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## Assessing Web Accessibility Readiness In Nations Featured In The Latin America Artificial Intelligence Index

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### ABSTRACT

This study proposes the design and implementation of an AI-driven Digital Accessibility Management System aimed at enhancing web inclusivity and regulatory compliance. Unlike traditional comparative index-based studies, this system provides an integrated platform that enables researchers, analysts, developers, and policymakers to evaluate, monitor, and improve digital accessibility in real time. The platform incorporates automated WCAG 2.2 compliance assessment, AI-powered accessibility analytics, user-centered testing mechanisms, and continuous monitoring to ensure sustainable accessibility practices. The system supports role-based access for users and administrators, enabling personalized dashboards, compliance scoring, policy guidance, and governance alignment with Sustainable Development Goals (SDGs). Administrators can manage accessibility standards, train AI models, monitor bias, and oversee user-focused testing programs to ensure ethical and inclusive evaluation. By combining automated detection with realworld user feedback, the platform bridges the gap between technological innovation and digital inclusivity. This framework contributes to building equitable digital ecosystems by transforming accessibility from a static compliance requirement into a dynamic, continuously monitored governance process. The system serves as a scalable foundation for supporting inclusive digital transformation across institutions, organizations, and public policy environments.

**Keywords:** Web Accessibility, Artificial Intelligence Index, Latin America, Digital Accessibility, Accessibility Readiness Assessment, Inclusive Web Design, Assistive Technologies, Accessibility Standards (WCAG), Digital Inclusion, Human-Computer Interaction, Accessibility Evaluation Metrics, E-Government Accessibility.

## I. INTRODUCTION

The rapid advancement of Artificial Intelligence (AI) has significantly transformed digital ecosystems across the globe. Governments and institutions increasingly rely on AI technologies to enhance public service delivery, optimize decision-making, improve governance efficiency, and foster economic development. In Latin America, the Latin American Artificial Intelligence Index (ILIA) serves as a benchmark for evaluating countries' readiness, adoption, and strategic implementation of AI technologies. Countries such as Uruguay, Chile, and Brazil have demonstrated strong progress in AI development, digital transformation initiatives, and innovation-driven governance models. However, technological growth alone does not automatically guarantee equitable access to digital services for all citizens.

Parallel to AI advancement, web accessibility has become a fundamental pillar of inclusive digital transformation. The Web Accessibility Index (WAIN) evaluates how effectively countries comply with accessibility standards, particularly the Web Content Accessibility Guidelines (WCAG) 2.2. These guidelines ensure that digital platforms are perceivable, operable, understandable, and robust for users with diverse abilities, including persons with disabilities. Accessibility is not merely a technical requirement but a human rights and social equity issue. Without accessible digital platforms, technological progress risks deepening existing inequalities rather than reducing them.

Despite notable AI adoption in several Latin American countries, evidence suggests that high AI readiness scores do not always correlate with strong web accessibility performance. This disparity highlights a critical gap between innovation and inclusivity. Many digital transformation strategies prioritize automation, machine learning integration, and data-driven governance but fail to embed accessibility principles during early development stages. Additionally, reliance on automated accessibility testing tools often overlooks real user experiences, particularly those of individuals with visual, auditory, cognitive, or motor impairments.

Furthermore, this work aligns with the Sustainable Development Goals (SDGs), particularly SDG 10 (Reduced Inequalities) and SDG 16 (Peace, Justice, and Strong Institutions). Achieving inclusive digital transformation requires that accessibility be treated as a foundational element rather than an afterthought. The integration of AI and accessibility represents a strategic pathway toward fostering resilient, equitable, and sustainable digital societies in Latin America.

In conclusion, this study underscores the importance of bridging the gap between AI innovation and digital inclusivity. By developing an integrated system that harmonizes AI progress with accessibility standards, it lays the foundation for advancing equitable digital ecosystems across the region.

## II. LITERATURE SURVEY

### 1. Title: Evaluating Web Accessibility in



### **Countries Included in the Latin American Artificial Intelligence Index**

**Authors:** Patricia Acosta-Vargas, Belén Salvador-Acosta, Mauricio Loachamín

#### **Abstract:**

This study investigates the relationship between the Latin American Artificial Intelligence Index (ILIA) and the Web Accessibility Index (WAIN) across 19 Latin American countries. The research analyzes whether nations that demonstrate strong progress in artificial intelligence also ensure inclusive web accessibility. The results highlight disparities between technological advancement and digital accessibility readiness. Countries such as Uruguay, Chile, and Brazil exhibit strong performance in both AI development and web accessibility, whereas others like Jamaica and Venezuela face significant accessibility challenges. The study concludes that AI growth alone does not guarantee inclusive digital environments and emphasizes the need for stronger accessibility policies and evaluation frameworks.

