

# Design of an AI and NLP-Based Resume Screening and Interview Evaluation Platform

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**Abstract**— In the modern competitive job market, students tend to struggle with writing good resumes and doing well during interviews. The paper presents an AI-Based Mock Interview and Resume Screening System that is aimed at helping the student to enhance their employability competencies. The system will analyze uploaded resumes through an Applicant Tracking System (ATS) method of assessing the quality of resumes, finding gaps in the resumes, and giving recommendations on how to improve the resume. Moreover, the platform provides the AI-based mock-interview service that enables people to train in answering both technical and behavioral questions. The system ranks responses in terms of relevancy, clarity, and with key words and offers individualized feedbacks to improve interview performance. It also has a student dashboard, which helps in the tracking of progress and performance over time. Using a combination of Artificial Intelligence and Natural Language Processing (NLP), the offered system suggests a convenient tool that allows students to work on the quality of their resumes, support their communication level, and become more confident in their abilities to be hired in the real world.

**Keywords**— Artificial Intelligence, Mock Interview System, Resume Screening, Recruitment Automation, Performance Analytics, Natural Language Processing, Machine Learning, Applicant Tracking Systems.

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## I. INTRODUCTION

In the current competitive employment environment, the preparation of interviews and proper screening of resumes are very important aspects in the recruitment process. Nevertheless, conventional approaches have a tendency of

giving brief and disjointed assessments. Traditional mock interviewing is known to provide only shallow type of feedbacks and neglect certain crucial nonverbal communication factors like the use of a tone of voice, style of speech, and the use of language. Likewise, the screening of the resumes manually is based on the key-word matching and the subjective human review, which may result in bias and incorrect assessment of the candidates.

In order to overcome these shortcomings, the proposed AI-Based Mock Interview and Resume Screening System will make use of artificial intelligence as a tool to judge the resume content and interview performance. The resume screening module is used to screen applications by analyzing them on the basis of skills, experience as well as the job requirements so that they can be shortlisted objectively. The interview assessment module is used to analyze verbal communication as well as emotional cues like tone and style of communication.

The system can simulate a realistic practice setting that enhances communication, confidence, and general interview preparedness and help make more efficient and evidence-based recruitment decisions by giving comprehensive feedback and tailored interview questions depending on the profiles of the candidates.

## II. LITERATURE SURVEY

**Revolutionising Resume Building with Intelligent ATS Optimisation to Boost Career Development and Employability** by Singh Siddharth Shravan Kumar et al. [1] is a web-based service that utilises intelligent ATS optimisation to enhance the quality of resumes. The system suggests

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resumes in a real-time manner, giving feedback and AI-based suggestions to make the resumes fit the industry.

A study by Saprit Anand et al. [2] called *Optimising Resume Design for ATS Compatibility* incorporates Large Language Models (LLMs) with NLP methods to study organisational preferences and assist a candidate in creating a resume that can successfully pass automated ATS filters.

*Fair and Ethical Resume Screening: Enhancing ATS with Just Screen the Resume Screening App*" by Gloribeth Navarro [3] proposes a resume screening system based on NLP regularities to exclude bias and allow recruiting a successful candidate based on merit.

The article by K. L. Abhishek et al. [4] is titled *Developing an Intelligent Resume Screening Tool with AI-Driven Analysis and Recommendation Features*, and it presents an idea of an automated resume analysis system based on the NLP techniques to extract information about the applicants and recommend them on how to improve their resume.

The article "*Mock Interviewer*" by Kirubha et al. [5] presents the use of an AI-based system that assesses resume layout, keyword support, and layout to increase the ATS compatibility and the accuracy of the shortlisting of applicants.

A resume analysis system described in Achal Jagadeesh et al. [6] is called *AI-Driven Resume Analysis and Enhancement Using Semantic Modelling and Large Language Feedback Loops*, and it operates with semantic similarity models and feedback that is generated by the LLM to enhance the clarity of the resume and its alignment with ATS.

An article by Ramesh Sunder Nayak et al. [7] is titled *AI Talent Suite - Resume Enhancement, Interview Preparing and Exam Monitoring System*; it introduces an all-in-one platform based on the use of NLP and TF-IDF in extracting keywords and K-Means in resume classification, as well as analyzing the responses during an interview.

