

## An AI-Powered Smart Interview Preparation and Evaluation System

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**Abstract** - Interview preparation often faces challenges such as limited real-time interactivity, generic feedback, and high subscription costs, reducing accessibility and effectiveness. The intelligent interview preparation system is implemented as a web-based application using Python IDE for backend processing and SQLite3 for database management. The system employs Natural Language Processing (NLP) to analyze candidate responses and emotion recognition using the InceptionV3 model to evaluate behavioral aspects, providing automated, personalized feedback. The system improves accessibility and effectiveness by offering personalized, automated, and institution-controlled interview training with minimal reliance on paid third-party platforms. It includes features for administrators to efficiently manage question banks, review responses, and monitor candidate performance. In the future, the project will support mobile application usage, enable multilingual interviews, incorporate advanced AI-based evaluation techniques, and integrate with recruitment platforms to further enhance accessibility, effectiveness, and adaptability for candidates

**Keywords:** Web Application, NLP, Inception V3 Model,

### 1. INTRODUCTION

Interview preparation today typically involves using multiple platforms for aptitude practice, coding exercises, resume review, and mock interviews. Candidates often rely on separate applications for technical skill development, behavioral practice, and performance feedback, resulting in fragmented learning and inconsistent evaluation. Most available platforms provide generic question banks without personalization based on a candidate's skills or experience, which reduces preparation efficiency and fails to simulate realistic interview environments [1]. Furthermore, limited attention is given to behavioral analysis, emotional awareness, and real-time response evaluation, all of which play a significant role in interview success. To address these limitations, this project proposes an AI-powered smart interview preparation and evaluation system that integrates technical assessment, behavioral analysis, and personalized feedback into a unified platform. The system begins by analyzing the candidate's uploaded resume using Natural Language Processing (NLP) techniques to extract key skills, educational background, and project experience [2].

Based on this extracted information, the platform dynamically generates skill-oriented aptitude assessments and coding challenges, ensuring that each candidate receives customized and relevant evaluation content.

The platform further enhances preparation through a live interview simulation module that replicates real interview conditions. During the session, candidates respond verbally to domain-specific questions while their audio and video inputs are recorded for analysis. To evaluate non-verbal communication and emotional stability, the system incorporates a deep learning-based emotion detection mechanism using the InceptionV3 convolutional neural network model [3]. This module analyzes facial expressions to detect confidence, nervousness, hesitation, and stress levels, enabling candidates to understand and improve their behavioral performance.

In addition to emotional analysis, the system applies NLP-based response evaluation techniques to assess the quality, relevance, and accuracy of spoken answers. By combining technical scoring with behavioral metrics, the platform generates comprehensive performance reports that highlight strengths and areas for improvement. Administrators are provided with a dashboard to manage question banks, review candidate responses, and monitor overall performance trends [4].

The entire system is implemented using the Flask framework and Python for backend processing, with HTML and CSS for the frontend interface and SQLite3 for database management. This integrated approach ensures scalability, accessibility, and efficient system performance. By unifying resume analysis, aptitude testing, coding evaluation, live interview simulation, and emotion detection into a single intelligent platform, the proposed system significantly enhances interview readiness, builds candidate confidence, and bridges the gap between academic preparation and real-world interview expectations [5].

### 2. SYSTEM DESIGN OVERVIEW

The proposed AI-Powered Smart Interview Preparation and Evaluation System is designed as an integrated and intelligent platform that assists candidates in developing both technical competence and behavioral confidence required for professional interviews. Unlike traditional preparation tools that provide separate modules for aptitude practice or coding exercises, this system follows a unified architectural approach where resume analysis, assessment generation, interview simulation,

and performance analytics are interconnected within a single workflow.

The system architecture is organized into four primary layers: presentation, application, intelligence, and data layers. The presentation layer, developed using HTML and CSS, provides an interactive interface for user registration, resume upload, assessments, and live interview sessions. The application layer, implemented using the Flask framework in Python, manages authentication, routing, evaluation logic, and communication between modules.

At the intelligence layer, Natural Language Processing (NLP) techniques extract technical skills and relevant keywords from uploaded resumes. These extracted skills are used to dynamically generate domain-specific aptitude questions and coding problems, ensuring personalized evaluation. The live interview simulation module records audio and video responses, while the InceptionV3 deep learning model analyzes facial expressions to identify emotional indicators such as confidence, stress, and hesitation.