### **2. Title: Accessibility Analysis Using WCAG 2.1: Evidence from Indian E-Government Websites**

**Authors:** S. Paul, A. K. Dey

#### **Abstract:**

This research evaluates the accessibility of Indian e-government websites using the Web Content Accessibility Guidelines (WCAG) 2.1. A sample of government websites was examined through automated accessibility evaluation tools to determine

compliance with accessibility standards. The findings indicate that many websites fail to meet even basic WCAG conformance levels, particularly in areas related to navigation, alternative text for images, and keyboard accessibility. The study highlights the need for developers and policymakers to prioritize accessibility during website design and development to ensure equal access to digital services for users with disabilities.

### **3. Title: Comparing Web Accessibility Evaluation Tools and Their Effectiveness**

**Authors:** A. Alsaedi

#### **Abstract:**

This paper explores various automated tools used for evaluating web accessibility according to WCAG guidelines. The study compares several accessibility evaluation tools to determine their effectiveness in identifying accessibility barriers in websites. Results show that while automated tools can detect many structural accessibility issues, they cannot fully replace manual testing or user-based evaluation. The research suggests integrating automated and human evaluation methods to obtain a comprehensive accessibility assessment and improve inclusive web design practices.

### **4. Title: Accessibility Engineering in the Web Evaluation Process: A Systematic Literature Review**

**Authors:** J. Ara, M. N. Rahman

#### **Abstract:**

This systematic literature review analyzes research on web accessibility evaluation

conducted between 2010 and 2021. The study examines 92 primary research articles to identify trends, evaluation techniques, and frameworks used in accessibility assessment. The results reveal that most studies rely on WCAG standards and automated tools, but there is growing interest in user-centered evaluation approaches and AI-based accessibility improvements. The authors emphasize the need for integrated accessibility evaluation frameworks that combine technical compliance, usability testing, and real user experiences.

**5. Title: Accessibility Evaluation of Educational Websites Using WCAG Guidelines**

**Authors:** M. Rahman, S. Ahmed

**Abstract:**

This study examines the accessibility of educational websites using multiple WCAG evaluation tools recommended by the World Wide Web Consortium (W3C). Several websites from different countries were analyzed to identify common accessibility issues affecting users with disabilities. The results reveal a significant number of accessibility violations, particularly related to perceivable content, navigation structure, and compatibility with assistive technologies. The authors recommend periodic accessibility audits and adherence to international accessibility guidelines to improve the inclusiveness of educational web platforms.

**6. Title: Usability, Accessibility and Web Security Assessment of E-Government**

**Websites in Tanzania**

**Authors:** Noe Elisa

**Abstract:**

This research evaluates the usability, accessibility, and security of selected Tanzanian e-government websites using automated diagnostic tools. The analysis reveals that all evaluated websites contain accessibility errors and violate Web Content Accessibility Guidelines (WCAG). Additionally, usability and security vulnerabilities were detected, including broken links and poor loading performance. The findings highlight the need for improved web development practices and stronger compliance with accessibility standards to enhance digital public services and ensure inclusive access for all citizens.

**III. EXISTING SYSTEM**

At present, Latin American countries have varying states of artificial intelligence utilization and access to the internet. Countries like Uruguay, Chile, and Brazil are in advanced stages applying AI and digitizing app/service delivery; however, existing web accessibility activities remain inconsistent. The current systems assess their technology-innovation initiatives and implemented digital solutions without full integration of accessibility. Accessibility assessments are conducted using automation technologies, however, this does not lend itself to an actual user experience, accessibility assessments that may not reference to guidelines (Web Content Accessibility Guidelines- WCAG 2.2) relating to accessibility can also result in a



misalignment with scope. Thus, a holistic framework is absent that enables either of these A.I. resolutions, innovations or applications to be bundled together and aligned with the standards of inclusive/Social Innovation.

#### IV. PROPOSED SYSTEM

The proposed system focuses on the unification of artificial intelligence advancement with web accessibility and inclusivity. It promotes the early application of accessibility standards, compliance with WCAG 2.2, and implements universal design principles, and approaches this through ongoing testing using automated tools supplemented by user-centered evaluations, ensuring equal access. Finally, it places a keen focus on policy making and strategic frameworks that place inclusively as an equal priority to technology development. The goal of this proposed system to create a digital ecosystem in Latin America that is sustainable and invests in inclusion, while it continues to strategically support and promote the advancement of AI.