The article by Mandalapu Bhavana Amrutha et al. [8] named *Enhancing Interview Evaluation: AI-Based Emotion and Confidence Analysis in Mock Interviews* is based on the analysis of facial expressions and speech pattern, and body language using CNN and RNN models to estimate the confidence and emotional intelligence of the candidates.

The article by Balasaheb Jadhav et al. [9] offers the proposal of an *AI-based simulator* which appraises not only technical answers but also non-verbal communication based on pose-based communicative interaction.

The article by Shashikant V. Golande et al. [10] is called *Mock Interview Evaluator Powered by AI* and uses deep learning and speech recognition methods based on CNNs to assess the non-verbal communication and technical knowledge and deliver structured feedback.

The device by Devanshi Slathia et al. [11] is called *Automated Interview Evaluation System* and is a multimodal assessment system in which facial emotion recognition and voice emotion analysis are integrated with NLP-based semantic analysis of candidates answers.

Abinav Dayal et al. [12] show in the article "*AI-Driven Mock Interviews: A Catalyst for Enhanced Interview Performance*" how AI-generated mock interviews can be used to enhance pronunciation, fluency, grammar, and confidence by means of practice.

The article by Harsh Koshti et al. [13] titled "*AI-Powered Interview Preparation System: Integrating Resume Analysis, HR Simulation, and Technical Skill Assessment*" provides a platform that is a combination of resume analysis and AI-driven interview evaluation that uses CNN models and BERT-based NLP methods.

The proposed deep learning architecture on visual, vocal, and verbal cues to facilitate equitable and consistent remote candidate assessment is the article by B. C. Lee et al. [14] titled *Development of an AI-Based Interview System for Remote Hiring*.

Sneha Gonjari et al. [15] propose a system based on the Gemini-based AI to simulate interviews and provide performance analytics to enhance recruitment workflows in "*AI Powered Platform for Interview Simulation: Candidate Evaluation and Recruitment Workflow Optimisation*."

The system described in the article by Anubhav Singh et al. [16] is called *INTERVIEW HUB* and involves the combination of GPT-based question generation and speech transcription to facilitate simulated real-time interviews and feedback-based responses in the form of structured feedback.

In the article by Reshma Totare et al. [17], *MockHire: Enhancing Candidate Preparedness and Streamlining Recruitment Through AI-Powered Interview Simulation*, the researchers suggest a recruitment platform using resume parsing, adaptive questioning and performance analytics to facilitate automated candidate evaluation.

### III. METHODOLOGY

The proposed AI-Based Mock Interview and Resume Screening System offers an in-depth system that addresses job

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applicants in a competitive recruitment setting. The system is a combination of Natural Language Processing (NLP) used to optimise resumes and Computer Vision-based behavioural analysis which assists in supporting the development of technical and interpersonal skills.

Category	AI-Based Interview	Personal Interview
Stage	First-level screening	Final-level interview
Method	AI analyses face, voice, speech & answers	Q&A interviewer
Setup	Computer, webcam, mic	Face-to-face panel
Focus	Skills, confidence, behaviour	Skills, attitude, ethics
Evaluation	Automated scoring by AI models	Human judgment
Time	50 mins (online)	40 mins (offline)
Evaluator	AI system	Panel of experts
Bias	Low, consistent	Possible human bias

Table 1. AI Interview vs Personal Interview

The resume analysis component applies NLP algorithms to analyze the resume, determine the absent keywords, and confirm the compliance with the Applicant Tracking System (ATS) requirements. This assists candidates to enhance the relevancy of the resumes and key words optimisation.

The interview simulation model employs Convolutional Neural Networks (CNNs) and pose estimation algorithms to study the behaviour of the candidates in an interview simulation. It gives a response of confidence degree, emotion display, posture, body language and communication clarity. The system will optimise the resume based on ATS, and boost the readiness to be interviewed with the help of the behavioural analysis done by AI, which will result in the overall employability.

## A. System Architecture

The Mock Interview and Resume Screening System is proposed to be a scalable cloud-based architecture that runs on Amazon Web Services (AWS). It is composed of three primary layers, namely Presentation Layer, AI Processing Layer and Cloud Infrastructure Layer which allows it to efficiently process AI at the same time as being able to respond to user interaction.

