

Implementing an Inclusive Communication System with RAG-enhanced Multilingual and Multimodal Dialogue Capabilities

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Abstract

Inclusive communication technologies are essential for ensuring equal access to information and public services among individuals with speech impairments and speakers of low-resource languages. While large language models and multimodal systems have made significant progress, current solutions often lack domain-specific support and cross-lingual flexibility. This study aims to address this gap by developing a lightweight RAG-enhanced dialogue system that integrates multimodal input and multilingual generation for inclusive task-oriented scenarios. The system architecture combines vector-based semantic retrieval and generative AI to support text speech and image inputs across mobile and web platforms. It was co-designed with assistive organizations and deployed iteratively in three stages, improving scalability accessibility and response quality. Results from preliminary testing show increasing engagement and positive feedback on system usability content accuracy and interaction style. This research contributes a practical framework for inclusive AI communication support with implications for accessibility-focused system design in both social and public service domains.

Keywords - Retrieval-Augmented Generation (RAG), Multimodal Dialogue System, Multilingual Communication, Inclusive AI, Non-Profit Organization