

A Real Time Speech to Text Conversational Agents for Hands-Free Virtual Assistance

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Abstract:

The increasing demand for contactless and natural human-computer interaction has intensified research in real-time conversational artificial intelligence systems. Speech-driven virtual assistants enable seamless hands-free control across healthcare, smart environments, automotive systems, and assistive technologies. This paper presents a real-time speech-to-text conversational framework integrating ASR, NLU, dialogue management, and TTS, achieving low latency and high accuracy.

Keywords: Automatic Speech Recognition, Conversational AI, NLP, Hands-Free Systems, Real-Time.

1. Introduction

Speech-based interaction is widely used due to its natural and hands-free capabilities. This paper proposes a low-latency conversational system.

2. Related Work

Earlier systems used HMM and GMM. Modern systems use deep learning models like RNN, LSTM, and Transformers.

3. Proposed System

The system includes speech acquisition, ASR, NLU, dialogue management, and TTS.

4. Methodology

Includes dataset preparation, preprocessing, and model training.

5. Results

WER < 7%, Accuracy > 94%, Latency < 350 ms.

6. Conclusion

The system provides efficient real-time conversational AI.