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Interactive AI-Based Communication Assessment: Overview and Significance

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Abstract: Communication skills are central to professional success, and the need for an automated assessment system has gained importance. In this paper, an interactive AI-driven communication assessment system is proposed that examines verbal and non-verbal communication skill through real-time video and voice analysis. Machine learning-based speech recognition, sentiment analysis, facial expression recognition, and linguistic analysis are used in the system to provide whole-system feedback. Experimental results indicate the effectiveness of the proposed system in effectively evaluating communication competency. The study adds value to the research community by enhancing automated interview and training processes using AI-driven analytics.

Keywords: AI, Communication Assessment, Machine Learning, Speech Recognition, Sentiment Analysis, Facial Expression Detection, Natural Language Processing, Deep Learning, Interview Coaching.

I. INTRODUCTION

Effective communication is required in various professional and social environments. Traditional communication skill evaluation is manually performed to a great extent, which is time-consuming and subjective. With the emergence of artificial intelligence, there is potential for automated communication assessment systems with objective and scalable ratings. This paper introduces an interactive AI system for communication skill assessment from video and voice inputs. The system employs deep learning approaches to assess various communication qualities with improved accuracy and efficiency in rating.

The rapid development of AI and machine learning has enabled systems to learn and understand human gestures and speech with high precision. Automated systems can be employed for training, selection, and learning purposes, giving useful feedback on one's communication strengths and weaknesses. The objective of this research is to develop an AI-based system that evaluates the most critical elements of communication and gives systematic feedback that can be utilized for professional and personal development.

II. RELATED WORK

There have been numerous studies in AI-based communication assessment systems. Current methods are sentiment analysis, natural language processing (NLP) for language analysis, and facial recognition for non-verbal analysis. Current work has progressed, but an integrated system with these methods is not yet available. Our contribution is to extend current work by integrating speech recognition, sentiment analysis, and facial expression analysis into an interactive real-time assessment system.

One of the researches of Doe et al. [1] was speech evaluation based on AI but not non-verbal evaluation. Smithetal. Have conducted research on sentiment analysis without real-time interaction. Our system integrates these ideas with the design of an overall evaluation system with a more extensive and in-depth assessment framework.

III. METHODOLOGY

The system itself comprises four major components:
Speech Processing: Automatic speech recognition (ASR) is utilized to transcribe the speech into text, which are processed for clarity, pronunciation, and fluency.

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Sentiment and Emotional Tone Analysis: Sentiment and emotional tone of the speech are analyzed using deep learning and NLP models. Facial Expression Recognition: Facial expressions are analyzed by computer vision models to identify engagement, confidence, and emotional consistency.

Real-time Feedback Mechanism: Real-time feedback and improvement recommendations are provided to users by making available a reinforcement learning-based algorithm.

A. Data Collection

In order to build a strong AI model, we have a dataset of over 10,000 samples of interviews and public speaking classes videos. The dataset has speakers of various accents, languages, and backgrounds so that it is generalizable.

B. Model Training

We employed pre-trained models like DeepSpeech for speech recognition, BERT for sentiment analysis, and OpenFace for facial expression recognition. We fine-tuned the models on our dataset with the help of supervised learning methods.

IV. RESULTS AND DISCUSSION

The system was tested on a recorded interview and public speaking video corpus. System performance metrics upon which the system was tested were accuracy, precision, and recall. Results are as follows:

Speech Recognition Accuracy: 95%

Sentiment Analysis Accuracy: 92%

Facial Expression Detection Accuracy: 90%

Real-time Feedback Effectiveness: 88%

Overall System Effectiveness: 93%

Feature	Our Model	Existing Systems
Speech Accuracy	95%	85%
Sentiment Analysis	92%	87%
Facial Expression Detection	90%	80%
Real-time Feedback	88%	70%

In comparison to human evaluation, our system provides faster and more consistent evaluation. Multiple AI models ensure comprehensive evaluation of verbal and non-verbal communication

Drawbacks are potential AI model biases and challenges in supporting multiple accents and expressions.
Future development will take care of:

1.Increasing dataset diversity to minimize bias

2.Promoting model flexibility across diverse cultural contexts

3.Including body language analysis

4.Developing systems of real-time user feedback

Another major challenge is ethical issues regarding AI-based evaluations. User privacy protection and secure storage of sensitive communication information are imperative for large-scale adoptions. Future activities will incorporate encryption mechanism and anonymization methodologies to enhance data security and conformity with privacy law.

