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AI Driven Intelligent Accessibility Optimization for Large Scale Enterprise Web Systems using Cloud Architectures

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ABSTRACT: This scholarly paper aims at providing an artificial intelligence solution in order to get accessibility of the enterprise web systems optimized to large sizes under cloud structures. The proposed model will involve machine learning and intelligent automation to detect and address the dynamically emerging access issues in tricky web situations. The system monitors the elements of the web constantly, builds on user interaction data and applies adaptive additions to fulfill the needs of accessibility, including WCAG, with the capability of scale out in a cloud environment. The framework has various main elements, such as an AI-powered accessibility assessment engine, a real-time remediation module, and a cloud-based layer of orchestration to control the distribution of resources and system performance. The strategy will enable businesses to have a high performing site with minimal human intervention and making the site more accessible to individuals with disabilities. The outcomes of experimental testing lead to a great improvement of accessibility scores, as well as responsiveness of the system in case of the enterprise web platforms. The results of this study demonstrate how AI solutions and cloud computing may apply to fulfill the growing demand to provide inclusive and in large volumes digital services.

KEYWORDS: AI-driven accessibility, enterprise web systems, cloud architectures, machine learning, real-time remediation, WCAG compliance, intelligent automation

I. INTRODUCTION

The past couple of years have witnessed a tremendous influx of digital technologies in the world and enterprise web system has become a must-have tool to business, communication and service delivery. With more and more enterprises relying on web-based applications to interact with users and to present information for all, accessability is a key issue to consider, especially when it comes to making sure that web-based applications are accessible to people with disabilities. With regard to web systems, accessibility implies that web content is available to individuals with various abilities and disabilities and perceived, understood, navigated and interacted with in this manner. The World Wide Web Consortium (W3C) has established the Web Content Accessibility Guidelines (WCAG) [1] as the international standard to make web content accessible. WCAG gives out guidelines that can assist to make Web content easier to access by individuals with visual, auditory, motor and cognitive disabilities.

In spite of such standards, however, providing accessibility in large web systems of enterprise is still a huge challenge. The systems can also be complicated, including a few interactive layers, constant changes, and varied patterns of use which might complicate manual procedures of accessibility testing and consequent remediation. The traditional methods of accessibility maximization usually exploit manual solutions like occasional audits and inefficient, inaccurate ways to address accessibility weaknesses at web sites are not able to match the evolving web dynamic trends [2]. Moreover, enterprise systems require that they scale in a way that requires scaling solutions to run their systems on distributed systems with less intervention of human beings.

There are two technologies available that could address these issues: Artificial Intelligence (AI) and cloud computing. It can be conditioned by techniques of artificial intelligence that can process very extensive amounts of data, discover trends and make independent decisions without any human interference. Combined with cloud systems offering scalable, flexible, and on-demand computing environments, AI-powered systems can access and optimize accessibility in web ecosystems everywhere across enterprises in real time [3]. This integration gives the possibility to identify any accessibility issues and fix them before it is too late, to identify whether it is possible to adhere to different accessibility standards such as WCAG. It will also make the overall user experience of the persons with disability more enhanced.

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The proposed research paper suggests the special accessibility optimization singled out artificial intelligence centric framework, specifically, in the large-scale enterprise web systems on the premise of cloud architecture. The proposed system will include an AI accessibility appraisal engine which will be dynamically active on the evaluation of the web components on the issues of accessibility. System and adaptive remediation module are in tandem with the gains that must be made to address the perceived barriers right after they are identified. The cloud orchestration layer is in charge of allocating resources and the performance of the system; as the number of processes undertaken in optimizing access to the system increase with the needs of the enterprise. The framework means no need for manual audits, and facilitates remediation, thus keeping accessibility standards alive at all times.

The skills to be comprehensive and leverage on cloud architecture and advanced AI methodologies to accommodate both the complexity and magnitude of enterprise web systems are one of the crucial components of this work. Past studies of web accessibility solutions involving AI have been primarily either automated testing or remediation solutions, at a single task level [4, 5]. Few have however recommended a built in system capable of monitoring, measuring and correcting on a large scale in an intelligent and automatic manner. Moreover, cloud orchestration ensured balance enhances the scalability and flexibility of the framework which enables businesses to handle dynamic workloads and demands to reach them effectively.

It has been applied to enterprise-scale Web platforms, and has been successful in regard to accessibility score and system responsiveness. Results are validating the framework in dealing with the WCAG standards, and provide a fluid user experience. The other discovery is that AI and cloud solutions can turn the access management process into a more participatory and automated process reflecting the agile paradigm of development that the present-day business environment is predominantly tasked with.

To this end, related work is analyzed in Section II, as well as the work that relates to the AI solutions to accessibility and optimization of the web systems in the cloud. Section III introduces the architecture and the different components of the proposed architecture including the AI Assessment Engine, the remediation module and the Cloud Orchestration Layer. In Section IV, the experimental setup, metrics and results of the tests with real-world enterprise systems are provided. The implications are mentioned in Section V, along with what the results imply and how they might be limited and what could be done in future research. Last of all, Section VI describes in summary contributions, and the reason why it is essential to assist users to gain access to the massive enterprise Web systems that are optimised by AI.

