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AI-Powered Platform for Real-Time Mock Interviews and Personalized Feedback

Dr. Anup Bhange[1], Saurabh Shewalkar[2], Prajwal Bobade[3]
Head of Department, Computer Application[1]
MCA, Computer Application[2,3]
K. D. K College of Engineering, Nagpur, Maharashtra, India
anupbhange@gmail.com[1], saurabhshewalkar.mca23@kdkce.edu.in[2], prajwalbobade.mca23@kdkce.edu.in[3]

Abstract: *In today's highly competitive job market, strong interview skills are essential for graduates seeking further training or employment opportunities. However, many candidates require effective preparation throughout their academic journey to confidently navigate interview situations. To address this gap, researchers are focusing on developing training systems that enhance candidates' communication and interpersonal skills for job interviews.*

Interviews serve as a critical tool for employers to assess a candidate's suitability for a role, relying heavily on social cues demonstrated by applicants. This paper introduces an innovative approach to simulating job interviews through an AI-powered virtual recruiter, incorporating signal processing techniques to analyze candidate behavior, communication, and emotional responses in real-time.

The proposed system is designed to help job seekers, particularly young professionals, improve their interpersonal skills necessary for successful interviews. Key components of the system include a real-time social cue recognition module, a dialogue manager, a behavior monitoring unit, and a 3D interactive environment. Feedback mechanisms integrated within the system evaluate facial expressions, head movements, response time, speech pace, and volume, providing candidates with valuable insights into their performance. Additionally, a speech-to-text module analyzes grammar, while graphical reports allow candidates to track their progress over multiple practice sessions. This research contributes to the field of interview training and assessment, demonstrating the potential of AI-driven technologies in enhancing job seekers' preparedness and social communication skills..

Keywords: Facial Expression Recognition, Sound Analysis, Interview Assessment, AI-Based Application, Real-time Feedback, Speech-to-Text Technology

I. INTRODUCTION

In today's evolving job market, excelling in interviews is crucial for recent graduates as they seek higher education or employment opportunities. However, many candidates lack structured interview practice during their academic journey, creating a gap in their preparedness. To bridge this gap, researchers have focused on developing innovative training models aimed at enhancing candidates' communication and interpersonal skills, helping them adapt to different interview scenarios effectively.

Job interviews serve as a key evaluation tool for employers, allowing them to assess a candidate's suitability based on verbal and non-verbal cues. These cues provide insights into an applicant’s communication style, confidence, and interpersonal skills. This paper introduces a novel AI-powered interview simulation system that integrates a virtual recruiter and real-time behavioral analysis. By leveraging artificial intelligence and signal processing, this system aims to offer young job seekers a platform to refine their social competencies essential for interview success.

This research provides a detailed examination of the proposed interview simulation model, outlining its core components, functionalities, and feedback mechanisms. The system utilizes facial expression analysis, speech recognition, and graphical performance metrics to offer actionable insights, enabling candidates to continuously improve their interview skills. Drawing from interdisciplinary research in personality recognition, video interview

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analysis, and AI-driven mock interview evaluations, this study highlights the transformative role of technology in preparing candidates for job interviews. Through empirical evaluation and user feedback, the study examines the system's effectiveness, contributing to the growing field of AI-driven interview assessment methodologies and social skill development.

II. PROBLEM STATEMENT

Interviews play a crucial role in securing academic and professional positions, yet many applicants—particularly recent college graduates—struggle with effective preparation. Despite their academic qualifications and technical knowledge, they often find themselves unprepared to navigate the complexities of real-world interviews. This challenge arises primarily because conventional educational environments focus more on theoretical concepts and subject-specific learning rather than providing structured opportunities for students to develop and refine their interview skills. As a result, there exists a noticeable gap between abstract knowledge and its practical application in professional settings.