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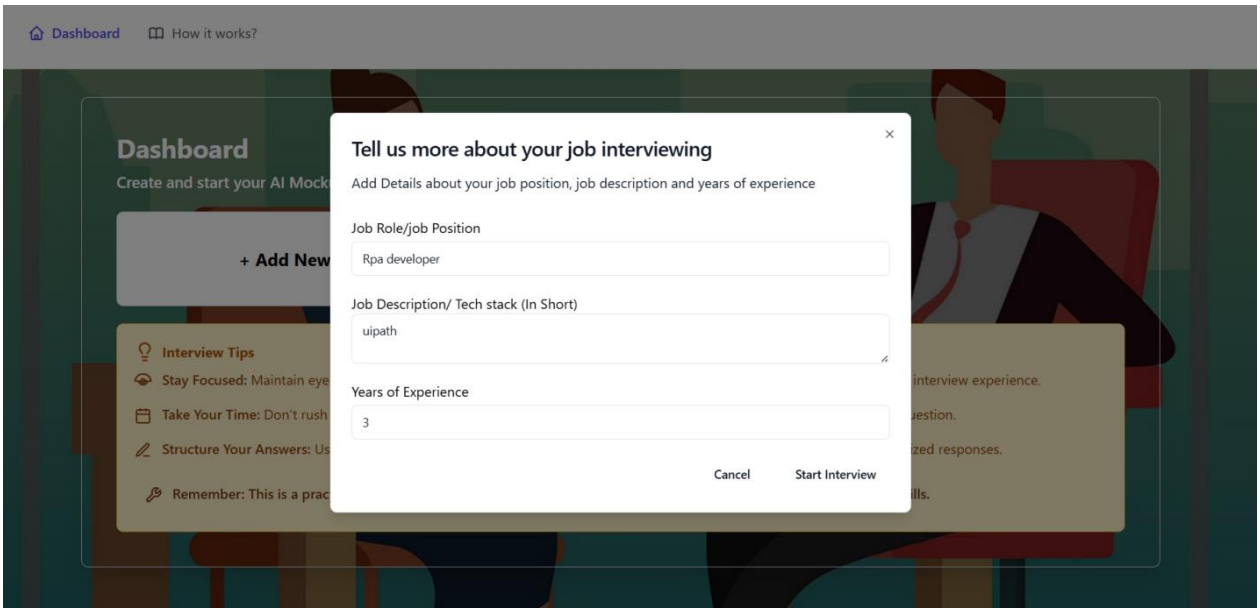