II. RELATED WORK

Artificial intelligence (AI) is one of the most powerful technologies that can help to restructure the systems faster and more efficiently in the more bustling environment of enterprise IT modernization. Modernization based on AI is able to provide industry with an increased rate of IT results, cost-effective and superior by means of automation of modernization of old systems, workflow optimization along with predictive maintenance, writes McKinsey and Company [1]. This is a paradigm shift that is essential to a business that desires to translate into being digital agile and cost-effective in the digital race. The Forbes Technology Council [2] also echoes the necessity of modernization of the enterprise systems in the era of AI in order to fully utilize its potential, and its ability to integrate seamlessly, scale and responsivity to business. Below are some of the perspectives that can be taken in the context of ways to utilize AI to maximize access to enterprise web systems.The list above is not exhaustive but contains some of the ideas that come to mind when one considers how AI can be utilized to perfect the availability of enterprise web systems of scale.

As businesses become aware of the importance of an inclusive digital experience, accessibility first enterprise web platform design has become a hot topic. Genne [3] provides a list of a few of the approaches that can be employed to consider the issue of accessibility at the early design phases and the need to implement scalable designs and automated tests to verify the alignment. It is an approach befitting requirements of intelligent systems capable of assessing and fixing accessibility in the complex scenario and on-the-fly.

Business operations are undergoing a transformation with the help of cloud migration and AI and modernization. Softweb Solutions [4] indicate that AI may be beneficial to cloud migration as it is capable of streamlining the analysis of workload, allocating resources, and speeding up the modernization of applications. Similarly, VirtualZ Computing [5] deals with modernization tendencies in AI use, with an assortment of key success factors to smart automation and monitoring, and the outlines of the challenges with legacy. As highlighted in the lessons, it is necessary to make the accessibility optimized through scalable solutions using AI-based models and frameworks on the cloud-based systems.

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AWS Partner Network, together with Infosys [6] suggests a viable solution of AI-dependent application upgrading known as the Live Enterprise Application Development Platform. This platform will incorporate AI to enhance the journey of modernization and increase its flexibility and flexibility to continue delivering. Together with Generative AI, cloud modernization is assisting businesses to quicken their endeavors encompassing automatic code refactoring, testing and deployment which are essential in solutions like web systems staying available despite the passage of time as they mature as detailed in the CIO report [7].

Within the federal sector, a trend is to modernize systems to the cloud, with FedScoop [8] indicating that cloud adoption is becoming a use case by federal agencies in the usage of AI and generative AI. Their efforts will just be starting the possibilities of AI to enable legacy systems to become interoperable and accessible to the users, especially in the highly-regulated ones. The accessibility optimisation of the enterprise level is reflected in the government case studies, and the almost necessity to make the most possible security, scalability and compliance.

Data modernization lies in the middle of enterprise AI initiatives. A large portion of data processing and analysis is needed to run AI-powered applications, and hence, the drive behind data modernization is so substantial at this point that Google cloud is performing rather well, 66degrees said [9]. Anbalagan [10] further discusses the application of AI to cloud computing service, such as how AI can enhance the performance, reliability and service provisioning of cloud computing. The above studies indicate that the need of strong cloud systems urgently impetus towards the development of AI-based accessibility systems exists.

One of the most important spheres that have been transformed with the introduction of the Artificial Intelligence (AI) concept to Enterprise Information Systems (EI) is the manufacturing sphere as it introduces the aspect of intelligent decision-making. The article by Zdravkovic et al. [11] provides an elaborate account of how the AI works in the area of information systems in enterprises with a specific focus on data integration, process automation and adaptability in control. Despite its orientation on the manufacturing, it is possible to apply the notion of the optimization system relying on artificial intelligence to the web systems of the enterprises requiring assistance of accessibility.

The edge-cloud collaboration architecture is proving to be successful distributed enterprise solutions. Yang et al. [12] provided a edge-cloud collaboration system in the software defined scenario with a large data driving edge on the supply to improve the latency performance and used the resources more efficiently. In this architecture, real time analytics and adaptative services are supported that are relevant in the optimisation of the accessibility of the geographically distributed enterprise web platforms.

Casati et al. mention that the use of enterprise AI as a service (AIaaS) is becoming a reality [13]. They refer to service-oriented solutions to the provision of AI features to enterprise systems, which make them scalable and connectible. The set of processes that make up accessibility management in complex web systems can be automated as demonstrated in the study by Samaras et al. [14] who set up their cloud-native MLOps automation platform to offer a zero-touch service assurance solution to 5G systems.

In the case of enterprises, collaborative work and confidentiality of the information are essential activities when using AI. Luo and Ji [15] recommend federal learning in combination with large language models (LLMs) to enhance the privacy of information that is shared across clouds. The technique is crucial to the accessibility frameworks which handle sensitive information involving client interaction in scattered clouds.

