Automated Testing of Digital Accessibility – The Productivity Challenge

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Abstract—Web accessibility audits are crucial to ensuring that digital experiences are inclusive, yet the industry faces a major scalability challenge. Accessibility experts are scarce and costly, making it difficult for organizations to meet increasing demand. Additionally, training new professionals to perform comprehensive audits requires significant time and effort.

In this session, we introduce an AI-driven tool designed to automate a large portion of the work performed by accessibility experts. By dynamically interacting with web pages, identifying compliance issues, and generating detailed reports with actionable recommendations, our tool streamlines the audit process and enhances efficiency.

We explore two key scalability challenges where this automation is game-changing:

Scaling with Demand: As businesses expand their digital presence, the need for accessibility audits grows, but hiring and training enough experts to meet demand is a bottleneck.

Accelerating Onboarding: Junior professionals require extensive training before they can conduct audits effectively, slowing team growth. Our tool bridges these gaps by providing structured, automated insights, allowing fewer experts to handle more audits and new auditors to ramp up faster.

Keywords—Web Accessibility, Automated Testing, WCAG Compliance, Digital Inclusion, Accessibility Audits, AI-driven Tools, Scalability, Productivity, Accessibility Expertise, Training and Onboarding.

1. Introduction: The Scalability Problem

Despite advances in awareness and regulation (e.g., Web Content Accessibility Guidelines (WCAG 2.2), European Accessibility Act (EAA)), the industry faces two major hurdles:

- Scaling with Demand: An increase in accessibility requirements outpaces the availability of experienced auditors.
- Accelerating Onboarding: Junior professionals require months of training to perform reliable evaluations.

These challenges hinder broader compliance efforts and delay accessibility improvements that directly impact users with disabilities.

2. Our Solution: A11yDetector Accessibility Audit Tool

We developed a proprietary tool that automates core auditing tasks while preserving expert oversight. It interacts dynamically with web content and surfaces issues tied to WCAG criteria. Its design supports:

- Real-time Detection of accessibility barriers.
- Actionable Reports that include recommendations and code-level suggestions.
- Onboarding Support to train junior auditors through guided testing modules.

The tool was built to complement, not replace, human judgment, ensuring that nuanced, context-based evaluations are still addressed by experts.

3. Preliminary Results: Scope, Methodology, and Metrics

The tool is currently in its initial development phase and focuses on partially automating the evaluation of accessibility criteria related to basic keyboard navigation. This first iteration targets common barriers in native interactive elements, with plans to scale toward more complex components such as custom widgets and dynamic content structures.

Functional Scope

At this stage, the tool provides full or partial coverage for the following WCAG 2.2 success criteria: <u>2.1.1: Keyboard., 2.4.3: Focus Order.</u>, <u>2.4.7: Focus Visible., 1.4.3: Contrast (Minimum)</u>. The current implementation targets a defined subset of accessibility failures that are objectively detectable through DOM analysis and keyboard interaction simulation. Each category directly corresponds to WCAG 2.2 failure conditions and was selected based on frequency, user impact, and automation feasibility within the initial development scope.

Evaluation Approach

To evaluate performance, a set of 20 structurally diverse URLs was tested. Automated results were manually verified, using precision as the main metric to quantify the accuracy of issue detection (Precision = True Positives / [True Positives + False Positives]). Higher precision reflects lower false positive rates and greater diagnostic reliability. The following table summarizes the issue types assessed, current coverage, and observed precision levels during this initial phase.

Table	I.	Summary	of	Accessibility	Issue	Types	Detected	by	A11yDetector,	with
Corresponding WCAG 2.2 Criteria, Coverage, and Current Precision Estimates										

WCAG Success Criteria	Detected Issue Type	Coverage	Precision
2.1.1	Elements not focusable via keyboard	Complete	TBD
2.1.1	Controls not operable via keyboard	Complete	TBD
2.4.3	Non-logical or inconsistent focus order	Complete	TBD
2.4.3	Non-interactive elements receiving focus	Complete	TBD
2.4.3	Hidden controls receiving focus	Complete	TBD

2.4.3	Duplicate focus in nested elements	Complete	TBD
2.4.3	Missing visible focus indicators	Complete	TBD
2.4.3	Unexpected focus jump	Partial	TBD
2.4.3	Lost focus as a result of keyboard activation	Partial	TBD
2.4.3	Focus does not return to its triggering element	Partial	TBD
2.4.3	Focus does not trap (stuck in a modal)	Partial	TBD
1.4.3	Insufficient text to background contrast	Partial	TBD

Note: Precision rates are approximate and based on the current sample. These figures will be refined as the tool evolves and its detection capabilities are expanded.

4. Next Steps and Future Vision

The next development cycle will broaden the tool's capabilities to include more accessibility requirements by enhancing coverage of color contrast, keyboard traps, focus visibility, and consistent user interactions. It will also support basic navigation better and begin testing complex composite widgets following IARIA guidelines, targeting elements such as accordions, comboboxes, menus, and menubars. This marks a significant step forward in automating multi-layered interaction evaluation and improving overall focus management.

The below milestones will turn the tool into a scalable, reliable platform for automated accessibility testing in modern web environments. Planned long-term enhancements include:

- AI-assisted remediation suggestions
- Mobile accessibility testing
- CI/CD pipeline integration
- Cross-framework component analysis

Conclusions

AllyDetector offers a strategic solution to the challenges of scaling accessibility audits. By automating core evaluations and supporting expert oversight, it streamlines onboarding and enhances real-time detection. As the tool evolves, its expanding capabilities promise to further revolutionize accessibility practices and pave the way for a more inclusive and efficient digital future.

References

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