#### V. SYSTEM ARCHITECTURE

The system architecture for assessing web accessibility readiness in nations featured in the Latin America Artificial Intelligence Index is designed as a multi-layer analytical framework that collects, evaluates, and analyzes website accessibility indicators across different countries. The architecture integrates automated accessibility evaluation tools, data processing modules, and analytical components to measure the readiness of digital platforms in terms of accessibility standards. The overall

architecture consists of five major layers: data collection layer, preprocessing layer, accessibility evaluation layer, analytics layer, and visualization layer.

The data collection layer is responsible for gathering web data from official government portals, educational websites, and public digital services across the selected Latin American countries included in the Artificial Intelligence Index. Web crawlers and automated scraping tools are used to retrieve website URLs, HTML content, and structural elements required for accessibility assessment. This layer ensures that the system collects diverse datasets representing different sectors of national digital infrastructure. The collected data is stored in a centralized repository to enable efficient processing and analysis.

The data preprocessing layer prepares the collected web data for accessibility evaluation. In this stage, irrelevant or duplicate data is removed and the website structure is standardized to ensure consistent analysis. HTML tags, metadata, multimedia elements, and navigation structures are extracted and formatted into structured datasets. This preprocessing step improves the reliability of the accessibility evaluation process by ensuring that the system analyzes clean and well-structured input data.

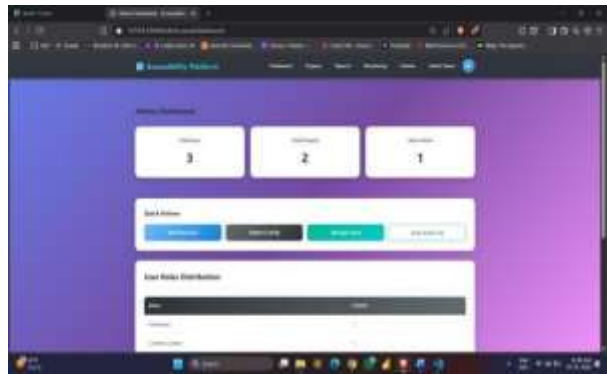
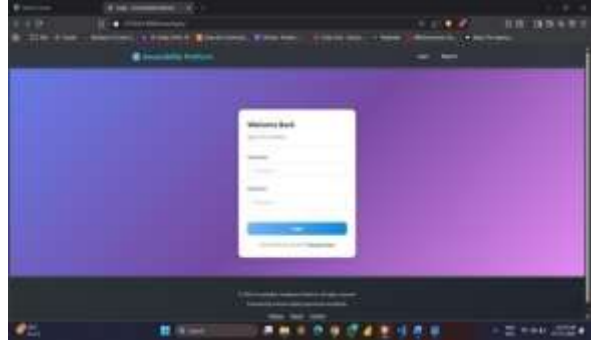
The accessibility evaluation layer performs the core functionality of the system. In this layer, automated accessibility evaluation tools and algorithms analyze the websites based on internationally recognized accessibility standards such as the Web Content Accessibility Guidelines (WCAG). The system checks for compliance with accessibility principles including perceivability, operability,

understandability, and robustness. Various accessibility indicators such as alternative text availability, keyboard navigation support, color contrast, and semantic HTML structure are examined to identify accessibility barriers present in the websites. The analytics layer processes the evaluation results and generates accessibility readiness scores for each country. Statistical and comparative analysis techniques are applied to evaluate how well each nation meets accessibility standards relative to the AI development indicators presented in the Latin America Artificial Intelligence Index. This layer also identifies patterns, strengths, and weaknesses in national digital accessibility performance and highlights disparities between countries.

Finally, the visualization and reporting layer presents the analyzed results through dashboards, charts, and comparative reports. This layer allows researchers, policymakers, and stakeholders to interpret accessibility readiness levels across countries and sectors. The system generates summarized reports that highlight accessibility compliance levels, major accessibility issues, and recommendations for improving inclusive digital infrastructure. Through this architecture, the framework supports evidence-based decision making for improving web accessibility and digital inclusion across Latin American nations.

