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TESTING THE WEB ACCESSIBILITY OF HOTEL AND RESTAURANT COMPLEXES

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Abstract: Web accessibility is a necessity enabling people with disabilities to engage in a digital realm regardless of their physical, cognitive, or sensory capabilities. Nowadays, web accessibility assumes significant importance across various domains, including governmental aid, healthcare services, education, cultural activities, sports, and the service sector. Nevertheless, developers and testers often face uncertainty about actions to be taken when addressing accessibility concerns. This article delves into website accessibility matters, outlines key principles for developing accessible web-oriented software, introduces an accessibility testing checklist for web content, conducts both manual and automated testing of the websites of hotel and restaurant complexes, and offers recommendations for enhancing web accessibility levels.

Key words: web accessibility, Web Content Accessibility Guidelines (WCAG), manual and automated testing, screen readers.

1. Introduction

According to the World Health Organization, at least 2.2 billion people worldwide live with some form of vision impairment or blindness [1]. Over 5 % of the world's population have hearing impairments [2]. There are no precise statistics available for Ukraine as the Ministry of Health does not maintain formal statistical records. However, considering the current military realities, the number of people with visual, hearing, and motor impairments is rapidly increasing. Therefore, the issue of inclusivity and accessibility of websites is extremely relevant today.

2. Testing web content for accessibility

Inclusivity and accessibility are crucial aspects to be considered in the process of creating websites. However, these concepts are not identical. The distinction lies in the fact that an inclusive website is initially developed for a specific group of people with disabilities. Accessibility, on the other hand, entails ensuring that the website is usable by all individuals, including those with various visual, auditory, motor, and other impairments [3]. Within this scientific paper, websites of hotels and restaurants were analyzed in terms of their accessibility.

Testing web content for accessibility is a process that combines a set of specific approaches, methods, and tools aimed at verifying the usability of a website by people with visual, auditory, or motor impairments. Such testing is conducted in accordance with requirements and standards that are prevalent in a specific country or globally. The most prominent international standard is the Web Content Accessibility Guidelines (WCAG) [4]. The guide was developed by a group of individuals, including testers and participants of the World Wide Web Consortium (W3C), some of whom have physiological impairments. It contains recommendations aimed at ensuring greater accessibility of web content. The main of them include the alternatives for audio and visual content, the ability to use the user's native language, correct rendering of tables, clear navigation mechanisms, and clarity and simplicity of documents. On this basis, four principles of accessibility have been formulated, namely, perception, operability, clarity and reliability.

1. Perception guarantees that the users are able to receive information via methods that are accessible to them. This may include simplified content delivery, voice narration, font enlargement, and alternative options for images and videos.
2. Operability ensures accessibility of interaction with the website under any conditions. The website should feature navigational elements being easy to access, a straightforward search function for important components, and techniques helping users determine their location on the site, enabling them to return or navigate to specific sections of the website as needed.
3. Clarity implies that website should be understandable to all users. Efforts should be made to ensure that the content does not cause any strain during viewing. It is important to create easily readable text and provide predictability in navigation. Another important detail is providing assistance to users during form completion, such as hints, demonstration of errors, and their explanations.
4. Reliability is expected to ensure the uninterrupted operation of the website across various platforms, devices, and systems, as well as compatibility with different software. This means that when implementing inclusivity or accessibility in displaying content, it is important to ensure its normal functioning under any conditions.

Following these principles will make websites more convenient and their content accessible to all visitors, including those with impairments, special needs, or limitations in perception.

3. Website accessibility testing checklist

After analyzing the works of experts [5, 6, 7] regarding web accessibility, key criteria have been identified that need to be considered when working on the accessibility of websites.

1. "Alt" tags for images serves for users with visual impairments accessing the content with the use of screen readers. These programs inform them about what is depicted in the image. Therefore, appropriate descriptions should be provided.
2. Easy-to-read text is intended for users having difficulties with reading, as well as for those encountering challenges in learning. Therefore, it is necessary to make sentences simple and concise.
3. Navigation must ensure consistency in user's navigation throughout the website and avoiding changes in the structure of web pages.
4. Image integration consists in adding images where possible to accompany texts to aid users with reading difficulties in understanding the content easily.
5. High contrast colors serve to ensure the optimal level of contrast on the website to make digital content accessible to people with visual impairments.
6. Avoiding pop-ups: screen readers read the content of such windows along with the main content, so it is better to avoid them.
7. "Airy" design means a single-column layout covering the entire screen, minimalist design, ample space between elements, and large photographs. Such a website can be created using WordPress or choosing another content management system (CMS).
8. Accessibility features assume that websites should have special features for users with limited motor skills who may not be able to use a keyboard or mouse.
9. Dynamic interactive elements: it's necessary that expandable menus and clickable images should be accessible for interaction through the keyboard, voice commands, and special features.
10. Video subtitles: videos should be provided with subtitles in multiple languages for users with hearing impairments.