Speech-to-text processing converts verbal responses into text for semantic analysis, where NLP-based techniques evaluate answer relevance and technical correctness. Technical scores and behavioral metrics are combined to generate a comprehensive performance report. All user information, extracted data, and evaluation results are securely stored in the SQLite3 database, ensuring structured data management and system reliability.

The modular design enables scalability and future enhancements such as multilingual support, advanced AI-based scoring models, and mobile platform integration. Overall, the system provides a structured, adaptive, and intelligent environment that enhances interview readiness and bridges the gap between academic preparation and real-world interview expectations.

### 3. RELATED WORK

Existing research in AI-based interview systems highlights the growing importance of intelligent models in evaluating both technical competence and behavioral attributes. Several studies have explored adaptive interview mechanisms that adjust questions based on user responses and non-verbal cues. While these approaches improve interaction quality, they mainly focus on conversational adaptability and do not include comprehensive technical skill assessment or resume-driven personalization.

Multimodal learning techniques have been applied in automated video interview analysis, where facial expressions, speech patterns, and textual responses are evaluated to predict candidate performance. Fairness-aware models further address bias reduction in AI-based hiring systems. However, these systems are generally designed for recruitment screening rather than interview preparation, limiting their role in skill development and structured training.

Natural Language Processing (NLP) methods have also been used for automated answer evaluation through semantic similarity and keyword-based scoring. Similarly, deep learning models such as convolutional neural networks have shown effectiveness in facial emotion recognition. Despite these advancements, most existing solutions address isolated components of interview evaluation. There remains a need for an integrated framework that combines resume-based skill extraction, adaptive technical assessment, live interview simulation, emotion detection, and automated feedback generation within a unified platform.

### 4. PROPOSED SYSTEM

The proposed AI-Powered Smart Interview Preparation and Evaluation System is designed to provide a comprehensive and intelligent solution for structured interview training. Unlike traditional preparation platforms that focus only on aptitude practice or coding exercises, the proposed system integrates technical assessment, behavioral analysis, and personalized feedback within a unified framework. The primary goal is to enhance both knowledge competency and communication confidence through an adaptive and automated evaluation process.

The system begins with user registration and resume upload. Once the resume is submitted, Natural Language Processing (NLP) techniques are applied to extract key technical skills, project details, programming languages, and domain-specific keywords. These extracted attributes are stored in the database and used to customize the evaluation process. Based on the identified skill set, the system dynamically generates skill-oriented aptitude questions and coding challenges from a structured question bank, ensuring that each candidate receives relevant and domain-specific assessments.

After completing the aptitude and coding rounds, candidates proceed to a live interview simulation module. This module creates a real-time interview environment where candidates respond verbally to technical or HR-based questions. The system records both audio and video inputs for further analysis. A deep learning-based emotion detection model, implemented using the InceptionV3 convolutional neural network architecture, analyzes facial expressions during the session to detect emotional states such as confidence, stress, nervousness, and hesitation. This enables behavioral performance evaluation beyond traditional answer-based scoring.

In addition to emotion analysis, speech-to-text processing converts spoken responses into textual format. NLP-based evaluation techniques such as keyword matching and semantic similarity analysis are applied to assess answer relevance, clarity, and technical correctness. By combining technical scores with behavioral metrics, the system generates a detailed and structured performance report highlighting strengths, weaknesses, and improvement suggestions.

The platform also includes an administrative module that allows management of question banks, review of candidate responses, monitoring of emotional analytics, and tracking of performance progress over time. All user data, evaluation results, and behavioral metrics are securely stored in the database to ensure reliability and organized data management.

Overall, the proposed system delivers a scalable, intelligent, and integrated interview preparation platform that bridges the gap between theoretical knowledge and real-world interview performance. By combining AI-driven personalization, automated evaluation, and behavioral analytics, the system significantly improves preparation effectiveness and candidate confidence.

### 5.1 AUTHENTICATION & USER MANAGEMENT

This module manages secure user access and profile handling within the system. It includes registration, login authentication, password validation, and session management mechanisms. User credentials are encrypted and securely stored in the database to ensure data protection. The module also maintains candidate history, including completed assessments, scores, and interview records. By maintaining structured user profiles, the system ensures personalized content delivery and progress tracking over multiple sessions.

