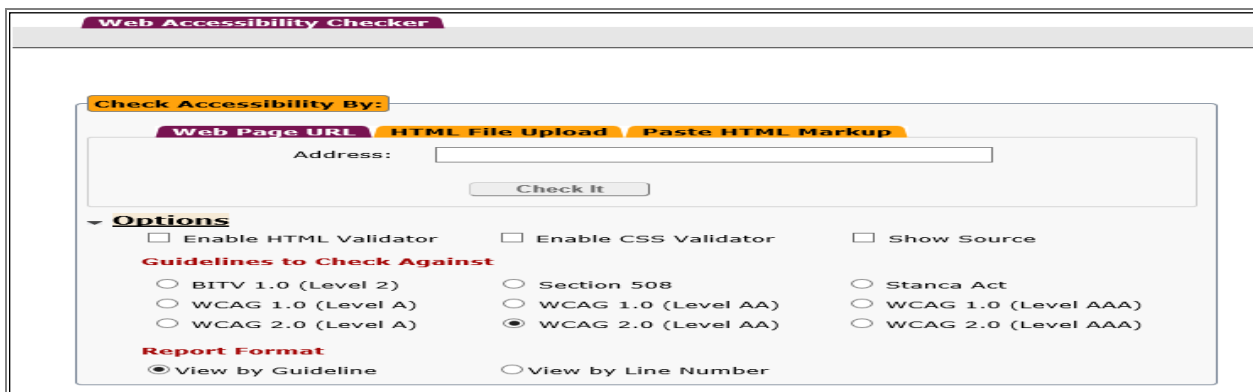
Accessibility Checker is an open source web accessibility evaluation tool. This tool tests web accessibility by entering web page URL or by uploading its HTML file at AChecker.

AChecker provides option to select an international accessibility guideline for accessibility check:

- WCAG 1.0 (International)
- WCAG 2.0 (International)
- BITV 1.0 (Germany)
- Section 508 (U.S.)
- Stanca Act (Italy)

It also gives the option to choose report format (View by Guideline and View by Line Number).

AChecker can be accessed using URL "<http://achecker.ca/checker/>"



The screenshot shows the AChecker web interface. At the top, there's a title bar "Web Accessibility Checker". Below it, a section titled "Check Accessibility By:" contains three tabs: "Web Page URL", "HTML File Upload", and "Paste HTML Markup". Under the "Web Page URL" tab, there is an "Address:" input field and a "Check It" button. Below this, there is an "Options" section with several checkboxes: "Enable HTML Validator", "Enable CSS Validator", and "Show Source". Under "Options", there is a "Guidelines to Check Against" section with radio buttons for "BITV 1.0 (Level 2)", "WCAG 1.0 (Level A)", "WCAG 2.0 (Level A)", "Section 508", "WCAG 1.0 (Level AA)", "WCAG 2.0 (Level AA)", "Stanca Act", "WCAG 1.0 (Level AAA)", and "WCAG 2.0 (Level AAA)". The "WCAG 2.0 (Level AA)" option is selected. Below that is a "Report Format" section with radio buttons for "View by Guideline" (selected) and "View by Line Number".

2. Accessibility Valet

Accessibility Valet is a web accessibility test tool which tests the application accessibility compliance w.r.t.W3C Web Content Accessibility Guidelines (WCAG) or Section 508.

Accessibility Valet can be accessed using URL "<http://valet.webthing.com/access/url.html>"