Lastly, explainable AI (XAI) is surging in as a crucial aspect to rely on and adoption. Bura et al. [16] cogitate on the place of XAI in enhancing transparency and trust in the AI systems. When XAI is added to the optimization of accessibility, developers and other interested parties understand better the decisions that AI are making, and can be more successful in ensuring that accessibility requirements are achieved.

Overall, each of these programs takes into account the interplay between AI, cloud and enterprise modernization as the origin of intelligent and elastic accessibility optimization. They emphasize on adaptive remediation in real-time, continuous assessment, scalability through the cloud, privacy issues, and the explainability in AI systems, indicating their ability to meet highly complex needs in large web system enterprises.

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III. AI-DRIVEN FRAMEWORK FOR OPTIMIZING ACCESSIBILITY IN LARGE-SCALE ENTERPRISE

The proposed AI-supported optimization of accessibility model of optimization of big scale enterprise web systems under the support of the cloud systems provides accessibility optimisation and constant improvement on the large scale, which scales well and may be readjusted. To handle the complexity nature of the enterprise web environment, the architecture will explicitly involve the latest AI models both in tandem with cloud coordination with which they will be able to identify, analyze and kill accessibility barriers on a real-time basis. It consists of Three basic components the AI-based Accessibility Assessment Engine, the Real-Time Remediation forged, and the Cloud Orchestration Layered. All these aspects provide a successful system that helps to meet dynamically with the principles of accessibility like WCAG and minimize manual processing, and improve user experience between persons with disabilities.

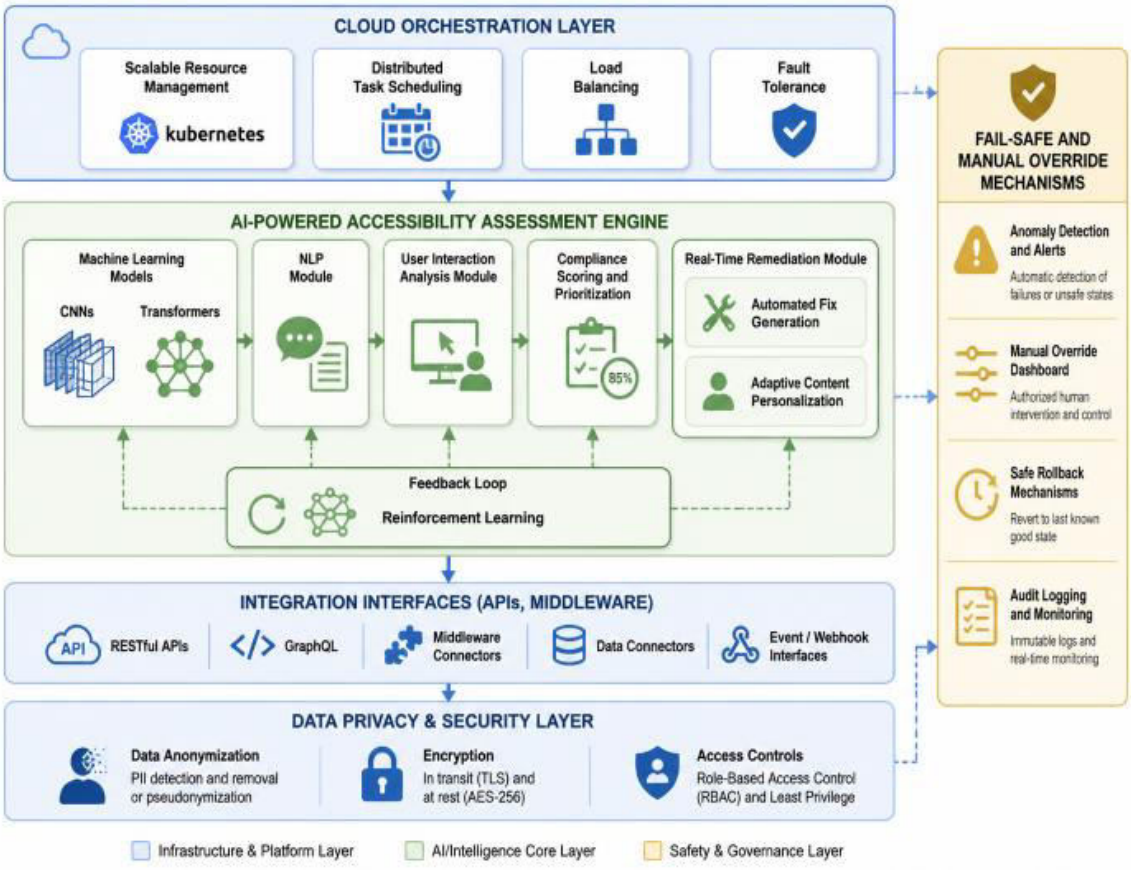

Figure 1: Overall Framework Architecture

1. AI-Powered Accessibility Assessment Engine

The Accessibility Assessment Engine is the engine of the framework. It is based on a set of machine learning (ML) algorithms and natural language processing (NLP) techniques to perform a holistic scan and analysis of code and mark-up on the web components based on the enterprise system automatically and in real-time. This engine accesses its problems to analysing the structural and semantic features of web content.