The Presentation Layer offers an online student dashboard where customers can post resumes, take part in simulated interviews based on AI and monitor the performance. AWS Cognito is incorporated to deal with secure authentication and session management.

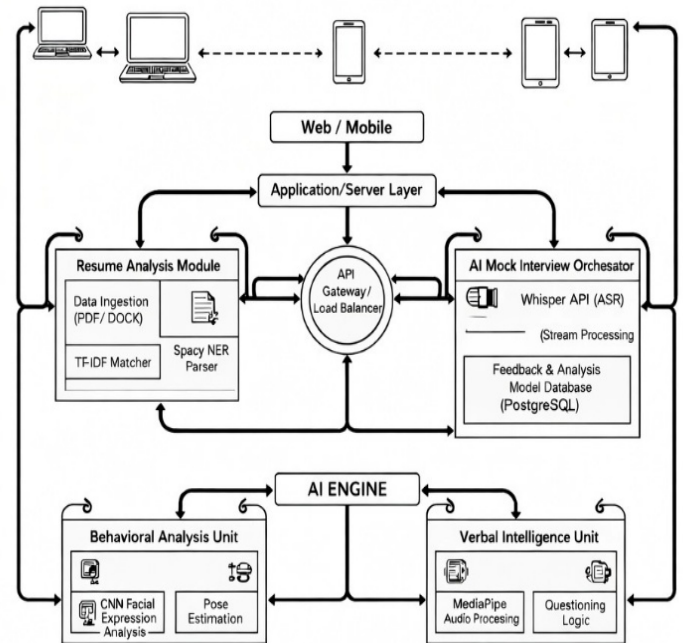


Figure 1. System Architect

The intelligent modules are built in the AI Processing Layer. The Resume Screening and ATS Engine uses resumes submitted in AWS S3 and converts them into machine-readable text and the NLP subdivisions it performs on this text include keyword extraction, TF-IDF, and cosine similarity to produce score streams and optimisation advice. Interviews Behavioural Assessment Module is giving CNN-based facial recognition and posture estimation, in determining confidence, emotions, and body language. The Verbal Intelligence Module will turn the speech into the text and will analyze the correctness of response, its relevance, technical correctness, and dynamically modulate the interview difficulty. Cloud Infrastructure Layer is used to store files in the AWS S3 and structured data in the AWS RDS to securely, efficiently and scale data. The security protocols will involve role-based system access and encryption of data to secure user data.

## B. Resume Screening and ATS Engine

Applicant Tracking Systems (ATS) are currently popular in the recruitment field where they are used to automate resume filtering and candidate ranking. The legacy ATS systems are largely dependent on the check word match system as a method of search that restricts them to decode contextual significance and semantic connections. To surpass this

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weakness, the proposed Resume Screening and ATS Engine combines more intelligent resume evaluation with the combination of semantic similarity modelling and enhanced Natural Language Processing (NLP) methodologies.

It starts with the uploading of the resume and storage in the AWS S3, which accepts PDF and DOCX formats. The text in resumes is turned into machine readable text and run through a series of NLP pipeline that does skill extraction, entity recognition and relevance scoring. The resume content is compared to a predefined job-role requirement using techniques that include statistical weighting and analysis of the resume content using vectors.

The system also finds the missing or underrepresented skills, review of resume structure, and suggestions of improvement. All the evaluation results and performance records are stored in AWS RDS where they are tracked continuously. This method supplements the conventional ATS screening with a more precise and evidence-based candidate evaluation system.

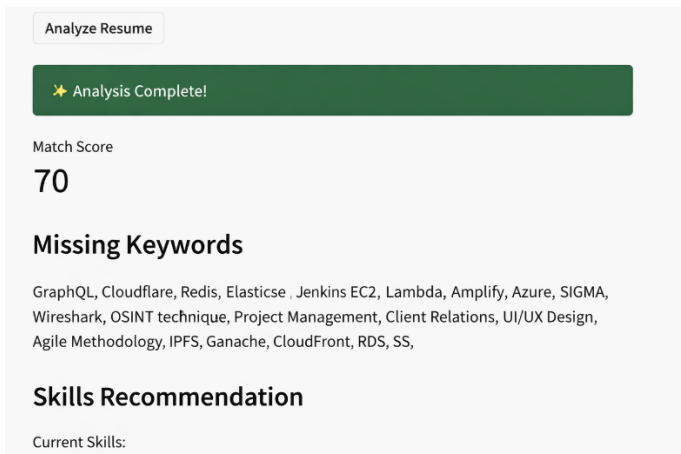


Figure 2. Identifying missing keywords

## C. Multi-Modal Speech Processing Engine

Multi-Mode Speech Processing Engine tests linguistic content of candidate responses and vocal features of candidate responses in the process of mock interviews. This module is unlike the traditional systems that considers information based solely on the text analysis, where the approach entails the acoustic feature analysis with the semantic evaluation.