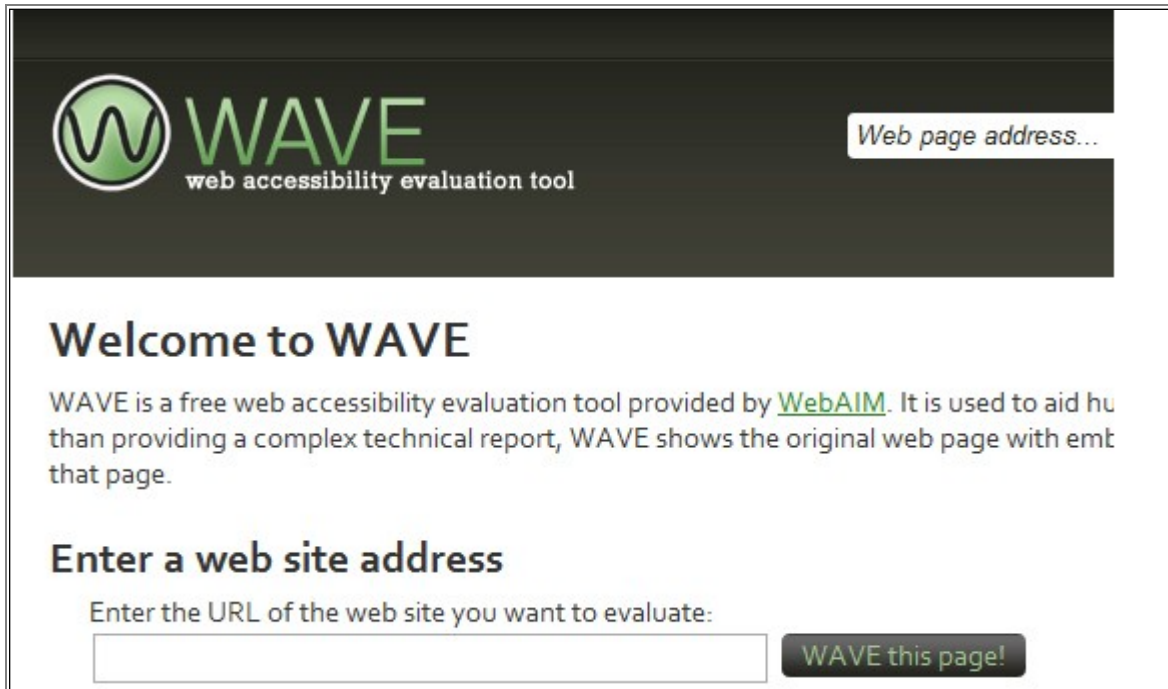
The screenshot shows the Accessibility Valet Demonstrator interface. At the top, there's a title bar "Accessibility Valet Demonstrator". Below it, there is a section titled "Check a Document by URL". Under this section, there is a "URL" input field and a "Check" button. Below the "Check" button, there are two dropdown menus: "Test Suite: WCAG AAA" and "Report Format: Compact". At the bottom, there is a checkbox labeled "Mail copy of report (subscribers only)".

3. WAVE

WAVE is very utile web accessibility tool. WebAIM has provided several options to use WAVE:

- 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>”.
- WAVE provide the option to upload a file can be uploaded or enter HTML code to check.
- WAVE toolbar is also available to run the WAVE reports in Firefox. WAVE toolbar can be downloaded from “<http://wave.webaim.org/toolbar/>”.

WCAG 1.0 and Section 508 guidelines are used by WAVE for the webpage evaluation.



The screenshot shows the WAVE web accessibility evaluation tool interface. At the top left is the WAVE logo, which consists of a green circle containing a white waveform, followed by the word "WAVE" in large green letters and "web accessibility evaluation tool" in smaller black letters below it. To the right of the logo is a text input field with the placeholder text "Web page address...". Below the logo and input field is a large heading "Welcome to WAVE". Underneath this heading is a paragraph of text: "WAVE is a free web accessibility evaluation tool provided by [WebAIM](#). It is used to aid hu than providing a complex technical report, WAVE shows the original web page with emt that page." Below this text is another heading "Enter a web site address". Underneath this heading is a text input field with the placeholder text "Enter the URL of the web site you want to evaluate:". To the right of this input field is a dark green button with the text "WAVE this page!" in white.

4. Web Accessibility Toolbar for Internet Explorer

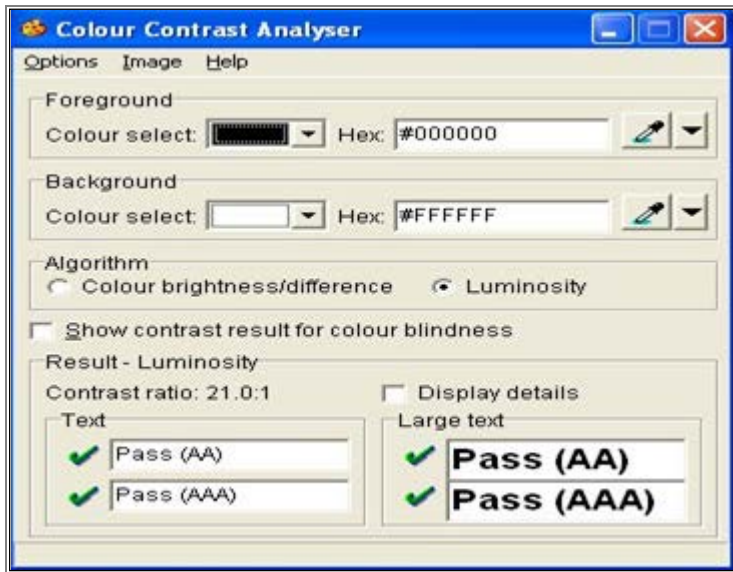
Web Accessibility Toolbar is used to validate accessibility manually. Tool bar has functionality:

- To identify components of a web page
- To Provide access to alternate views of page content
- To Facilitate the use of third party online applications

Web accessibility toolbar follow the WCAG 1.0, Section 508 and BITV guidelines.

5. The Color Contrast Analyser

Color Contrast Analyser checks the color contrast (foreground/background color combinations) and color visibility. It checks the color contrast against WCAG 2.0 color contrast criteria. It also provides the feature to simulate some visual conditions such as color blindness and cataract. Tool helps to determine that contrast ratio between two colors can be read or not by visually challenged people.



6. EvalAccess 2.0

EvalAccess2.0 is developed by the University of the Basque Country in Spain. This tool can evaluate a single web page as well as an entire website for WCAG 1.0 and Section508 compliance.

EvalAccess provides the beneath ways to test web accessibility:

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



7. FAE (Functionality Accessibility Evaluator)

FAE evaluates web page.

Evaluation results returns in following categories: Navigation and Orientation, Text Equivalents, Scripting, Styling and HTML Standards.

FAE can be accessed using URL "<http://fae20.cita.illinois.edu/>"



8. AccessColor

AccessColor checks the color brightness, color combinations and color contrast between colors. It ensures that color contrast can be accessed by people with visual impairments.

AccessColor also helps in finding appropriate color combinations within HTML and CSS documents in order to test the contrast between each color combination. It provides the option to only errors and warnings in report or view full report with details.

AccessColor checks the color combinations against WCAG 1.0 guidelines.

AccessColor can be accessed using URL "<http://www.accesskeys.org/tools/color-contrast.html>".



9. Hera (Version 2)

Hera is a web-based system that performs the accessibility test as per the WCAG1.0 guidelines. It does some automation testing and guides users through tests which need to be done or confirmed manually.

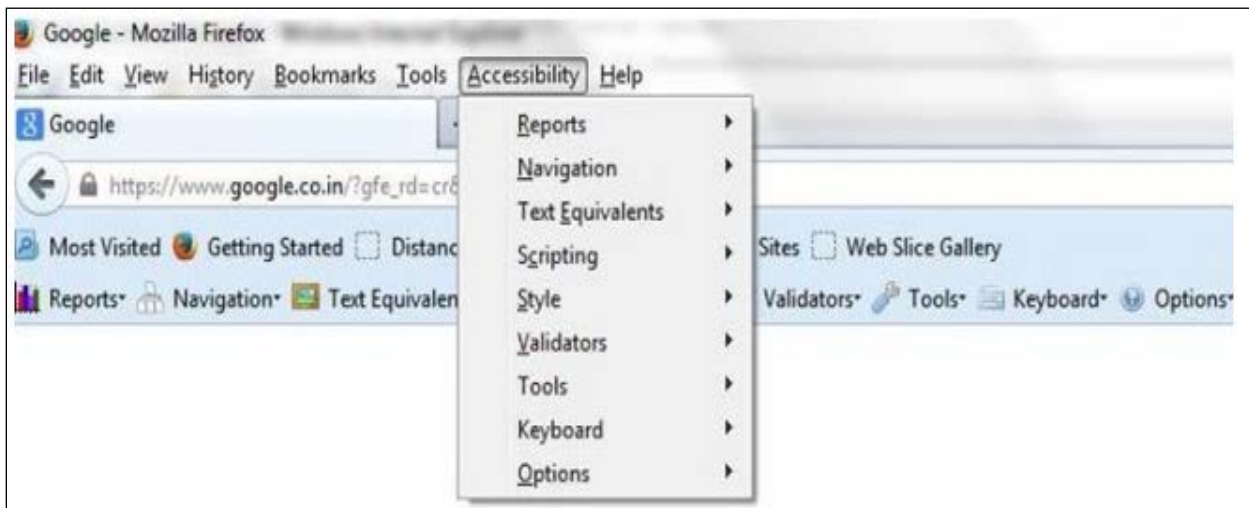
Hera can be accessed using URL "<http://www.sidar.org/hera/>".