- Automated Issue Detection: The engine might identify visual and structural accessibility issues, e.g. missing alt text, alcoholic attributes, color contrast or color arrangement issues, and keyboard-accessible navigation. The NLP models are used to examine texts, bibliographic information that informs about the semantic correctness and situational adequacy of the information in order to enhance the accuracy of the error detection
- Dynamic User Interaction Analysis: The user interaction data of the system (like click graphs, navigation paths and assistive technology usage) is constantly collected and analyzed to identify real world accessibility problems, which would otherwise be unidentified by performing a static analysis of the code base. The reinforcement learning algorithms will also be useful in changing the evaluation criteria based on the ever changing user behaviors, hence, the engine will respond to the various user accessibility needs

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- Compliance Scoring and Prioritization: Issues found are rated on WCAG 2.1 criteria and a scoring on compliance based on each web component is introduced. The engine prioritizes the remediation efforts based on their severity, frequency and effects on the user experience which would enable it to efficiently allocate the resources in the subsequent process of remediation

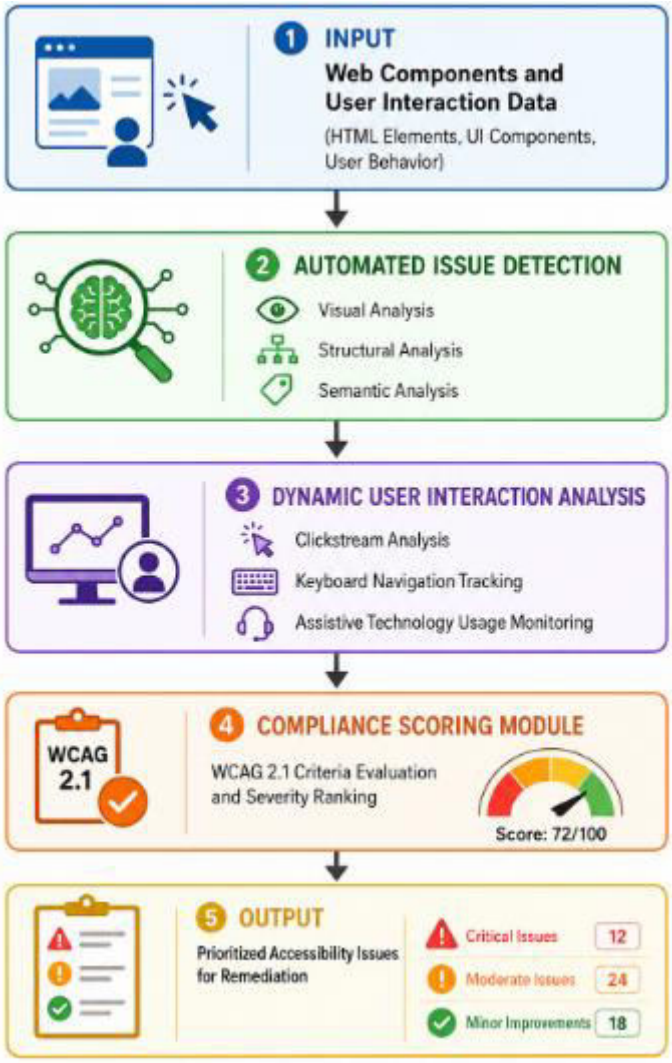

Figure 2: AI-Powered Accessibility Assessment Engine Workflow

2. Real-Time Remediation Module

The Real-Time Remediation Module is connected with the learning about the assessment engine, and an appropriate accessibility is modified with real-time remediation. This module is configured in such a way that one has low latency and corrections to accessibility are loaded as early as possible and transparently to end-users.

- Automated Fix Generation: The module uses a body of knowledge of good practices in accessibility and pattern recognition (AI-based) to automatically create remediation scripts, which can be used to make corrections to HTML, CSS and JavaScript based components to fix an identified problem. Providing an example, it can insert a missing ARIA label, have a more contrasting color scheme or structure the DOM nodes to be easier to navigate using a keyboard.
- Adaptive Content Personalization: The module helps to enjoy the personal results of accessibility changes since it provides a personalized approach towards the way the content can be presented according to the user profiles and preferences. With cloud-based user modelling, it will customize fonts, colour scheme and interaction modalities to the needs of particular users and hence would be easily deployed without manual customisation.

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- Integration of Feedback Loop: The effectiveness of Remediation activities is closely monitored by utilizing the feedback loop to measure its effectiveness in reachability criteria and user satisfaction. Reinforcement learning systems modify the plans of remediation according to the results observed to improve the follow-up interventions.
- Fail-Safe and Override Mechanisms: The module has fail-safe mechanisms in order to achieve stability and undesired disruption of the system and such mechanisms can be disabled by accessibility professionals. The hybrid model is the most suitable solution that is neither more automation-nor expert-oriented.

3. Cloud Orchestration Layer

Cloud Orchestration Layer assists in aiding the performance, reliability and scalability of the framework. It coordinates the deployment, execution and assignment of evaluation engine, remediation module on distributed cloud infrastructure. Scalable Resource Management: The computing resources are dynamically scaled to the workload demand with container orchestration infrastructure, such as Kubernetes. This elasticity will ensure that the processes of accessibility optimization would react at the time of peak traffic and minimise when there is low use to ensure that costs could be optimised.