The procedure starts as an audio capture in real-time using the microphone of the candidate. Preprocessing of the audio signal includes: noise reduction, silence removal and normalisation of amplitude to enhance the quality of the audio signal then analysis is done.

The audio is processed after which a deep learning-based Automatic Speech Recognition (ASR) model converts the audio into text. Natural Language Processing (NLP) is applied to the generated transcript to measure semantic relevance, grammatical correctness and correspondence with the interview question.

Also, acoustic measures like the difference of pitch, rate of speech, duration of pause and energy distribution are obtained in order to determine the pattern of hesitation, emotional coloring, and confidence. The system is able to evaluate verbal clarity, fluency, and confidence in communication holistically by combining acoustic and semantic analysis in interviews.

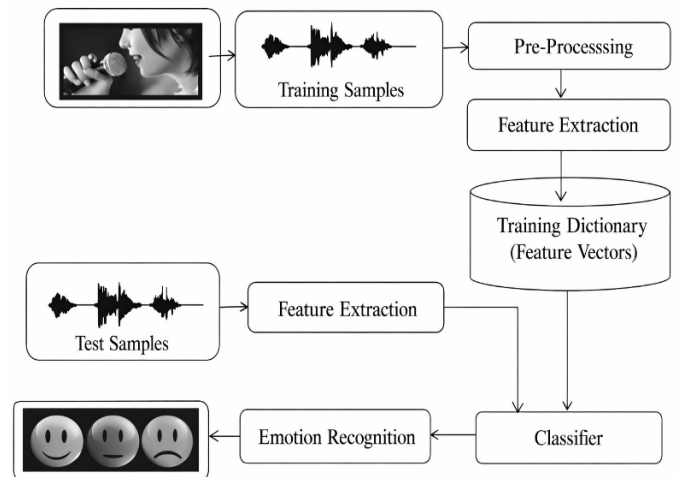


Figure 3. Speech emotion detection

## D. Computer Vision Data Pipeline

Computer Vision Data Pipeline is an evaluation of non-verbal behavioural cues during mock interviews. As facial expressions, gaze stability and posture affect the perception of an interview, the system processes real-time video analysis in gauging confidence in behavioural and emotional stability.

It starts with a live video capture using the webcam of the candidate whereby the stream is broken into frames to be examined. Preprocessing of every frame includes image to grayscale conversion, image to normalisation and image to noise reduction to enhance feature extraction.

The facial landmark detection model is a deep learning model that detects major areas of the face such as eyes, eyebrows, nose and mouth. These landmarks are useful in the analysis of facial geometry, head orientation, gaze direction and micro-expressions.

The extracted features are fed through a Convolutional Neural Network (CNN) that has been trained on facial expression

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datasets to be able to classify the emotions as confidence, neutral, and stress. Frame level predictions are summed up to form a Behavioural Score, which is combined with the results of speech analysis. The end analysis is properly saved and presented on the performance dashboard.

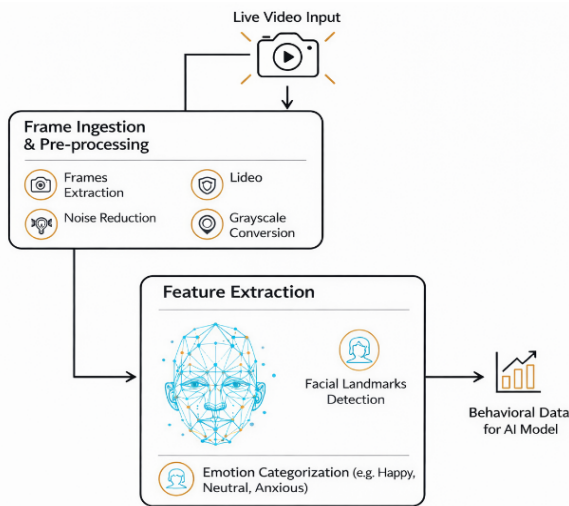


Figure 4. Feature Extraction

Emotion Type	Accuracy	False Positive Rate	Processing Time
Happiness	94.5%	3.2%	45 ms
Sadness	91.2%	4.1%	43 ms
Anger	89.8%	5.3%	44 ms
Neutral	96.3%	2.1%	42 ms
Anxiety	88.5%	5.8%	46 ms
Confidence	92.1%	3.9%	44 ms

