International Journal
Information Technology Applications (ITA)
Volume 7, Number 1, July 2018

ACCESSIBILITY OF WEB PAGES

Lucia Vladovičová

Abstract:

In this article we are dealing with the usability and accessibility of websites in the administration of public or state institutions located in the territory of the Slovak Republic. Specifically, the article describes how the created application works to automate the web accessibility tests. Subsequently, the results of web accessibility testing are carried out by the created application, as well as the results of manually testing website accessibility, they are presented in our article. This web application is made with JavaScript and JQuery. The user interface is created using Hyper Text Markup Language and Cascading Style Sheets.

Keywords:

Accessibility of web pages, application, testing, feasibility

Introduction

We live in the age of information technology when almost every private or public institution has its website to be accessible to the general public. Despite the effort to create a page accessible to all user groups, institutions are many times unsuccessful in this area.

We often encounter web site developers they want to create sites that would be accessible to the general public and groups with some kind of disadvantage, but the problem is that they often fail to imagine about accessibility and usability of web pages in this area, they do not know clearly to identify what must a web site contain in terms of accessibility and usability, and what not.

Web designers are expected to have an awareness of usability and if their role involves creating markup then they are also expected to be up to date with web accessibility guidelines [1].

For the above reasons, we have decided to explore the issue of website accessibility and usability, and then we would like to suggest a way for website developers to test their sites in the future so that their designed and implemented sites meet website accessibility standards.

According to ISO 9241-11, usability is understood as the extent to which the product can be used with the highest possible efficiency and satisfaction, with way to achieve the desired user goals [2].

In Slovakia, the usability and accessibility rules of websites are summarized in rules called Web Accessibility Standards. These standards are based on the Web Content Accessibility Guidelines (WCAG), which were standardized by the W3C consortium.

WCAG bears a wide range of recommendations to make web content available to a broad circle of people with disabilities, including blindness and weak vision, deafness, learning disabilities, cognitive limitations, speech disorders. These recommendations deal with the accessibility of web content on desktops, laptops, tablets, and mobile devices. [3].

Standards created by the Ministry of Finance of the Slovak Republic are made up of several parties, which can be divided into three groups and these are:

- Page design rules - This set of rules discusses font contrast and formatting font
- Technical implementation rules - In this group, the standards are largely focused on the correctness of the display, and what should individual HTML tags contain, such as that each “img” element must contain alternate text that appears if the image is not displayed or this text is read by nearly-blind man with e-reader.
- Page Content rules - In this group, the document describes what must be presented in content accessibility on the web page, such as map of sites.

1 Application design

This application was designed to control website accessibility standards by law no. 312/2010 Z.z. the proceedings of the Ministry of Finance of the Slovak Republic, and namely according to Annex No. 1 to the Decree entitled as website accessibility standards.

The application was designed as a web application executable by any web browser supporting Javascript.

The application was implemented with JavaScript and JQuery library. The basic screen that appears when you start the application was programmed in HTML and CSS.

The application consists of a text window into which the user inserts an HTML code for checking and a window with a list of errors found in given HTML code. Below the input text box there are buttons for starting the HTML code validation. Using these buttons, the user can clear the error message, restore the page, or open the validator's guide in the new browser window.

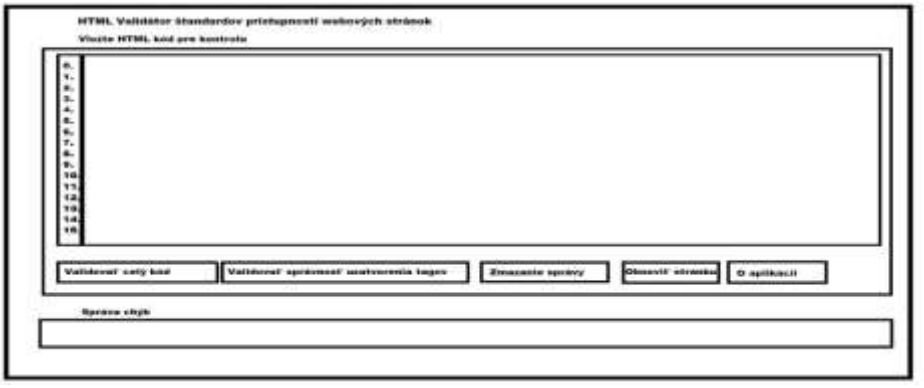

Fig.1. Final application design

2 Application functioning

The chapters below focus the principle of how an application works.

2.1 Validated embedded HTML code

The user opens the browser with validator and inserts the HTML code of the HTML page you want to test into a blank white window. The user has two options to check the embedded HTML code, to validate the entire code or only the correctness of HTML markup.