### 5.2. RESUME ANALYSIS AND SKILL MAPPING

The resume analysis module utilizes Natural Language Processing (NLP) techniques such as tokenization, stop-word removal, and keyword extraction to identify relevant technical skills, programming languages, tools, and project experiences. Extracted skills are matched with predefined skill categories in the system's database. This mapping mechanism enables dynamic customization of aptitude questions, coding problems, and interview topics. By automating skill identification, the system reduces manual filtering and improves assessment relevance.

### 5.3. APTITUDE & CODING EVALUATION

The aptitude module evaluates analytical thinking, logical reasoning, and domain knowledge through dynamically generated multiple-choice questions. Question selection is based on extracted skill categories, ensuring personalized assessment. The coding evaluation module allows candidates to submit solutions through an integrated coding interface. Automated validation mechanisms check syntax correctness, logical implementation, and expected output matching. This module ensures objective and consistent technical evaluation.

### 5.4. LIVE INTERVIEW SIMULATION SYSTEM

This module simulates real-world interview scenarios by presenting structured technical and HR-based questions. The system activates webcam and microphone access to capture candidate responses in real time. Recorded sessions are stored for analysis and

review. The simulation environment helps candidates develop time management skills, structured communication, and confidence under interview-like conditions. This feature enhances practical exposure beyond traditional practice methods.

### 5.5. EMOTION DETECTION AND BEHAVIOUR ANALYSIS

The emotion detection module applies the InceptionV3 convolutional neural network model to analyze facial expressions during the live interview session. The system identifies behavioral indicators such as confidence level, stress intensity, hesitation frequency, and engagement level. These metrics are aggregated to form a behavioral performance profile. This module adds a non-verbal evaluation dimension, enabling candidates to improve body language and emotional stability.

### 5.6. RESPONSE EVALUATION AND FEEDBACK SYSTEM

Speech-to-text processing converts verbal responses into textual format for semantic analysis. NLP-based techniques such as keyword matching and similarity scoring evaluate answer relevance, completeness, and clarity. Technical evaluation results are combined with emotional analytics to generate a structured feedback report. The report highlights strengths, identifies improvement areas, and provides actionable suggestions for better performance in future interviews.

## 6. SYSTEM ARCHITECTURE

The system architecture of the proposed AI-Based Smart Interview Preparation and Evaluation System is designed using a modular and layered structure to ensure scalability, flexibility, and efficient integration of intelligent components. The architecture consists of a Presentation Layer, Application Layer, Intelligent Processing Layer, and Data Layer, all working together to provide a seamless interview preparation experience. The Presentation Layer serves as the user interface where candidates and administrators interact with the system through secure login and role-based dashboards. It allows users to upload resumes, attend aptitude and coding assessments, participate in live interview simulations, and view performance reports.

The Application Layer, implemented using the Flask framework, acts as the central controller of the system. It manages request handling, authentication, session control, and communication between frontend interfaces and backend processing modules. The Intelligent Processing Layer integrates advanced AI components including an NLP module for resume parsing, skill extraction, and answer evaluation; a Coding Evaluation Engine for executing and validating programming solutions; and an Emotion Detection Module based on the InceptionV3 deep learning model to analyze facial expressions during live interviews. These modules





Fig. 7.4. Report Page

## 8. CONCLUSION & FUTURE WORK

This research presents an AI-Based Smart Interview Preparation and Evaluation Platform designed to enhance the effectiveness of technical and behavioral interview assessment. By integrating Natural Language Processing (NLP) for resume analysis and answer evaluation, a coding evaluation engine for validating programming skills, and a deep learning-based emotion detection module using the InceptionV3 model, the platform delivers a comprehensive and data-driven performance analysis. The system combines technical assessment with behavioral insights, enabling a more objective and structured evaluation process. Its modular architecture ensures efficient data processing, secure storage, and scalable implementation. Experimental validation confirms that the platform provides accurate skill extraction, reliable coding assessment, and meaningful emotional analysis, thereby reducing manual effort and improving interview preparation quality.

Future enhancements can boost the platform's intelligence and scalability by adding advanced deep learning for better emotion recognition, real-time speech and sentiment analysis, cloud deployment with distributed databases, and AI-driven personalized feedback for continuous candidate improvement.

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