One of the key difficulties candidates face is the inherently personal and dynamic nature of interviews. Unlike written examinations or standardized assessments, interviews demand strong communication skills, confidence, and the ability to interpret and respond to social cues in real-time. Many applicants struggle with aspects such as body language, tone of voice, and maintaining a professional yet engaging conversation. Additionally, relational interactions play a significant role in interview success, as interviewers assess not just technical expertise but also soft skills, cultural fit, and the candidate's ability to collaborate effectively in a professional setting. The subjective nature of these evaluations often leaves candidates uncertain about their strengths and areas needing improvement, making it difficult to enhance their performance without targeted feedback.

Given these challenges, there is a pressing need for innovative solutions that bridge the gap between theoretical learning and practical interview readiness. Traditional methods of interview preparation, such as mock interviews and career counseling, are valuable but often not comprehensive enough to address the diverse challenges faced by applicants. Emerging technologies, including AI-driven interview coaching, virtual reality simulations, and interactive training modules, offer promising solutions to help candidates develop confidence and adaptability in a risk-free environment. These tools can provide realistic, personalized, and iterative learning experiences, allowing candidates to practice responses, receive constructive feedback, and refine their interview techniques over time.

III. LITERATURE SURVEY

The field of AI-based mock interview behavioral recognition has garnered significant attention in recent years. This literature review explores existing solutions, methodologies, and technologies that have contributed to the advancement of AI-driven interview analysis. Research studies, training models, and various software applications serve as key sources of knowledge, helping identify gaps and challenges in the current landscape. The insights gained from this review guide the development of an advanced interview simulation system.

Odal First Impression Analysis with Deep Residual Networks
Authors: Yagura G, Isabelle Guyon (2019)

This study examines the use of deep residual networks for predicting behavioral traits from multimodal data, including sensory and language inputs. The research primarily focuses on analyzing short YouTube videos to assess personality traits. While it provides valuable insights into behavior prediction using AI, its application is centered on video content rather than interview scenarios.

Review of Personality Recognition Studies and Their Role in Job Interviews
Authors: Harari, Ramona Schoedel, Sumer Void, Samuel D. Gosling (2022)

This research provides a comprehensive analysis of past studies on personality recognition and its role in job interviews. It discusses the complexities of developing machine learning models for personality assessment, offering a detailed perspective on the challenges involved in evaluating personality traits in hiring processes.

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The Influence of AI on Recruitment: Transforming Hiring Practices
Authors: Dr. David Atkinson, James Frisket (2022)
This study explores the transformative impact of AI in recruitment, addressing the inefficiencies of traditional hiring methods. While it does not specifically focus on personality recognition or video interview analysis, it provides valuable insights into the broader implications of AI in modern recruitment strategies.

AI-Powered Video Interview Agent for Assessing Communication and Personality Traits
Authors: Hxsung-Yufe, Suhen, Kuho En Hugng, Chimen-Liang Lin (2020)
This research introduces AVI-AI, an AI-driven video interview system designed to evaluate candidates' communication skills and personality traits using TensorFlow CNN models. The study aligns closely with the topic of AI-based personality recognition and video interview assessment.

Machine Learning Techniques for Identifying Personality Traits from Online Text
Authors: Dan Saadat, Butuan Balti, Dan Shiferaw (2022)
This paper investigates the application of machine learning algorithms, particularly convolutional neural networks (CNNs), for analyzing textual data to classify personality traits. While it primarily focuses on text-based behavior analysis, its methodologies can inform the development of AI-driven personality recognition models in interview settings.
By reviewing these studies, this paper highlights the evolving role of AI in interview assessments and identifies opportunities for advancing AI-driven mock interview platforms.

IV. MOTIVATION

The inspiration for this research arises from the critical role that interview skills play in shaping a candidate's academic and professional future. Job interviews serve as key gateways to further education and career opportunities, making effective communication, confidence, and competency essential attributes for success. However, many candidates struggle due to a lack of structured interview practice and constructive feedback, which makes it difficult for them to prepare for these high-stakes interactions.Advancements in artificial intelligence, signal processing, and virtual simulation technologies offer a promising solution to bridge this gap. This paper aims to introduce an
innovative approach to interview training by developing a simulation environment that closely mimics real-world job interviews. The proposed system features a virtual recruiter capable of analyzing user behavior and emotional responses in real-time, offering a highly interactive and immersive learning experience.
The primary objective is to equip candidates, particularly recent graduates and young job seekers, with the necessary skills and confidence to excel in interviews. By providing insightful feedback and practical exposure, the system empowers users to refine their communication abilities, effectively present their qualifications, and enhance their chances of securing academic or career opportunities. Additionally, this research contributes to the evolution of interview assessment methodologies, the integration of AI-based learning tools in education and training, and the overall improvement of candidates' social and professional competencies in today's competitive job market.