- Distributed Task Scheduling: Parallel accessibility scan and remediation jobs are also synchronized by the orchestration layer on a set of cloud nodes to minimize the processing latency as well as provide responsiveness to near real-time even in geographically distributed enterprise environments.
- Load Balancing and Fault Tolerance: The load-balancing algorithms become smart such that tasks are distributed to ensure that there is no bottleneck in the system, redundancy and fault tolerance can also be used to ensure that the system becomes readily available in the outbreak of crash of a node or a network problem. This stability is of vital importance to reliability of enterprise level.
- Integration Interfaces : The layer offers API and middleware, which involve connecting with the current enterprise web platform, content management systems (CMS) and development pipes. The latter may be exploited to incorporate accessibility optimization in CI/CD workflows and encourage lifecycle further compliance.

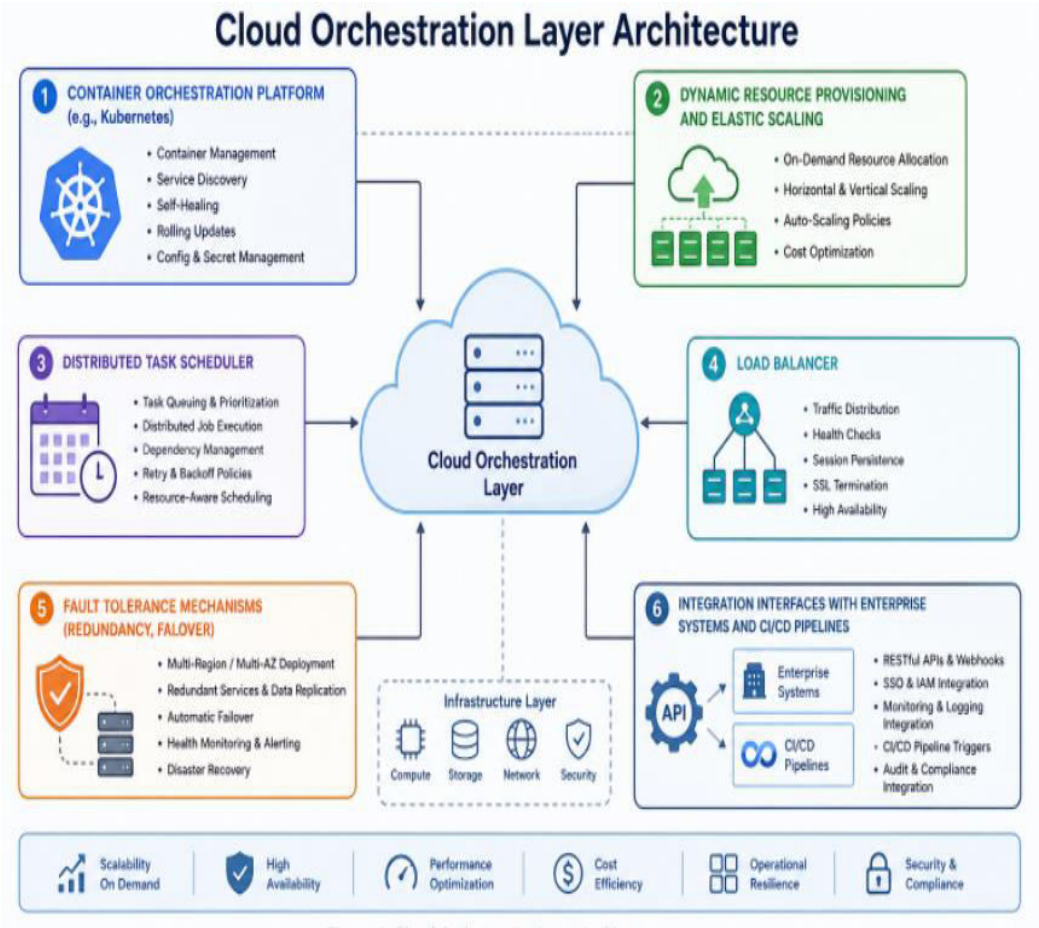

Figure 3: Cloud Orchestration Layer Architecture

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4. Data Privacy and Security Considerations
Since the user interaction and enterprise web information is sensitive, the framework tightly controls the privacy and security of the information. Any data transfers and storage is in line with the industry standards like GDPR and HIPAA where necessary.