If a user chooses the button Validate the entire code, the validator retrieves the text entered by the user from the text area and checks the entire HTML code. This means that validator checks, whether the page does not contain prohibited HTML elements that, according to the website accessibility standards valid in the territory of the Slovak Republic, pages should not contain and also validator checks the allowed elements that have the prescribed structure. At the end, the selected feature will check whether HTML tags have correct close. Subsequent errors are listed in the box below the text area.

If the user just wants to check whether the HTML tags have correct close, user chooses the button to validate HTML tags correct close. When you start this feature, the app retrieves text from the text area to find if it is an HTML tag that is unpaired or if it is tag, which should have pair. In the case of a pairing tag, the first occurrence of the given HTML tag is loaded into the field and searches for the corresponding end tag. In the final step of this feature, validator detected errors on the incorrectly closed HTML tags, which are written by validator in error message with line number in code.

2.2 Line spacing in validator

For easier orientation in the embedded code, the app contains line spacing.

Inserting a line number into a text field is designed and implemented using the JQuery module, where we have created one more text area whose placement and display properties are defined using cascading styles via JavaScript.

The numbering method and algorithm is implemented on the principle that if it writes a line break in the text area to check the code, function adds one line and displays the line number in the next text area which is created next to the text area designed for HTML code.

2.3 Search HTML elements in code

To simplify the search for an error that was detected using the function "Validate the entire code" was implemented the HTML element search feature. This search function retrieves the whole text from the text area into the variable, in the next step divided the text into rows and searches for all elements with the given HTML tag and lists the line numbers where the tag was found. Subsequently, the user can find the line with error and fix the error.

2.4 Additional funcions of validator

The secondary small features include, for example, Deleting a message that the user can activate by clicking on the deleting a message button and use that functionality if user repeats validation of the code. Deleting message and repeat validation of the code, user find out what bugs have already fixed and what errors to fix, because the program does not automatically delete the old error message when re-checking, but current error message validator write under old error message.

Another secondary feature that a user can use by activating a button named Refresh the page is to delete all the data in all areas of the page in case they want to remove them. Before executing the action described, the user's validator alerts you to this fact and requires confirm user.

An indirectly related feature that a user can use in the event of a problem is feature under the About application button, where are the basic information on how to run JavaScript in your browser, the explanation of the individual button functions and the basic characteristic of the validator.

3 Analysis of selected pages

To make an automated testing using the application described above and then to make manual testing, we chose 5 webpages from either state or public institutions that should meet website accessibility standards, based on a document issued by the Ministry of Finance of the Slovak Republic in Standards for Public Information Systems reports, including a document on website accessibility standards.

3.1 Ministry of Finance of the Slovak Republic

After inserting the source code of the Ministry of Finance[1] site of the Slovak Republic into our validator, we found that three errors were found on the page in specific page elements. There was an alt attribute missing in one image and another attribute at the input button twice. When validating tags, the validator found 16 instances of incorrect closing tag.

If you are interested in eliminating the deficiencies and improving the accessibility of the site, we recommend that you correct the errors so that the page is correct or valid according to the W3C consortium, and we recommend that your optimize your site for mobile devices.

3.2 Comenius University in Bratislava

After inserting the Comenius University[2] site into our validator, we found shortcomings in the standard for providing alternative text in images of the so-called alt attribute, which should contain the description of the image. For twelve images, the alt attribute was not specified. Another drawback is that they do not have properly closed HTML tags by our validator.

We recommend removing shortcomings they have not correct close HTML tag and, since it is a college that specializes in the study of disabled students and wants to help them, it should add descriptions to each, which should contain alternative text in HTML elements as these descriptions have of great importance to the blind people.

3.3 Capital city Bratislava

After inserting the site of the capital city of Bratislava[3] into our validator, we found a mistake in alt attribute at elements input and several incorrectly closed tags. We recommend correcting all of these errors because this is a page on which is the assumption of attendance a large number of people with different devices and restrictions.

[1] The source code of the test page is located at: view-source:http://www.finance.gov.sk/
[2] The source code of the test page is located at: view-source:https://uniba.sk/
[3] The source code of the test page is located at: view-source:http://www.bratislava.sk/

3.4 City part Bratislava - Dúbravka

After inserting the city part Bratislava-Dúbravka[4] page into our validator, we have found incorrectly closed HTML tags, and the input element was missing a description in the form of an alternate text.

If you are interested in improving the usability of the site, we would recommend that all W3C error messages be removed, because incorrect closed HTML tag can have adverse consequences for correct display of the page on different devices.

3.5 Slovak television and radio

After inserting the Slovak television and radio[5] page into our validator, we found shortcomings in introducing an alternate text for the element "img" and the input element, namely, that the alternative text of these elements was not given. The site as one of the few have correctly closed HTML tags according to our validator.

In order to improve website accessibility, we recommend that you complement alternative text to HTML elements.