V. ARCHITECTURE

The proposed architecture of the AI-driven mock interview behavioral recognition system integrates multiple components to provide a structured approach to interview preparation, real-time analysis, and feedback generation. The system leverages artificial intelligence, signal processing, and natural language processing techniques to create an immersive and interactive mock interview experience.

User Interface
The user interface serves as the primary point of interaction, allowing candidates to participate in mock interviews, receive feedback, and analyze their performance. It provides a seamless and intuitive environment where users can engage with the virtual recruiter and navigate through different interview scenarios.

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Input Modules

The input modules capture various candidate responses during the interview process. These include video inputs for facial expression and body language analysis, audio recordings for speech assessment, and textual transcripts for linguistic evaluation. By integrating multiple input sources, the system ensures a holistic assessment of the candidate's communication skills and behavioral traits.

Data Preprocessing

Before analysis, the collected data undergoes preprocessing to ensure consistency and accuracy. This involves noise reduction in audio signals, feature extraction from video frames, and normalization of text inputs. Preprocessing enhances the reliability of the system by refining raw data and preparing it for further evaluation.

Feature Extraction and Representation

Key features are extracted from the preprocessed data to analyze various aspects of candidate performance. Facial recognition algorithms detect muscle movements and emotional expressions, while speech analysis techniques assess tone, pitch, and speaking rate. Text-based responses are evaluated for grammatical accuracy, coherence, and sentiment, contributing to a comprehensive understanding of the candidate's interview readiness.

Model Integration

The extracted features are processed through an ensemble of AI models, each specializing in a particular aspect of candidate evaluation. Deep learning models analyze facial expressions, natural language processing techniques assess textual responses, and machine learning classifiers determine personality traits. The integration of multiple models ensures a well-rounded and objective assessment.

Decision Fusion

To derive a final evaluation, decision fusion techniques are employed to combine outputs from various AI models. This involves aggregating confidence scores, refining predictions, and ensuring that insights from different dimensions of the interview are considered. Decision fusion enhances accuracy by integrating multiple evaluation criteria into a single comprehensive assessment.

Feedback Generation

Based on the analysis, personalized feedback is generated to help candidates understand their strengths and areas for improvement. The system provides insights into verbal communication, non- verbal expressions, emotional engagement, and overall performance. Feedback is presented in an accessible format, including textual reports, graphical performance charts, and interactive visualizations that allow candidates to track their progress over multiple sessions.

By integrating these components, the proposed architecture creates a robust AI-driven interview training system that enables candidates to refine their communication skills, enhance their confidence, and improve their overall interview performance. The structured approach ensures that users receive meaningful and actionable feedback, preparing them for real-world job interviews with greater efficiency and effectiveness.

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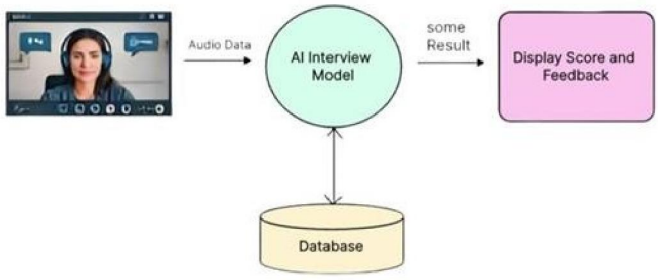

Fig.1 : Feedback System

User Analytics and Reporting

The system continuously tracks and evaluates candidates' performance across multiple interview sessions, maintaining records of key metrics and analytical data. Candidates have access to comprehensive reports and interactive analytics dashboards that allow them to monitor their progress over time. These insights help users identify their strengths, recognize areas that require improvement, and assess their overall development in mock interview scenarios.