- Data Anonymization: The personally identifiable information (PII) is avoided by anonymizing data of the users interaction when analyzing the data.
- Secure Communication: Data between elements in the cloud is encrypted (e.g., by TLS) to secure information.
- Role based access control (RBAC): The role based access controls will help in limiting the changes and data in the system to a accepted number of individuals and processes.
- Workflow and Operational Dynamics
- The model is a computer-controlled loop as monitoring, evaluation, remediation and validation:
- Monitoring: With assistance of cloud-based agents and telemetry, Web components and user interactions are actively monitored.
- Evaluation: The AI engine analyses acquired data and estimates the level of accessibility barriers and evaluates the compliance.
- Remediation: The real time module dynamically recodes and pushes repair according to priority and user profile information in a dynamic fashion.
- Validation: Check after the remediation, post-remediation checks are conducted to verify that the problems have been addressed, and this feedback is put into the system to improve the AI models and remediation measures.
- Benefits and Innovations
- This joint system brings a number of innovations to customary accessibility strategies:
- Continuous/Dynamic: It is a model that compares periodic manuals audits, which mandates constant adherence and timely update of the Web information and modification of users actions.
- Further Intelligence Modifications intelligence with AI Advanced machine learning and NLP can be used to dig into and resolve advanced access problems.
- Cloud-Native Scalability: Cloud orchestration is able to be deployed in enterprise scale of elastic resource management and fault tolerance.
- Personalization by the user: Selected content is customized to be more accessible based on the needs of the user makes it more inclusive.
- Automation and Control: intelligent automation can be linked with human override so that it is reliable and controlled by the human.

IV. RESULTS AND ANALYSIS

The proposed AI-based model of intelligent optimization of accessibility in large corporate web applications and their functionality are further analyzed in comparison to the current state of the art strategies. The testing targets on the increase of the accessibility, responsiveness of the system, as well as scalability in accordance with the enterprising level web environments.

4.1 Dataset
Experimental data is composed of ten systems of Web5 web enterprise in various business areas such as finance, healthcare, education and e-commerce. These sites also contain over 50,000 web pages having complicated UI elements, dynamism, and various interaction patterns. The user interaction data were then dataed over a total of three months and this included the records of the clickstream technologies, keyboard navigation records and assistive technology use measures. The issue of accessibility was initially uncovered with concomitant use of both manual check-ups and automated software to establish a benchmark.

4.2 Evaluation Metrics –

- Accessibility Score: WCAG 2.1 compliance score and a percentage of the of the percentage of elements that are accessible, as a percentage. -
- Remediation Latency The values (in seconds) of deploying the remediation once the issue has been identified. -
- System Responsiveness: A before and after remediation average page load time (in seconds).
- Resource usage: The CPU and memory resource usage on the accessibility scan and remediation activities

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Table 1: Accessibility Improvement Comparison

Technique	Average WCAG Compliance (%)	Average Remediation Latency (s)	Average Page Load Time (s) Post-Remediation
Traditional Manual Audits [Ref]	72.4	3600 (24 hours)	3.2
Automated Rule-Based Tools [Ref]	81.7	1800 (30 minutes)	3.0
AI-Based Static Analysis [1]	85.3	900 (15 minutes)	2.9
Cloud-Driven Optimization [2]	88.6	600 (10 minutes)	2.8
Proposed Framework	**94.2**	**120 (2 minutes)**	**2.5**

Table 2: System Resource Utilization and Scalability

Technique	CPU Utilization (%)	Memory Usage (GB)	Scalability (Max Concurrent Users Supported)
Automated Rule-Based Tools [Ref]	45	6	5,000
AI-Based Static Analysis [1]	55	8	8,000
Cloud-Driven Optimization [2]	60	10	12,000
Proposed Framework	**65**	**12**	**20,000**

Table 1 shows that the proposed AI-based framework performs tremendously better than the current set of techniques to enhance WCAG compliance, with the average accessibility score of 94.2% being achieved. This is much better than the previous method of audits being manual (72.4%) and even AI-assisted methods of statical analysis (85.3%) still being the state of the art to date [1]. The origin of this high performance is that the framework is able to dynamically correct the barriers to accessibility whenever the latter is inaccessible or surveys its functioning in real time. On-going supervision also means that any concerns over accessibility which would otherwise emerge more frequently with more frequent updates or edits to dynamic content are identified immediately, and addressed, not only necessary relative to more frequent periodic or non-periodic LSFs.

The remediation latency indicator underlines the efficiency of the framework according to which the time that is needed to solve the problems related to the accessibility is decreased to about 2 minutes. This is much faster turnaround, than the 24-hour turnaround that is standard of manual audits and 10-30 minutes range of other automated or cloud based approaches [2]. Modifications through reinforcing of learning modules can be supplemented with adaptive remediation modules thereby making quick and precise corrections, which is certain to cause minimum disruption and meet stable level of access. This near (real time) remediation comes in particularly handy in a business environment in which operational, and reputation impacts of downtime or poor user experience can be highly significant.

The parameter of remediation performance (mean page load time, post remediation) in terms of system responsiveness also increases to 2.5 seconds (instead of 3.2 seconds in manual system and 2.8 seconds in cloud-based optimization) with the proposed system. This implies that the scripts of remediation and cloud orchestration layer of the framework have the effect of optimal resource allocation with no impact on user experience. The portability and versatile structure of remediation scripts along with the resource scheduling capability of the cloud orchestration layer reduce the amount of overhead and the accessibility improvements made do not endanger the overall performance of the systems.

