Narula Institute of Technology

Project Synopsis
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AI - INTERVIEW ANALYSIS

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1 Introduction

Recruitment processes in modern organizations face increasing challenges due to the growing number of applicants, limited human resources, and the need for rapid yet accurate candidate evaluation. Traditional hiring systems rely heavily on manual resume screening and human-led interviews, which are time-intensive, costly, and prone to subjectivity and inconsistency. These limitations significantly affect recruitment efficiency, scalability, and fairness, especially in large-scale hiring scenarios such as campus placements and entry-level recruitment.

With recent advancements in Artificial Intelligence (AI), Machine Learning (ML), and Deep Learning (DL), automated recruitment systems have gained attention as a means to optimize early-stage candidate screening. Existing approaches primarily focus on resume parsing, keyword matching, or basic skill classification. Although effective to some extent, such systems do not comprehensively assess behavioral traits, communication skills, confidence levels, and interview integrity factors that play a critical role in hiring decisions. Furthermore, the dependence on human interviewers restricts scalability and introduces bias, making the recruitment pipeline inefficient for the evaluation of high-volume candidates.

To address these challenges, this article presents an AI-based Interview Analysis System that automates the end-to-end recruitment process by integrating intelligent resume evaluation with real-time interview performance evaluation. The proposed system allows organizations to define role-specific recruitment criteria, including required skills, qualifications, and evaluation thresholds. Candidates can explore relevant job roles and, upon meeting the defined criteria, are automatically notified and invited to participate in the interview process, ensuring alignment between candidate profiles and organizational requirements.

The system initially performs automated resume classification to identify the candidate's domain, suitability for the role, and skill category. Following classification, an Applicant Tracking System (ATS)-based scoring mechanism is applied to quantitatively evaluate the resume against company-defined criteria such as required skills, qualifications, and experience. This ATS score represents the candidate's technical alignment and contributes 30% to the final evaluation.

Subsequently, an AI mock interview module conducts structured interviews using predefined, company-specific questions. During the interview, deep learning–based computer vision and behavioral analysis models assess multiple performance indicators, including posture, gestures, confidence level, response relevance, and potential cheating behavior through continuous webcam monitoring. Each response is dynamically evaluated, and any detected anomalies or integrity violations result in real-time score adjustments.

The final candidate score is computed using a weighted evaluation strategy, combining 30% from the ATS-based resume score and 70% from the AI interview performance score. Candidates who meet or exceed the organization's predefined cutoff threshold are shortlisted and forwarded for further consideration. By automating both resume evaluation and interview assessment, the proposed system minimizes human intervention, reduces recruitment time, and ensures objective, consistent, and scalable candidate evaluation.

Contributions of This Work

The key contributions of this research are as follows:

- Design of a fully automated, AI-driven recruitment framework that integrates resume analysis and interview evaluation.

- Development of an ATS-based resume scoring and classification mechanism aligned with company-defined criteria.
- Implementation of an AI-managed interview system capable of real-time behavioral, confidence, and integrity analysis using ML and DL techniques.
- Introduction of a weighted scoring strategy combining technical qualifications and interview performance for fair candidate evaluation.
- Demonstration of a scalable and efficient alternative to traditional human-centric interview systems.
- The proposed system aims to enhance recruitment efficiency, reduce bias, and provide organizations with a reliable and scalable hiring solution.

2 Literature Survey

The recruitment and selection process has changed significantly with the rise of Artificial Intelligence (AI) technologies. Traditional interview methods can be time-consuming, subjective, and influenced by human bias. To overcome these issues, researchers and organizations have started using AI-based interview analysis systems. These systems aim to automate candidate evaluation and improve decision-making accuracy. AI interview analysis employs machine learning, natural language processing (NLP), computer vision, and speech analytics to evaluate candidates' performance during interviews.

Initial research in this area focused on automated resume screening and structured online interviews through rule-based systems. These systems used predefined criteria like keyword matching, scoring rubrics, and simple logical rules. While they improved efficiency, they lacked flexibility and contextual understanding, which led to limited accuracy and fairness. As computational power and data availability grew, researchers moved toward machine learning-based methods that could identify patterns from past interview data.

Natural Language Processing is essential in AI interview analysis. It evaluates the content and quality of candidates' verbal responses. Several studies have examined techniques such as sentiment analysis, semantic similarity, keyword extraction, and topic modelling to assess communication skills, technical knowledge, and confidence. Deep learning models, such as recurrent neural networks and transformer-based architectures, have been applied to analyse interview transcripts and open-ended answers. Research findings indicate that NLP-driven models can predict interview outcomes with reasonable accuracy, especially in technical and behavioural interviews.

Another key research area focuses on computer vision techniques for analysing non-verbal behaviour. Features such as facial expression recognition, eye gaze tracking, head movement detection, and posture analysis are frequently studied in video-based interviews. Convolutional neural networks (CNNs) and deep neural networks are commonly employed to identify emotions like happiness, anxiety, or nervousness. Several studies show that non-verbal cues offer valuable insights into a candidate's engagement level and emotional state. However, researchers also point out challenges such as lighting conditions, camera quality, and cultural differences in facial expressions.