4. Manual testing

Manual testing of website accessibility is a crucial component of the testing process as a whole. Automated tools alone cannot detect an inaccurate or subpar alternative text, reliably determine keyboard focus at any given moment, or uncover all possible instances of improper creation and functioning of dialog boxes, carousels, or accordion menus.

Within this study, manual testing of web accessibility was conducted on ten of the most popular hotel and restaurant complexes in Ukraine, Poland, and Germany. The websites were evaluated to determine their adherence to the key accessibility criteria outlined in the aforementioned checklist.The results of this testing can be found in Table 1 and Table 2.

Table 1

Manual testing of web accessibility for hotel and restaurant complexes (part 1)

Hotel and Restaurant Complex	Website	"Alt" tags for images	Easy-to-read text	Navigation	Image insertion	High contrast colors
Hotel "Ukraine"	https://ukraine-hotel.kiev.ua	+	+	-	+	+
Grand Hotel Lviv	https://grand-hotel.com.ua	-	-	-	+	-
Hvoya Bukovel	https://hotel-hvoya.com.ua	+	+	+	+	+
H15 Boutique Hotel	https://www.hotelh15boutique.pl	-	-	+	+	+
Unicus Palace	https://www.hotelunicuspalace.pl	+	-	+	+	-
Hotel "Stary"	https://stary.hotel.com.pl	±	-	-	+	-
Raffles Hotels & Resorts	https://raffles.com	-	+	+	+	+
Hotel Berlin, Berlin	https://hotel-berlin.de	+	+	-	+	+
Eurostars Book Hotel	https://eurostarshotels.de	+	-	+	+	-
Staycity	https://www.staycity.com	-	+	-	+	+

Table 2

Manual testing of web accessibility for hotel and restaurant complexes (part 2)

Hotel and Restaurant Complex	Website	Avoiding pop-ups	"Airy" design	Accessibility	Dynamic interactive elements	Video subtitles
1	2	3	4	5	6	7
Hotel "Ukraine"	https://ukraine-hotel.kiev.ua	+	–	–	–	Video unavailable
Grand Hotel Lviv	https://grand-hotel.com.ua	–	–	–	–	Video unavailable
Hvoya Bukovel	https://hotel-hvoya.com.ua	+	+	-	+	Video unavailable
H15 Boutique Hotel	https://www.hotelh15boutique.pl	+	+	–	+	Video unavailable
Unicus Palace	https://www.hotelunicuspalace.pl	–	+	+	–	Video unavailable
Hotel "Stary"	https://stary.hotel.com.pl	–	–	+	+	Video unavailable
Raffles Hotels & Resorts	https://raffles.com	+	+	+	+	–

Continuation of table 2

1	2	3	4	5	6	7
Hotel Berlin, Berlin	https://hotel-berlin.de	+	+	+	+	Video unavailable
Eurostars Book Hotel	https://eurostarshotels.de	–	–	+	+	Video unavailable
Staycity	https://www.staycity.com	+	+	+	–	–

After assessing the web accessibility of ten hotel and restaurant complexes, one website that stands out belongs to Raffles Hotels & Resorts. It features a dedicated Accessibility section where the corporation provides insights into the adherence of the site to international accessibility standards. Raffles Hotels & Resorts has undertaken a series of projects to ensure this. It contains:

• conducting a situational analysis of the website through WCAG 2 – Level AA accessibility audit;

• enhancing team awareness and qualifications;

• implementing specialized accessibility tools and documentation;

• considering accessibility in all web projects from the early stages of development;

• supporting accessibility experts [8].

Unfortunately, not many businesses today make an effort to ensure that their web resources are accessible to everyone. This holds true for both Ukrainian and foreign businesses, as research results indicate. Grand Hotel Lviv has developed a website that least complies with the basic accessibility criteria. The main shortcomings of this site include the absence of an "airy" design, pop-up windows, difficult-to-read and small font, low contrast levels on pages, complex navigation (even users without physical limitations find it difficult to orient themselves on the pages), and a large number of dynamic elements. This website is an example of what is not done to ensure digital content is accessible to all individuals.

5. Testing using assistive technologies

According to recommendations from experts in website testing [28], it is important to conduct testing using assistive technologies, such as automated testing, after manual testing. Automated tools scan the underlying code of the website and its content, flagging any errors.