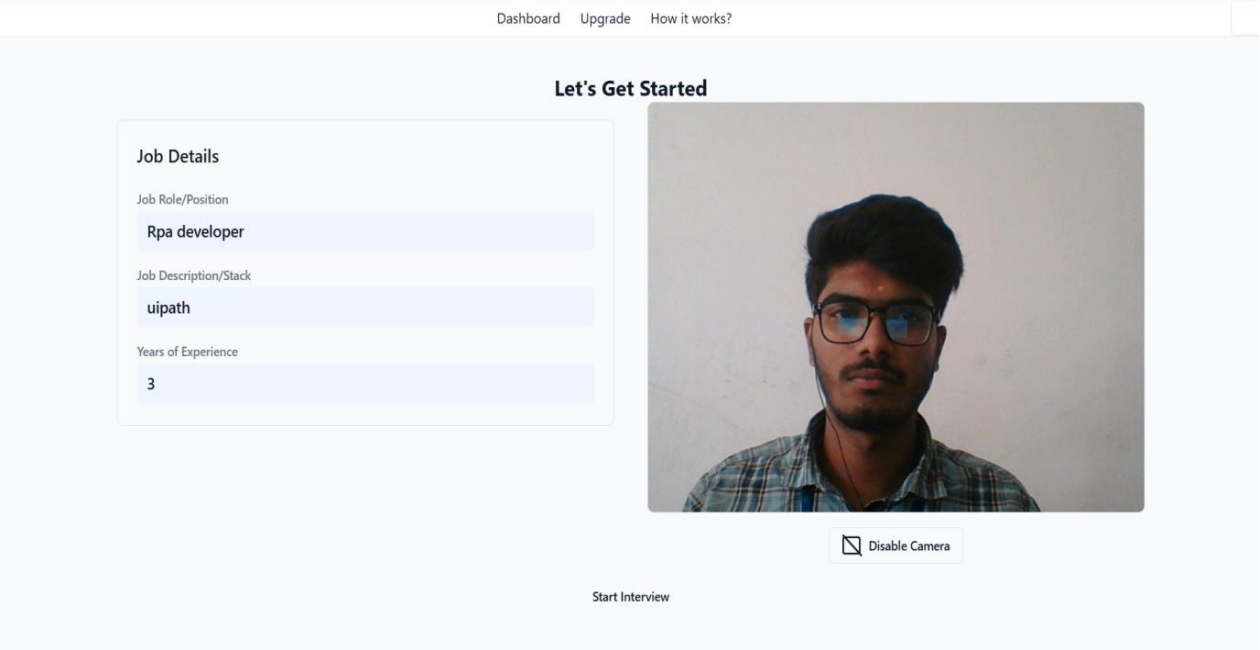

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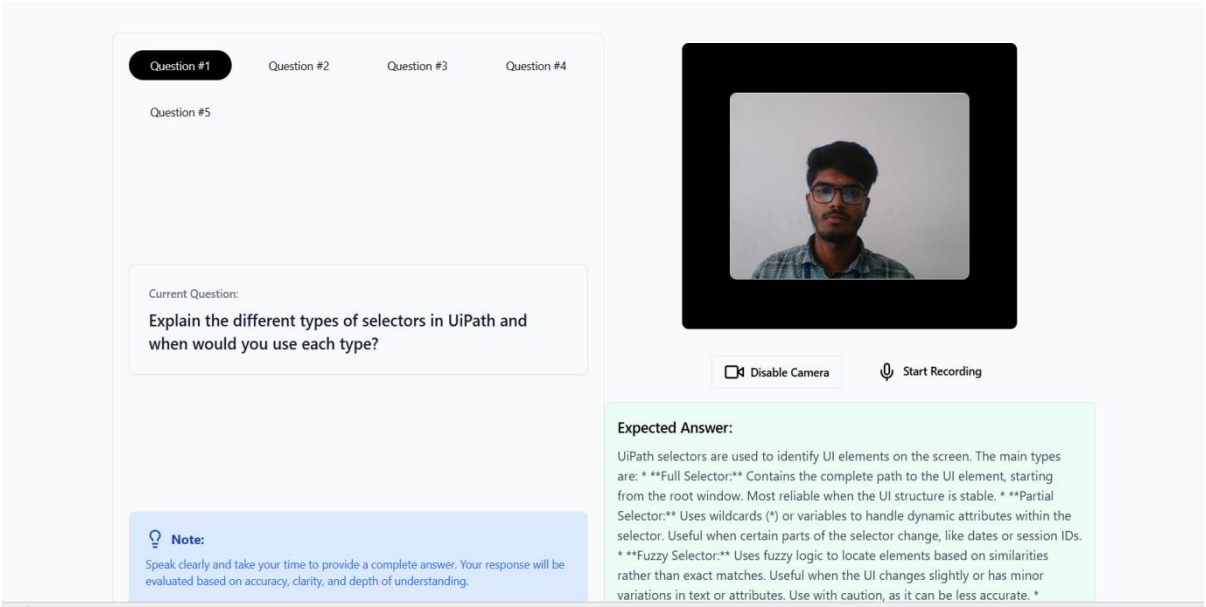