Speech and audio analysis are another crucial part of AI interview systems. Researchers have studied vocal features, including pitch, tone, speech rate, volume, pauses, and pronunciation clarity. Machine learning models trained on these features help assess communication

effectiveness, confidence, and stress levels. Studies indicate that combining acoustic features with textual analysis enhances prediction performance. Still, variations in accent, language ability, and background noise can impact the reliability of audio evaluation.

Recent literature highlights the creation of multimodal AI interview analysis systems. These systems integrate text, audio, and video data to provide a comprehensive assessment of candidates. Multimodal learning approaches have shown better performance than unimodal systems, capturing both verbal and non-verbal aspects of communication. Researchers have suggested various fusion methods, such as early fusion, late fusion, and hybrid models, to combine multiple data streams effectively.

Despite these technological advancements, the literature also identifies significant ethical and practical challenges. Bias in training data can result in unfair evaluations of candidates based on gender, ethnicity, or cultural background. The transparency and explainability of AI decisions remain major concerns since many deep learning models operate as black boxes. Additionally, data privacy and security issues related to the storage and processing of interview recordings are critical topics discussed in earlier studies.

In summary, the literature indicates that AI interview analysis can transform recruitment by enhancing efficiency, scalability, and objectivity. Research has evolved from rule-based systems to multimodal AI models capable of comprehensive candidate evaluations. However, challenges such as bias, lack of interpretability, and ethical concerns remain important research areas. These gaps highlight the need for further work on developing fair, transparent, and reliable AI-based interview analysis systems.

3 Problem Definition

3.1 AI-Based Interview Analysis System

The AI-Based Interview Analysis System is an automated recruitment framework designed to evaluate candidates by integrating resume-based technical assessment with real-time interview performance analysis. The system replaces human involvement in the preliminary screening and interview stages by employing machine learning and deep learning models to ensure objective, scalable, and consistent candidate evaluation.

3.2 System Entities

Organization (Company): An organization defines role-specific recruitment criteria, including required skills, minimum qualifications, predefined interview questions, and a cutoff score for candidate shortlisting.

Candidate (Student): A candidate selects an interested job role, uploads a resume, and participates in the AI-managed interview process through a webcam-enabled interface.

AI Evaluation Engine: The AI engine manages resume processing, interview orchestration, behavioral analysis, scoring, and final candidate evaluation without human intervention.

3.3 Resume Classification

Resume classification refers to the automated process of categorizing candidate resumes into relevant job roles or domains based on skills, education, and experience. This step ensures role alignment and acts as a prerequisite for resume scoring and interview eligibility.

3.4 Applicant Tracking System (ATS) Score

The Applicant Tracking System (ATS) score is a quantitative measure of a candidate's technical compatibility with organization-defined recruitment criteria. The score is computed by analyzing resume features such as skill relevance, educational background, experience level, and keyword alignment. The ATS score is normalized and contributes 30% to the final candidate evaluation.

3.5 AI-Managed Interview

An AI-managed interview is a structured and automated interview process in which predefined, organization-specific questions are presented to the candidate sequentially. The interview flow, question delivery, and response recording are controlled entirely by the AI system.

3.6 Interview Performance Analysis

Interview performance analysis refers to the real-time evaluation of candidate responses using deep learning–based computer vision and behavioral analysis techniques. The analysis includes the following components:

- **Answer Relevance:** Assessment of whether the candidate's response aligns with the expected answer context.
- **Confidence Level:** Evaluation of facial expressions, speech stability, hesitation patterns, and eye contact.
- **Posture and Gestures:** Analysis of body alignment, head orientation, and hand movements during the interview.
- **Cheating and Integrity Detection:** Identification of abnormal gaze behavior, presence of external entities, or suspicious movements through continuous webcam monitoring.

Each interview question is independently evaluated, and deviations from expected behavioral or integrity standards result in dynamic score adjustments.

3.7 Interview Score

The interview score represents the cumulative performance of a candidate across all interview questions. It reflects both technical correctness and behavioral attributes and contributes 70% to the final evaluation score.

3.8 Final Evaluation Score

The final evaluation score is computed using a weighted scoring mechanism that combines the ATS-based resume score and the AI interview performance score. The evaluation strategy ensures a balanced assessment of both technical qualifications and real-time interview behavior.

3.9 Cutoff Score and Shortlisting

The cutoff score is a predefined threshold set by the organization. Candidates whose final evaluation score meets or exceeds this threshold are shortlisted and forwarded to the organization for further consideration.

3.10 System Output

The system generates a ranked list of candidates along with their final evaluation scores. Only shortlisted candidates are forwarded for subsequent recruitment stages, while no human intervention is required during the screening and interview evaluation phases.

3.11 Scope of the System

The proposed system is intended to automate early-stage recruitment, including resume screening and interview evaluation. Final hiring decisions remain under the authority of the organization.

4 References

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