Most automated tools analyze the code of web pages for compliance with the Web Content Accessibility Guidelines (WCAG) [4]. Many tools also provide guidance on resolving issues. These tools often detect errors that may not be obvious to developers.

Automated accessibility testing tools are an important part of website development and quality control processes. However, they are only a helpful complement to manual testing, as they cannot fully assess the web content accessibility. According to the statistics from Level Access digital accessibility solution, automated tools detect only 20–30 % of existing defects [9]. Research carried out by Deque shows that its automated testing identifies 57 % of digital accessibility issues, surpassing industry standards [10]. However, even this figure is insufficient for comprehensive testing. Therefore, it is best to use automated accessibility testing tools in tandem with manual testing.

According to research conducted by Opkey [23], only 5 % of companies utilize fully automated software testing methods. Two-thirds of software development companies prefer a combined approach, where testing is conducted in a ratio of 75:25 (manual testing: automated testing) or 50:50. Only 9 % of companies rely solely on manual testing.

After analyzing the works [22, 24, 25], the following advantages of automated testing can be highlighted:

1. Faster issue detection: automated testing helps quickly identify website accessibility issues and is 70 % faster than manual testing [29].

2. Simultaneous testing on different platforms: automation tools allow testing across different browsers and devices simultaneously.

3. Reuse of test scripts: test scripts can be reused for testing on different versions of the website, thereby saving time.

4. Testing under different conditions: automation enables testing the site under various conditions, helping identify issues for different user groups.

5. Maximum coverage: automated testing ensures high coverage of various aspects of the website.

6. Automated tools for testing web accessibility: overview and comparison

Within this study, the following tools for website testing were considered:

1. ANDI – comprehensive accessibility testing tool. Identifies issues on the web resource and provides solutions for resolving them [11].
2. PA11Y – accessibility testing tool for developers [12].
3. Contraste – tool for checking for compliance with WCAG 2.0 [13].
4. Axe – accessibility testing tool for developers [14].
5. tota11y – set of accessibility checking tools for visual aspects [15].
6. ColorBox by Lyft Design – the program that assists in creating color schemes based on accessibility principles [16].
7. Sim Daltonism – color blindness simulator. A highly convenient visualizer [17].
8. Contrast – contrast checking according to WCAG 2.0 requirements [18].
9. Hex Naw – checking color systems for contrast and accessibility [19].
10. WAVE – tool for comprehensive accessibility assessment [20].

There is a wide range of automated tools for testing web accessibility available on the market, each with varying levels of accuracy and coverage. There are options for comprehensive accessibility testing (such as ANDI, PA11Y, Axe, etc.), as well as tools for assessing accessibility in visual aspects (Totally, Contrast, Hex Naw, etc.). Most of these tools are paid, but there are also free options available, which can be installed as browser extensions to provide detailed website analysis.

7. Analysis of hotel and restaurant complexes using automated tools

Within this study, an analysis of the ten most popular hotel and restaurant complexes in Ukraine, Poland, and Germany was conducted using the following automated tools: Axe, Wawe, Contrast, and Sim Daltonism. The test results can be found in Table 3.

Table 3

Automated testing of web accessibility for hotel and restaurant complexes

Hotel and Restaurant Complex	Website	Axe (number of Err)	WAVE (number of Err)	Contraste, % of tests passed	Sim Daltonism (website compliance)
Hotel "Ukraine"	https://ukraine-hotel.kiev.ua	26	28	60 %	+
Grand Hotel Lviv	https://grand-hotel.com.ua	23	27	80 %	+
Hvoya Bukovel	https://hotel-hvoya.com.ua	11	12	83 %	+
H15 Boutique Hotel	https://www.hotelh15boutique.pl	19	18	76 %	+
Unicus Palace	https://www.hotelunicuspalace.pl	13	9	68 %	+
Hotel "Stary"	https://stary.hotel.com.pl	24	31	56 %	+
Raffles Hotels & Resorts	https://raffles.com	26	33	76 %	+
Hotel Berlin, Berlin	https://hotel-berlin.de	3	5	85 %	+
Eurostars Book Hotel	https://eurostarshotels.de	32	41	56 %	+
Staycity	https://www.staycity.com	9	7	74 %	+

A comprehensive automated analysis was conducted using two programs: Axe and WAVE. The Axe program detects and describes various accessibility issues such as screen reader inaccessibility, improper use of HTML tags, low contrast, missing alt attributes, and others. The extension is installed in the browser, after which the program shows the number of errors requiring a correction. The WAVE program is a convenient extension that can be installed in three browsers - Chrome, Firefox, and Microsoft Edge. Since the extension works entirely in the web browser, no information is sent to the server. This ensures 100 % private and secure accessibility reporting.

