

AIVA – AI-Driven Visual Accessibility Assistant

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Abstract

This paper presents AIVA, an AI-driven visual accessibility assistant designed to enhance digital accessibility for neurodivergent and visually impaired users. The system leverages Natural Language Processing (NLP), adaptive summarization, and intelligent interface customization to improve readability and comprehension of complex digital content. It supports multiple accessibility modes such as dyslexia mode, contrast mode, focus mode, and reader mode. Additionally, it integrates text-to-speech functionality and an AI chatbot for interactive assistance. Experimental evaluation shows improved user engagement, reduced cognitive load, and enhanced learning efficiency.

Keywords: AI Accessibility, NLP, Adaptive Summarization, Text-to-Speech, Chatbot, Inclusive Learning

1. Introduction

Digital accessibility is a major challenge in modern education systems. Many users struggle with complex content due to lack of adaptive systems. AIVA introduces AI-based accessibility features to solve these issues by providing simplified and personalized content delivery.

2. Literature Review

Existing works in AI accessibility highlight summarization, adaptive UI, and chatbot systems. However, integration of all features in one system is limited. AIVA bridges this gap by combining multiple intelligent modules into a single platform.

3. Problem Statement

Traditional web platforms lack adaptive readability, accessibility customization, and real-time assistance, making it difficult for neurodivergent and visually impaired users to understand content effectively.

4. Proposed System

AIVA fetches web content, processes it using AI, and presents simplified summaries with accessibility enhancements. The system ensures real-time interaction and adaptive content delivery.

5. System Architecture

The architecture consists of frontend, backend, AI engine, and accessibility module. The modular design ensures scalability and efficient data processing.

6. Methodology

The workflow includes user input, content extraction, NLP processing, summarization, accessibility adaptation, and output display with optional voice support.

7. Implementation

The system is developed using React, Node.js, and AI APIs. It includes chatbot integration, accessibility engine, and responsive UI design.

8. Results and Discussion

The system improved readability, reduced cognitive load, and enhanced accessibility. User feedback indicates better engagement and understanding.

9. Advantages

- Improved readability
- Personalized accessibility
- Real-time AI assistance
- Inclusive learning support

10. Conclusion

AIVA successfully enhances digital accessibility using AI-driven techniques, improving user experience and learning efficiency.

11. Future Scope

Future work includes mobile apps, browser extensions, multilingual support, and advanced AI personalization.

12. References

1. Include references in IEEE format as per IJFMR guidelines.