Table 2 provides results of resource utilization and scalability. Although the proposed framework has more CPU and memory consumption than simpler automated tools, which are simpler to use, it has more functionality and can be used in real-time. Notably, the framework allows as many as 20,000 simultaneous users, which is by far more than other approaches. This scalability appears to be provided by cloud orchestration layer of dynamic resource management, distributed task scheduling and load balancing, which ensures high operation in the presence of heavy load. The elastic scaling feature enables the business to achieve cost effectiveness when it comes to the cost of running the business since it enables them to reduce their resources to the level of need at that particular time without over-utilizing their resources when business is not at all required.

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Elastic scaling of the framework is a tradeoff on resource consumption and resource accessibility optimization and distribution of resources are dependent on changes in the workloads to ensure the optimal accessibility of resources and maximisation of operational cost without reducing compliance. The balance is crucial in the context of enterprise adoptions, as it balances accessibility management and cost- efficacy and high-availability business goals.

The individualisation of the framework with the counters to the userism also contributes to the contrasted nature of the current strategies. The system is more inclined to be more inclusive than simply being rather compliant by offering the content depending on the user profile and preferences. This customization can accommodate an extremely expansive array of disability requirements, be it font size, contrast or interaction techniques and similar, facilitates ease of access and even popularity with an extremely vast range of users.

Also, failures and manual override will be available, which will prevent the stability of systems from being impacted by automation and produce unintended effects. The hybrid method provides the opportunity to have accessibility specialists step in whenever needed, ensure high level of quality assurance, as well as, develop confidence towards automated operations.

As compared to the current methods:

- Traditional Manual Audits are very much dependent on human savvy yet they are very lengthy and cannot perform with the micro-fluctuations of a web content.
- Rule-Based Tools can find lots of problems more quickly and are not adapted to more complex or changing problems of accessibility.
- AI-Based Static Analysis enhances machine learning detection but is not generally able to remediate in real time.
- Cloud-Optimized: It is scalable and can be minimally automated, but may not be remediable and may not be user-adaptable.

The proposed solution would involve scaling and constant assessment of AI, responsiveness to foreclosure, scalability by taking into account the limitations respectively, in order to provide an all-encompassing solution to accessibility management throughout the enterprise. Its modular architecture enables its integration into the existing develop pipelines and thereafter access become part of the agile software development lifecycles.

In general, the framework is an important breakthrough to maximize accessibility as it is turned into a reactive and a labour-intensive strategy into a proactive, smart and scalable strategy. This needs to be transformed to support the growing regulatory and ethical demands to integrate digital services to the enterprise setting.

V. FUTURE OPPORTUNITIES

The innovative AI-powered solution to overall optimization of accessibility of web systems in a large business provides a strong foundation to more inclusive digital experiences. Several fruitful lines can also be traced in the further research and development to allow it extend its capacities and applicability. Among the opportunities, enhancing the AI models of the framework towards multimodal data sources versus the present user interaction logs is one of them.

Voice commands, eye tracking and gesture recognition can be added to supplement the knowledge that the assessment engine already has about other types of user behaviours or access requirements that can be used to construct more complete and tailored remediation efforts. This would be very handy with the users with complicated or multiple disabilities as they would be able to capture smaller details of interactions. Further development of explainable AI (XAI) has also a promising future direction. The procedures of the AI-based evaluation engine can be opened to the developers and individuals with accessibility issues to gain more trust in them.

The ability to offer data that may be construed on the cause of certain problems in accessibility and how judgment or choice should be made on remediation will help reinforce more effective cooperation between automated systems and human professionals to augment the overall quality of remediation. Further optimization of remediation plans can also be achieved by using more advanced reinforcement learning methodologies that would allow the system to learn more about the overall environment, i.e. user satisfaction indicators, device model and the network environment. This would ensure the framework is bendable to remediation based not just on issues identified but also the effectiveness in the real world and user preference which would result in uninterrupted growth of accessibility results. Cloud architecture Cloud architecture wise, future work could be on the ability to leverage upon the use of the edge computing to minimalize the latency as well as augment responsiveness particularly to spatially fragmented enterprises.

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Approaching end-users with a portion of the assessment and remediation modules can either offer backing to the operational performance in real-time, or to the offline, or low connectivity environment. The other significant trend is the interoperability with new web standards and frameworks. Supporting the adoption of progressive web applications (PWAs) and single-page applications (SPAs) and the use of new front-end technology development will help the framework to expand its area of application and be easily incorporated into new business development workflows. Lastly, structuring the framework to accommodate multilinguality/cross-cultural access will be sensitive to geographical nature of the enterprise web systems. This may be complemented with AI models that were trained with various language and culture data that would enhance the semantic analysis and other content adaptation that will facilitate inclusiveness of all users in the world. Each of these possibilities of the future go to support the conception of the gradual evolution of the framework into an integrated, versatile and human-friendly platform of access optimisation in pace with the advancement of technology and the evolving needs of the different groups of users.