Deployment and Integration

The system can be deployed as an independent web or mobile application, ensuring accessibility across various devices for user convenience. Additionally, it can be seamlessly integrated with existing Learning Management Systems (LMS) or career development platforms, facilitating its incorporation into academic institutions or professional training programs. This approach enhances accessibility and ensures that candidates can utilize the system as part of a structured learning or career development initiative.

By leveraging advanced technologies such as deep learning, natural language processing, and multimodal analysis, the proposed architecture offers a highly effective platform for mock interview preparation. The integration of these components ensures a dynamic and data-driven approach to interview training, equipping candidates with the necessary tools to refine their skills and improve their overall performance.

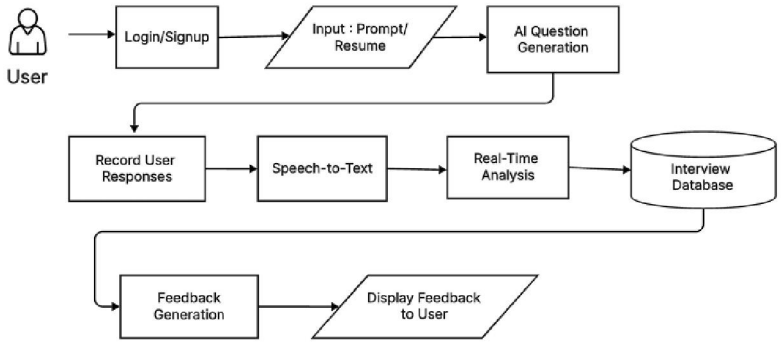

Fig.2: System Architecture

VI. PROPOSED METHODOLOGIES

The planned AI-driven mock interview system integrates advanced technologies and methodologies to evaluate various aspects of a candidate's behavior, personality traits, and emotional responses. Below is a detailed breakdown of the classification process:

A. Multimodal Data Acquisition

1) The system gathers multimodal data from candidates throughout mock interview sessions, incorporating multiple sensory inputs.

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2) Video Data: Captures facial expressions, body language, and gestures using webcams or camera sensors.
3) Audio Data: Records speech patterns, tone, and intonation via microphones.

B. Preprocessing and Normalization

1) The collected data undergoes preprocessing and normalization to ensure uniform input across different modalities.
2) This step may involve noise reduction, data alignment, and feature extraction for enhanced analysis.

C. Facial Expression Recognition

1) Facial expression recognition algorithms process video input to detect and classify expressions that indicate various emotional states.
2) Techniques like Convolutional Neural Networks (CNNs) can be employed for accurate feature extraction and classification.

D. Speech Analysis

1) Speech processing algorithms analyze audio data to extract features such as pitch, tone, speaking rate, and sentiment.
2) Natural Language Processing (NLP) techniques may be used for speech-to-text conversion and linguistic pattern analysis.

E. Personality Recognition

1) Personality recognition algorithms integrate facial expressions, speech patterns, and textual analysis to infer a candidate's personality traits.
2) Machine learning models, including Support Vector Machines (SVMs) and Neural Networks, can be trained on labeled personality datasets for classification.

F. Emotion Detection and Classification

1) Sentiment analysis algorithms leverage data from facial expressions, speech characteristics, and text analysis to identify and classify emotional states
2) Multimodal fusion techniques can be used to integrate diverse sensory data, improving accuracy in emotion recognition.

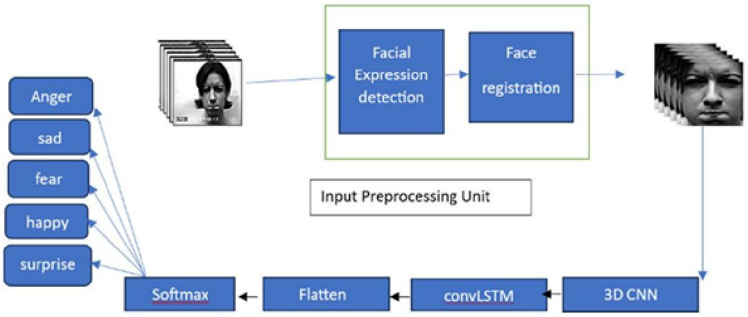

Fig.3:Emotion Analysis

G. Feedback Generation and Presentation

1) Based on the comprehensive analysis, the system generates personalized feedback highlighting strengths, weaknesses, and areas for improvement.
2) Feedback can be presented in multiple formats, such as textual summaries, visual reports, and interactive insights.