10. Firefox Accessibility Extension

Firefox Accessibility Extension is an add-on available for Firefox which makes people with disabilities to view and navigate web page contents. To download the Accessibility Extension open Firefox and navigate to Tools>Add-ons>Accessibility Extension. A new menu bar “Accessibility” is displayed with number of features:

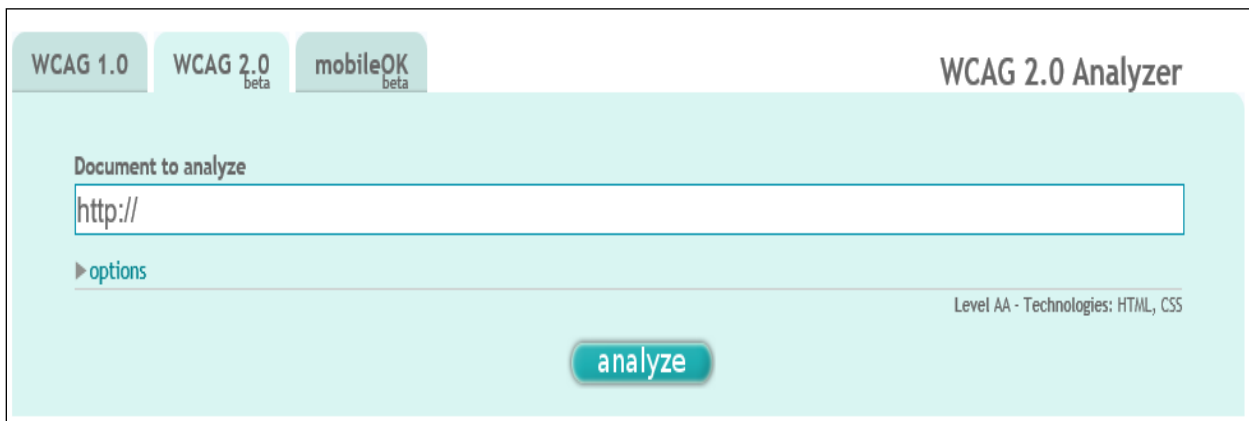
- Reports(Accessibility Issues)
- Navigation (Title, Headings, Links, Forms, Data Tables, Language Changes etc.)
- Text Equivalents (List of Images, List of Objects, List of Abbreviations etc.)
- Scripting (Focus Inspector, List of ARIA Widgets, Disable Scripting etc.)
- Style (Colour Contrast, Text Flow, Text Sizing, High Contrast View etc.)
- Validators (W3C Specifications, HTML Validator, CSS Validator, Link Checker etc.)
- Tools (FAE, WebAIM WAVE, Cynthia Says, WebXact, TAW etc.)
- Keyboard (Keyboard Shortcut Options, Disable Access Keys etc.)



11. TAW Online

TAW (Web Accessibility Test) is an online tool for the accessibility test of web sites based on the W3C Web Content Accessibility Guidelines. It gives the option to select a guideline WCAG1.0 or WCAG2.0. It also gives the option to select Level Analysis (Level A, Level AA and Level AA). As per the selected WCAG guideline standard and level, it tests the web site.

TAW can be accessed using URL “<http://www.tawdis.net/ingles.html>”



12. PDF Accessibility Checker (PAC)

PDF Accessibility checker is a freeware windows tool to check the accessibility of PDF files. PAC is recommended by W3C for checking the accessibility of PDF files.

PAC can be used by opening the “PDF Accessibility Checker 2.0.exe”, PAC can be downloaded from “<http://www.access-for-all.ch/en/pdf-lab/pdf-accessibility-checker-pac.html>”.



VII. CONCLUSION

Accessibility testing assists in making application disabled friendly. Accessibility testing may be challenging for testers because they are unfamiliar with disabilities. It is better to work with disabled people who have specific needs to understand their challenges.

In addition, it's a myth that creating accessible website and testing them is expensive. It is not limited to disabled; it also improves the usability of application which helps regular users as well.

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