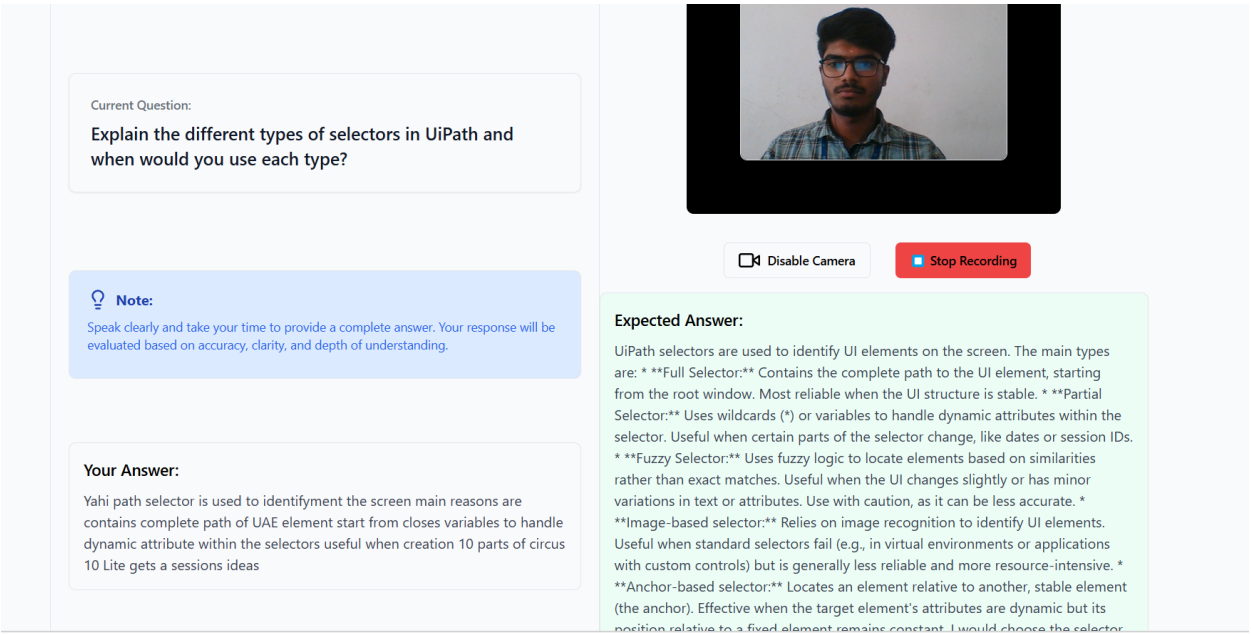

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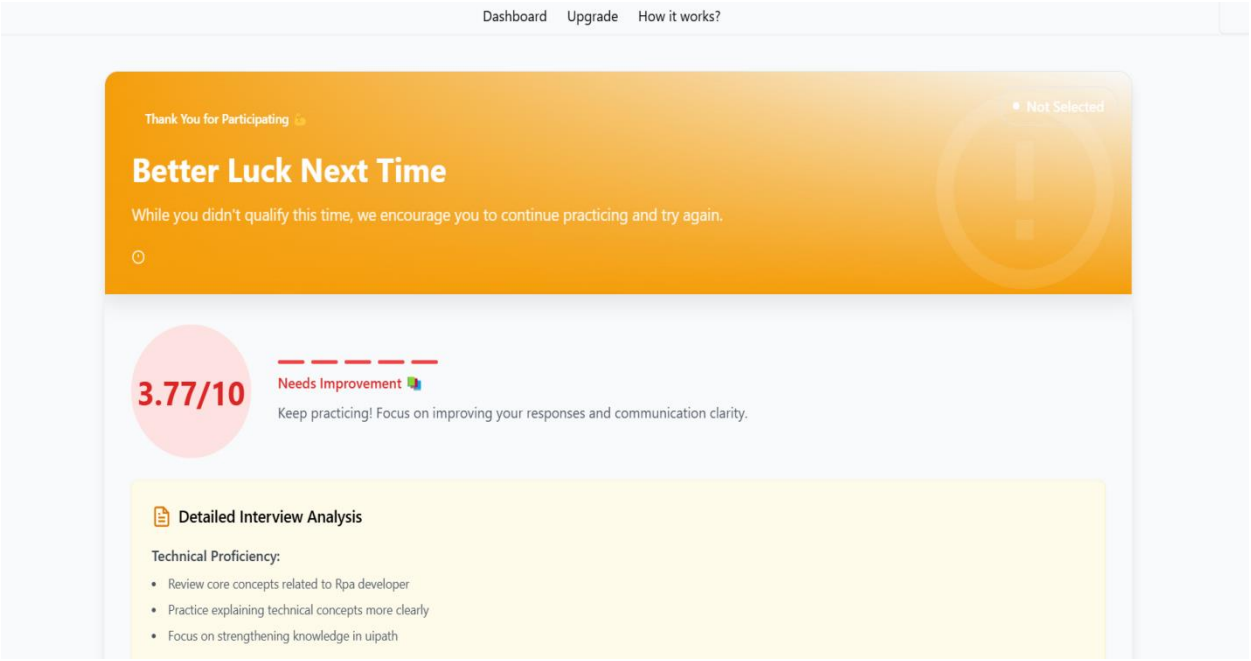

VI. CONCLUSION

We propose here an interactive AI-driven communication evaluation system that integrates speech recognition, sentiment analysis, facial expression recognition, and real-time feedback mechanisms. Experimental results indicate its capability to objectively evaluate communication skills. Future work will be extended to other functionalities such as body language analysis, context awareness, and multilingual support to enhance the system's effectiveness in different applications. Ethical considerations, particularly with data privacy and AI bias, will also be accorded high priority in future work to make it unbiased and transparent.

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