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3) By utilizing this holistic approach, the proposed system aims to provide candidates with valuable insights and constructive feedback to enhance their interview skills, communication effectiveness, and overall performance.

H. Integration of Hugging Face Models

1) The system leverages Hugging Face models, utilizing advanced natural language processing (NLP) techniques to analyze candidate responses with high precision.
2) By incorporating pre-trained transformer models like BERT, RoBERTa, T5, and cutting-edge LLMs such as LLaMA-2, Mistral-7B, and Falcon-7B, the system can generate accurate, human-like feedback, making interview coaching more personalized and insightful.
3) Hugging Face models are also employed for intelligent interview question generation, using GPT-based and transformer models like Falcon-7B and Mistral-7B to create dynamic, role-specific, and contextually relevant questions, ensuring that candidates experience a realistic and diverse range of interview scenarios.

VII. RESULT

The AI-Powered Mock Interview and Feedback Platform successfully simulates a realistic interview experience by generating dynamic questions, analyzing user responses, and providing detailed feedback. By integrating AI-driven question generation, speech-to-text processing, and eye contact monitoring, the platform offers users an immersive practice environment that closely mirrors real interview conditions. User authentication ensures secure access, while data is systematically stored in a PostgreSQL database for personalized tracking and improvement over time. Overall, the platform effectively helps users identify strengths and areas for development, enhancing their confidence and readiness for real-world interviews.

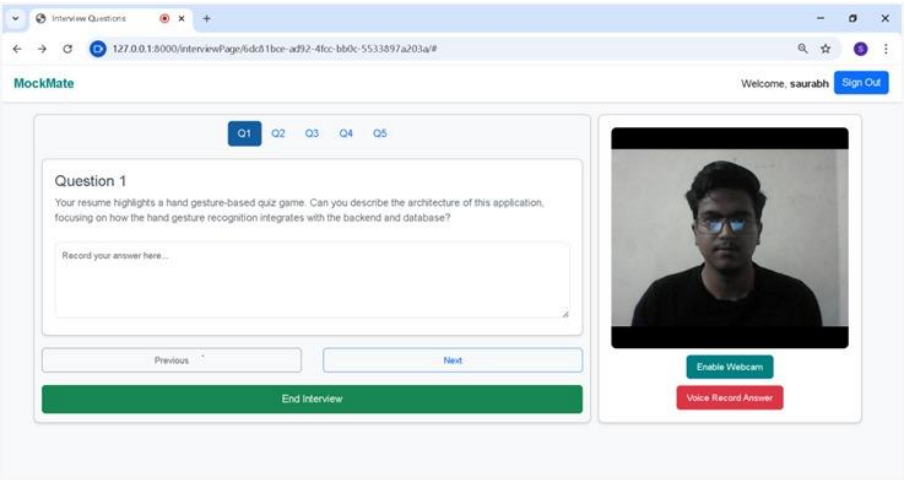

Fig 4: Interview Page

Fig 4 illustrates the interview practice interface, where users respond to AI-generated questions either by typing or utilizing speech-to-text functionality. The platform integrates real-time webcam access and voice recording features to simulate a realistic interview environment and enhance user engagement.