Contrast checking is conducted as part of comprehensive testing, but there are many tools available for more detailed analysis of visual indicators. The analysis with the use of the Contraste program and the Sim Daltonism application was carried out. The Contraste program performs 101 tests and identifies issues that need to be addressed. The Sim Daltonism application simulates the website in colors that a person with color blindness could see. A special window is overlaid on the website or part of the website to check readability.

After conducting automated testing, it was found that many websites have certain accessibility issues. They were identified using tools such as Axe, WAVE, and Contraste.

The Hotel Berlin (Berlin) website demonstrated the best results during testing. According to the results, both automated comprehensive testing tools identified only a small number of errors. The contrast test passing rate is 85%, indicating the correct choice of colors, fonts, and other visual elements of the website.

Using the Sim Daltonism application, accessibility testing for people with color blindness was conducted. All websites showed satisfactory results, with the content being readable and accessible to people with various forms of color blindness.

8. Recommendations

A study on the accessibility of ten hotel and restaurant complexes was conducted, using both manual and automated testing. During the research, key indicators of web accessibility which should be taken into account when testing web resources were identified. Based on the study, the following recommendations have been developed:

1. Taking into account WCAG recommendations: web development and testing should adhere to the WCAG, since they are international standards encompassing all crucial aspects of web accessibility.

2. Ensuring website accessibility using technologies: automated accessibility testing tools are essential in the development process, but their use should be considered as a supplement to manual testing.

3. Using comprehensive accessibility testing tools: it is recommended to apply comprehensive tools like ANDI or PA11Y, which provide a complete assessment of accessibility and suggest solutions to issues revealed.

4. Attention to visual accessibility: among the tools, those specializing in visual accessibility, such as ColorBox by Lyft

Design or Contrast, should also be used to ensure the optimal level of color contrast and other visual accessibility aspects.

5. Regular updating of testing tools: taking into account the rapid pace of technological advancements and changes in accessibility requirements, it is advisable to constantly update testing tools and methods to detect new types of issues.

6. Continuous monitoring and support of accessibility: after the release of a web resource, it is important to ensure continuous monitoring of its accessibility and timely support for addressing identified issues.

Adhering to all aforementioned recommendations makes the website accessible and, therefore, promotes inclusion, compliance with legislation, enhances brand reputation, ensures access to important information, and expands audience and markets.

9. Conclusions

In the course of the research, the importance of paying significant attention to the website accessibility was highlighted. It was shown that web accessibility is crucial for ensuring equal access to digital content for all Internet users. According to Sitemorse [27], 60 % of users will leave a website if they encounter accessibility issues, which can lead to potential loss of clients. Hence, it is essential to prioritize website accessibility. At the outset of this work, a checklist was developed, outlining the primary criteria to consider while testing a website for web accessibility. Based on the results of testing ten websites of analyzed hotel and restaurant complexes, specific recommendations for possible improvement of the web accessibility level of these sites were formulated.

Wide variety of accessibility testing tools are available on the market, each with varying levels of accuracy and functionality. In this work, selected tools meet the needs and provide a comprehensive assessment of accessibility.

Automated tools for testing web accessibility are an important supplement to manual testing. However, their accuracy and coverage may not always be sufficient to detect all accessibility issues. This work emphasizes the importance of using automated and manual testing methods in tandem.

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ТЕСТУВАННЯ ВЕБДОСТУПНОСТІ ГОТЕЛЬНО-РЕСТОРАННИХ КОМПЛЕКСІВ

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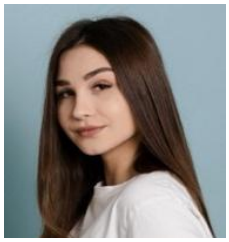
Вебдоступність – це необхідність, яка дає змогу людям з інвалідністю брати участь в цифровому світі, незалежно від їхніх фізичних, когнітивних або сенсорних здібностей. Сьогодні вебдоступність набирає все більше обертів у всіх сферах нашого життя: державна допомога, медичні послуги, освіта, культура та спорт, сфера обслуговування. Однак часто розробники або тестувальники, стикаючись з цим питанням, не знають, з чого починати та що їм робити. Тому в межах статті ми розглянули питання доступності сайтів, виділили основні принципи, розробили чекліст тестування вебвмісту на доступність, виконали мануальне та автоматизоване тестування сайтів готельно-ресторанних комплексів і надали рекомендації, спрямовані на підвищення рівня вебдоступності.



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