3.6 Evaluate results from manual site testing

For a better idea than the sites tested fulfilled the criteria set by the standards, we have compiled a summary table. In this table, we expressed the points that the test page fully meets or partially meets or does not meet the given criterion. If the web page has fully met the criterion test, the criterion obtained 1 point for this, if the page partially met the criterion, it gained 0.5 points if the page did not meet the criterion, it did not get any point.

Criteria/web page	Ministry of Finance of the Slovak Republic	Comenius University in Bratislava	Capital city Bratislava	City part Bratislava-Dúbravka	Slovak television and radio
Web accessibility Document	1	0	1	1	0
Map from sites	1	1	1	1	1
Alt attributes	0.5	0	1	1	1
Print version	1	1	0.5	1	0
Validate by W3C	0	0	1	0.5	0.5
Functionality without Flash and JavaScript	1	1	0.5	1	0
Correct structure table	1	0.5	0	0	1
Text version	0	0	1	1	0
Text accuracy in navigation	1	1	1	1	1
Optimization for mobile devices	0	1	0.5	1	0
Functionality without graphic	1	0	0.5	1	0.5
Forms	1	0	0	0	0
Documents in PDF, doc format	1	1	1	1	0
Total points	**9.5/13**	**6.5/13**	**10/13**	**10.5/13**	**5/13**

[4] The source code of the test page is located at: view-source:https://www.dubravka.sk/sk/Home.html

[5] The source code of the test page is located at: view-source:https://www.rtvs.sk/

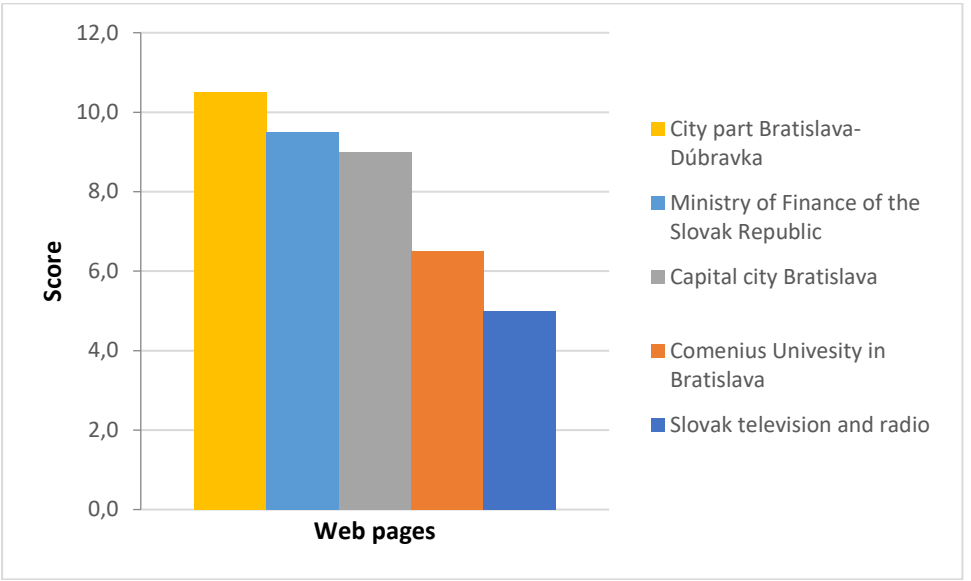

Fig.2. Graphic representation of the evaluation

The graphical representation shows that website accessibility standards from the tested pages were best met by the web page of City part Bratislava-Dúbravka, and the biggest gap in the fulfillment of the standards has the Slovak Television and Radio website.

Conclusion

The aim of this work was to design a possibility to create universal automated tests.

We have attempted to achieve this objective by studying the document entitled The Decree of the Ministry of Finance of the Slovak Republic on Standards for Public Administration Information Systems, which also contains web accessibility standards, and based on a detailed analysis of the document, we designed and subsequently implemented this proposal through the application.

We have tested the final version of the app as it works, whether there are any changes in display in the most commonly used web browsers across different platforms like Linux, Microsoft Windows and Apple. For Linux, we tested the functionality of the application in Mozilla Firefox or Opera. For Microsoft Windows, we tested the application in Google Chrome, Microsoft Internet Explorer and Microsoft Edge. For Apple platforms we tested the app in Safari.

In all tested browsers, the app appeared correctly as it should. All validator functions worked correctly, in addition to browser Mozilla Firefox, in which the main functionality of validator did not work, which ensures that the code is validated according to website accessibility standards, so we encourage browser Mozilla Firefox users to choose one of the alternative tested browsers to work with this app.

After testing the app in different browsers we looked at the application from user's perspective, so we found it convenient to write a manual. Based on this new look, we have written manual, which is part of the application called About App.

In the future, we are thinking of creating a site where validator will be created freely accessible to the public.

References

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Bc. Lucia Vladovičová
Faculty of Informatics, Pan-European University in Bratislava
lucia.vladovic@gmail.com