“Enhancing Web Accessibility Using Machine Learning: A Data-Driven Approach”

1AJAY RAJARAM GUPTA, 2Dr. VISHAL SHRIVASTAVA, Dr. SAUMYA MISHRA, Dr. AKHIL PANDEY3

1B.TECH. Scholar, 2Professor, 3 Assistant Professor, 4Assistant Professor

Department of Information Technology, Arya College of Engineering & I.T. Jaipur, India

[111feb.ajay@gmail.com](mailto:111feb.ajay@gmail.com), [2](mailto:2vishalsrivastava.cs@aryacollege.in)vishalshrivastava.cs@aryacollege.in, [saumyamishra.cs@aryacollege.in](mailto:saumyamishra.cs@aryacollege.in) [3akhil@aryacollege.in](mailto:3akhil@aryacollege.in)

**Abstract**- The accessibility of the site is essential to ensure that people with disabilities can use the website efficiently and thus support a more inclusive digital environment and improve their general digital experience. This research examines the application of automatic learning techniques, which includes self -learning and deep learning to increase the availability of the site. The study examines how artificial intelligence models (AI) can be used to detect and remedy the availability barriers, customize the user interface for compatibility with assistance devices, and automate observance of web content accessibility (WCAG). In addition, this document applies to the appearing challenges and future addresses in this evolutionary area.

**Index Terms:** Web availability, automatic learning, assistance technology technology, adolescent learning, consistency with WCAG, UX.

**1. Introduction**

The growing prevalence of digital interactions has increased the importance of creating available experiences on the web. Traditionally, improving the availability of the site has largely been based on manual tests and strict adherence to WCAG instructions, processes that often require a lot of time and are susceptible to human error. The arrival of automatic learning offers a persuasive alternative by enabling automation of availability tests, dynamic customization of user interfaces and improving assistance technology. This document examines the role of automatic learning in the automation and improving the availability of the web with access to its consequences for usability, integrating and digital capital.

**2. Understanding the Site Availability Challenge**

Despite the constant efforts, numerous websites remain inaccessible due to poor design possibilities, lack of consciousness between developers and technical limitations. The common barriers of availability include:

Visual Domods: Insufficient alternative text for images, low color contrast and absence of scalable text.

Motor domains: unfavorable navigation structures and shortcut shortcuts, which makes navigation on the website for users.

Stop Cognitive: Contenow Systems Design and Consisible Proposals that can provoke significant challenges for users with cognitive disabilities.

AIP AI, trained to automatically identify gaps in the area of ​​accessibility and dynamically adjusting the user's needs, offers a promising solution to these challenges.

**3. Automatic access to the availability of the site**

Several automatic teaching techniques are used to improve the availability of the site:

**3.1 Tests of automated accessibility**

Computer vision models: These models can analyze user interface elements (IU) to automatically detect problems such as insufficient color contrast and missing alternative text for images.

Processing of natural language (NLP): PNL techniques can be used to identify comprehensive or confusing text content,

which may be an obstacle to users with cognitive or learning.

**3.2 Separately available learning for assistance technologies**

Text Voice Models: Independent adolescents can improve voice accuracy and robustness for text models and improve voice navigation for users with visual obstacles.

Picture subtitle models: These models can generate detailed and accurate image descriptions and provide valuable information for user readers.

**3.3 Adaptive user interface**

Strengthening learning: This technique can be used to customize IUs based on the interactions and preferences of individual users and optimize user experience for people with disabilities.

Predictive Models: These models can dynamically indicate an improvement in accessibility based on user behavior and availability instructions, allowing to improve proactive availability.

**4. Implementation and Case Studies**

Several platforms and organizations have successfully integrated automatic learning to improve the availability of the site:

* Microsoft AI for accessibility: Microsoft uses deep learning to improve screen readers' experiences and provides users with more accurate and informative comments with visual obstacles.
* Google for supervision: This application uses computer vision to provide descriptions in real -time surroundings for visual disability, allowing more independence and access to information.
* Webaim's Accessibility Cand: Webaim has developed tools that analyze WCAG websites and provide remedial proposals.

**5. Challenges and Limitations**

Despite significant progress, automatic learning applications face several challenges and restrictions:

* **Lack of data:** Limited availability of various and representative data sets of availability can prevent the training and performance of automatic learning models.
* **Pressurence in AI models:** Artificial intelligence models trained in distorted data can produce inaccurate or unfair predictions, especially for user groups.
* **Computer costs:** Automatic real -time learning solutions for accessibility can be computationally intensive, requires significant sources and infrastructure.

**6. Future Directions**

In order to further proceed in the area of ​​the availability of the web, future research efforts should be focused on:

* Development of inclusive data files: Creating complex and diverse data that precisely represents the needs and experience of users with different disabilities.
* Improving the interpretability of AI: Improve transparency and interpretability of AI models to provide clear explanations for their decisions and recommendations related to availability.
* ML integration with WCAG compliance tools: Integration without automatic learning problems with WCAG tools compliance with regulations for automation of availability and speeding up processes.

**7. Conclusion**

Automatic learning has the potential of the revolution of the availability of websites by automation of compliance checks, adapting user interfaces and improving assistance technologies. While challenges persist, constant progress in AI promotes significant progress towards creating a more inclusive digital panorama. The ultimate goal is to transform a digital experience, make it available and usable for all people regardless of their skills. Future research should prefer the development of robust and reliable automatic learning models that can effectively solve a wide range of barriers to availability.

**8. References**

[1]       W3C Web Accessibility Initiative, "Web Content Accessibility Guidelines (WCAG)," Retrieved from https://www.w3.org/WAI/standards-guidelines/wcag/

[2]       Microsoft AI for Accessibility, "Using AI to Improve Accessibility," Retrieved from https://[www.microsoft.com/en-us/ai/ai-for-accessibility](https://www.microsoft.com/en-us/ai/ai-for-accessibility)

[3]       Google Research, "Advances in AI for Assistive Technologies," Retrieved from https://research.google/

[4]       WebAIM, "AI-powered Web Accessibility Testing Tools," Retrieved from https://webaim.org/

[5]       Seeman, L. C. (2000). *A new beginning – developing universal web site accessibility*. In Proceedings of the 5th international ACM Conference on Assistive technologies (Assets '00). Association for Computing Machinery.

[6]       Chisholm, W., Vanderheiden, G., & Jacobs, I. (1999). *Web content accessibility guidelines 1.0*. W3C recommendation.

[7]       Kirkpatrick, A., O'Day, V. L., & Burwell, S. (2006). *Evaluating web accessibility*. Communications of the ACM, 49(2), 56-61.

[8]       Lazar, J., Dudley-Sponaugle, A., & Greenidge, K. (2004). *Online learning: Is it the panacea for higher education?* . *The Internet and Higher Education*, 7(1), 31-38.