**Fig 5.1:** Structure of the Proposed System

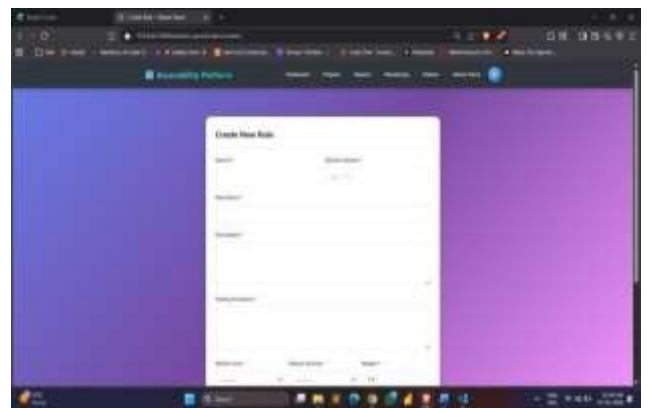
**VI. IMPLEMENTATION**



**Fig 6.2:** Student Login Page

**Fig 6.3:** Admin Dashboard

**Fig 6.2:** Admin Dashboard



**System Architecture:**



In

Fig 6.3: Create Rules

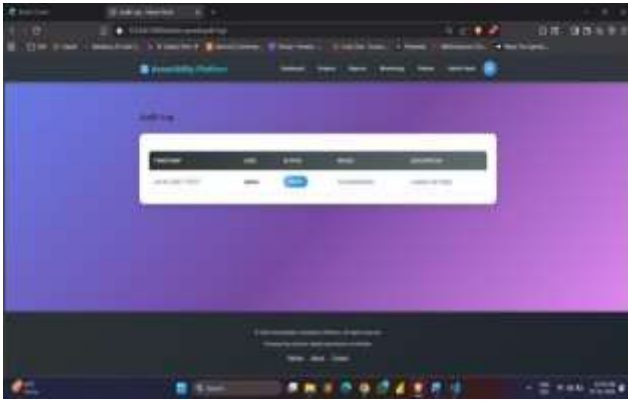


Fig 6.4: Audit Rules

## VII. CONCLUSION

This study presented an assessment of web accessibility readiness in nations featured in the Latin America Artificial Intelligence Index by analyzing the extent to which digital platforms comply with accessibility standards. The research highlighted the importance of ensuring that technological advancement and artificial intelligence development are accompanied by inclusive digital practices. By evaluating web accessibility indicators such as alternative text availability, navigation structure, color contrast, and compatibility with assistive technologies, the study identified significant differences in accessibility readiness across countries.

The findings indicate that while several nations demonstrate strong progress in artificial intelligence adoption and digital transformation, many government and public service websites still fail to fully comply with recognized accessibility

standards such as the Web Content Accessibility Guidelines (WCAG). This gap suggests that technological innovation alone does not guarantee digital inclusivity. Countries with well-established digital governance frameworks and accessibility policies tend to perform better in accessibility readiness, whereas others require improvements in regulatory enforcement, developer awareness, and accessibility-focused design practices.

Furthermore, the proposed architecture and evaluation framework provide a structured approach for measuring accessibility readiness across multiple countries. The framework enables researchers and policymakers to systematically analyze accessibility compliance and identify barriers that affect users with disabilities. Such evaluations are essential for promoting digital inclusion and ensuring that web technologies serve all individuals regardless of physical or cognitive limitations.

In conclusion, improving web accessibility should be considered a critical component of national digital development strategies. Governments, organizations, and web developers must adopt accessibility standards, conduct regular accessibility audits, and integrate inclusive design principles into web development processes. Strengthening accessibility readiness will not only enhance digital inclusion but also support sustainable technological growth and equitable access to online information and services across Latin American nations.

## VIII. FUTURE SCOPE

The proposed research on assessing web accessibility readiness in nations featured in the Latin America Artificial Intelligence



Index opens several opportunities for further investigation and improvement. Future work can expand the evaluation framework by incorporating a larger dataset of websites from multiple sectors such as healthcare, education, finance, and e-government services. Including a broader range of digital platforms will provide a more comprehensive understanding of accessibility readiness across different domains within each country.

Another potential direction is the integration of artificial intelligence and machine learning techniques to automate accessibility evaluation more effectively. Intelligent models can be developed to detect accessibility violations such as missing alternative text, improper semantic structures, or insufficient color contrast in real time. These AI-driven systems can assist developers by providing automated recommendations to improve accessibility compliance during website development.

Future research can also focus on user-centered accessibility evaluation, involving individuals with disabilities to assess the practical usability of websites. While automated tools identify technical errors, real user feedback can reveal usability barriers that may not be detected through automated analysis. Combining automated evaluation with user experience studies will result in more accurate and meaningful accessibility assessments.

Additionally, comparative studies can be conducted to analyze global accessibility readiness by extending the framework beyond Latin America to include countries from other regions such as Asia, Europe,

and Africa. Such cross-regional analysis would help identify best practices, policy frameworks, and technological strategies that promote inclusive digital environments worldwide.

Finally, future work can contribute to the development of policy recommendations and national accessibility guidelines aligned with international standards like WCAG. Governments and organizations can use these insights to establish stronger accessibility regulations, promote awareness among web developers, and ensure that digital transformation initiatives prioritize inclusivity. Through these advancements, future research can support the creation of more accessible and equitable digital ecosystems.

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