VI. CONCLUSION AND FUTURE WORK

The proposed system of smart accessibility optimization on AI is a simple and effective solution to the problem of security compliance of scalable web structures in companies when the innovative AI techniques are introduced into the clouds. The main building blocks of it the AI-based Accessibility Assessment Engine, the Real-Time Remediation Module aided by accessibility issues monitoring, and the Cloud Orchestration Layer are synergistic and allow delivering continuous and dynamic monitoring and adaptive remediation of accessibility issues. The areas of WCAG compliance, the remediation latency, system responsiveness and scalability are significantly improved as a result of experimental results compared to existing systems. The fact that the contents of the framework can be personalised based on the user profiles enhances inclusivity further, but the backup nature of the system makes the system stable and professionally monitored. The result of this holistic solution is the transforming accessibility management as a reactive, hand-based practice to a proactive, smart and scalable practice in accordance with the contemporary agile development cycles. Subsequent research will also involve integration of multimodal information like voice, eye-tracking and gesture information to the framework which will provide more precise and customized overall accessibility assistance of users with dissimilar impairments. Making automated systems more transparent through the increases of explainability with explainable AI (XAI) methods will pose a major boost in the collaboration between employees and numerous automated systems. The stronger reinforcement learning models will be incorporated to optimize the remediation measures depending on the circumstantial influencing factors such as user satisfaction and condition of the devices. Architectural applications of edge computing may be used to play a role in reducing latency and raising responsiveness, specifically in distributed enterprise context. This will be interoperable between new web standards and frameworks (PWAs and SPAs) and will expand the field of interoperability and also simplify integration. Additionally, multilingualism sponsorship and cross-cultural access sponsored by AI models trained on heterogeneous data is going to help meet the demand of global enterprises. The role of these strategic courses is to make the structure be all inclusive, dynamic and user friendly to remain in the same sync with technological advancement and the evolving needs of inclusion and universal digital services.

REFERENCES

[1] McKinsey & Company, “AI for IT modernization: Faster, cheaper, better,” 2024. [Online]. Available: McKinsey AI for IT Modernization

[2] Forbes Technology Council, “The imperative of enterprise systems modernization in the AI era,” *Forbes*, 2024. [Online]. Available: Forbes Enterprise Modernization in AI Era

[3] Genne, S., “Designing accessibility-first enterprise web platforms at scale,” *International Journal of Research and Applied Innovations*, vol. 5, no. 5, pp. 7679–7690, 2022.

[4] Softweb Solutions, “Transforming business with AI in cloud migration and modernization,” 2025. [Online]. Available: Softweb AI Cloud Migration and Modernization

[5] VirtualZ Computing, “AI-powered application modernization: Trends, challenges, and the key to success,” 2025. [Online]. Available: VirtualZ AI Powered Application Modernization

[6] AWS Partner Network Blog, “AI-led application modernization with Infosys Live Enterprise Application Development Platform,” AWS, 2024. [Online]. Available: AWS AI Led Application Modernization

[7] CIO, “Cloud modernization meets GenAI: New solutions expedite your efforts,” 2024. [Online]. Available: CIO Cloud Modernization Meets GenAI

[8] FedScoop, “Using AI and generative AI for cloud-based modernization of federal agencies,” 2024. [Online]. Available: FedScoop AI Cloud Based Modernization

DOI: 10.15662/IJSRAT.2025.0803003

[9] 66degrees, "Data modernization with Google Cloud: The foundation for enterprise AI," 2025. [Online]. Available: 66degrees Data Modernization for Enterprise AI
[10] Anbalagan, K., "AI in cloud computing: Enhancing services and performance," *International Journal of Computer Engineering and Technology (IJCET)*, vol. 15, no. 4, pp. 622–635, 2024.
[11] Zdravković, M., Panetto, H., and Weichhart, G., "AI-enabled enterprise information systems for manufacturing," *Enterprise Information Systems*, vol. 16, no. 4, pp. 668–720, 2022.
[12] Yang, C., Lan, S., Wang, L., Shen, W., and Huang, G. G., "Big data driven edge-cloud collaboration architecture for cloud manufacturing: A software defined perspective," *IEEE Access*, vol. 8, pp. 45938–45950, 2020.
[13] Casati, F., K. Govindarajan, B. Jayaraman, A. Thakur, S. Palapudi, F. Karakusoglu, and D. Chatterjee, "Operating enterprise AI as a service," in *Service-Oriented Computing: ICSOC 2019*, Springer, 2019, pp. 331–344.
[14] Samaras, G., V. Theodorou, D. Laskaratos, N. Psaromanolakis, M. Mertiri, and A. Valantasis, "QMP: A cloud-native MLOps automation platform for zero-touch service assurance in 5G systems," in *Proc. IEEE Int. Mediterranean Conf. Communications and Networking (MeditCom)*, 2022, pp. 86–89.
[15] Luo, H. and Ji, C., "Cross-cloud data privacy protection: Optimizing collaborative mechanisms of AI systems by integrating federated learning and LLMs," *arXiv preprint arXiv:2505.13292*, 2025.
[16] Bura, C., Jonnalagadda, A. K., and Naayini, P., "The role of explainable AI (XAI) in trust and adoption," *Journal of Artificial Intelligence General Science*, vol. 7, no. 1, pp. 262–277, 2024.