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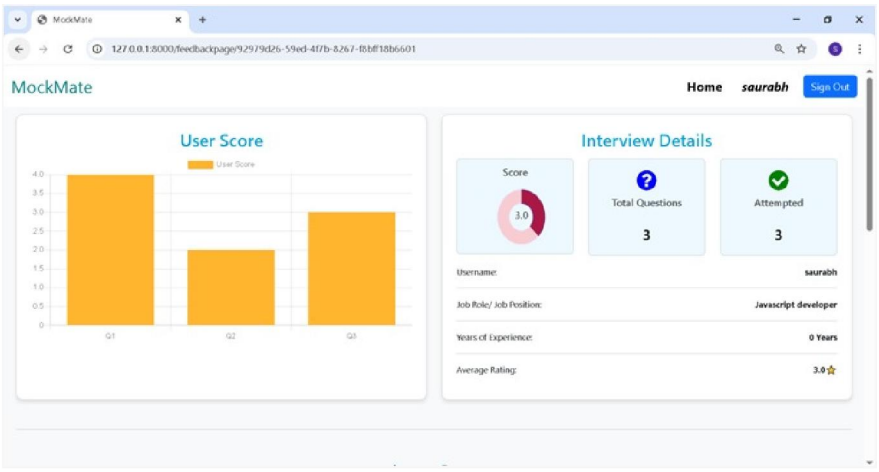

Fig 5: Feedback Page

Fig 5 presents the feedback page, providing users with a detailed analysis of their interview performance through individual question ratings and overall metrics. A graphical representation of scores enhances visualization, offering clear insights into user strengths and areas for improvement.

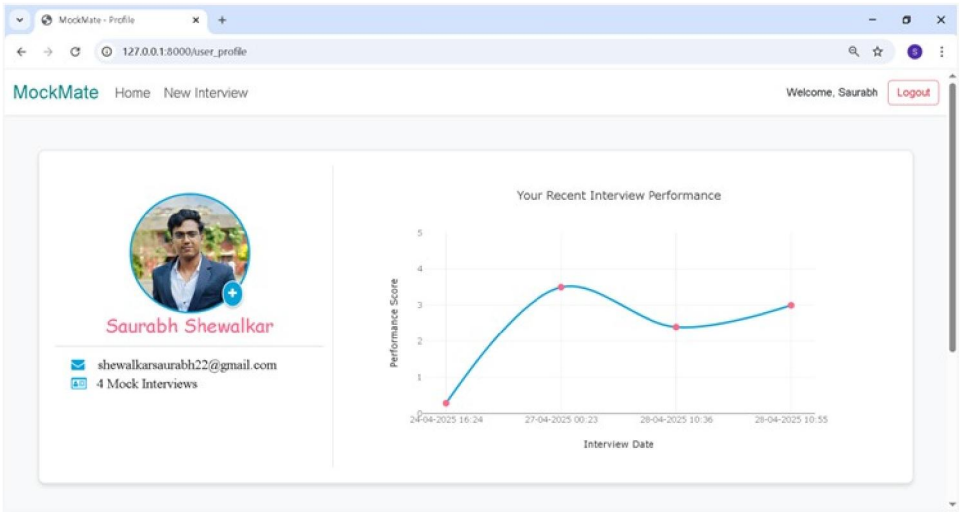

Fig 6: Feedback Page

Fig 6 displays the user profile page, showcasing the user's recent interview performance through a line graph for visual trend analysis. Additionally, it provides access to the user's interview history, enabling continuous tracking of progress and engagement over time.

VIII. CONCLUSION

The anticipated AI-Based Mock-Interview Behavioral Recognition Analyst marks a significant advancement in interview training and evaluation methodologies. By integrating cutting-edge technologies such as deep learning, natural language processing (NLP), and multimodal analysis, this innovative system provides candidates with a comprehensive, data-driven platform to enhance their interview skills, self-awareness, and professional growth. Unlike traditional interview preparation methods, which often rely on generic advice and one-time mock interviews, this AI-driven solution offers personalized, real-time feedback that helps candidates recognize their strengths and work on areas needing improvement with precision.

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One of the most transformative aspects of this approach is its ability to analyze behavioral cues, speech patterns, and emotional intelligence, allowing for a more holistic assessment of a candidate's readiness for professional interviews. Through advanced speech recognition algorithms, sentiment analysis, and facial expression tracking, the system can evaluate various aspects of a candidate's performance, including tone modulation, confidence levels, eye contact, and overall engagement. This multifaceted assessment approach enables candidates to fine-tune their responses, body language, and communication style, ensuring they are well-prepared for diverse interview scenarios.

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