Table 2. Emotion detection performance

## E. Integrated Technical Sandbox and Algorithmic Heuristics

The Integrated Technical Sandbox is a test that assesses the practical skills of the candidates in the secure and controlled medium of programming. As opposed to the classical multiple-choice tests, this module enables real-time writing of code and its execution, which is comparable to the real-life situation during technical interviews.

The sandbox offers a web-based code editor with support to languages like Python, Java, and C++ with additional functionality such as syntax highlighting, structured indentation, and syntax validation in real time. The programming problems are presented in structured form of input-output handling and the candidates are required to solve the problems within the time constraints.

The code after submission is run in isolated secure runtime environments to make the system safe. The solutions will be tested with known test cases and the execution time and memory consumption will be tracked.

In addition to correctness, the system assesses the efficiency of algorithms, the code structure and the standard of the code such as readability and modularity. Such technical measures are combined with behavioural and communication measurements to create an overall performance assessment and customised feedback.

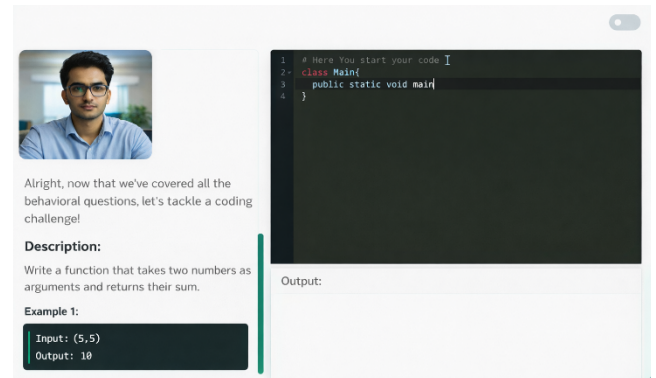


Figure 5. Code Editor

## F. Performance Evaluator

The Performance Evaluator represents the last part of the system to be analytical and it combines the results of the resume analysis, computer vision, speech processing and coding modules. It integrates the Resume Compatibility Score, Behavioural Index and the technical Proficiency Score into a single evaluation measure, which makes sure that the applicants are evaluated in terms of technical skills, clarity of communication and behavioural confidence.

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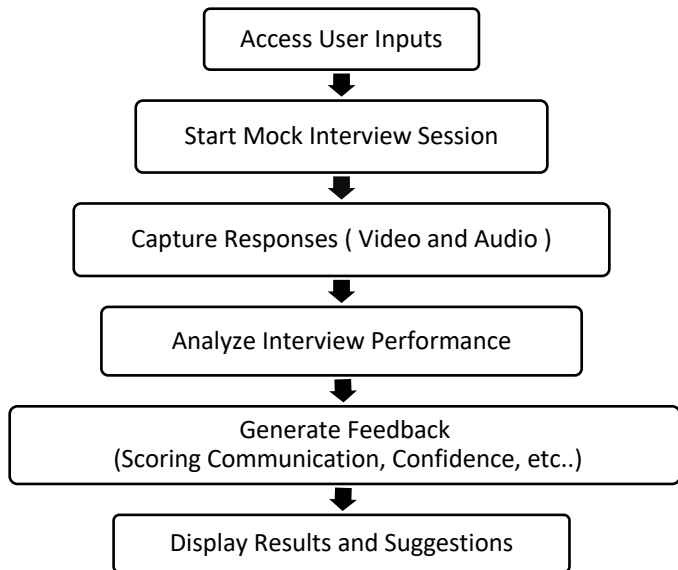


Figure 6. Evaluation Process

There are three main data sources of the evaluation process that include resume text data, video-based behavioural analysis, and audio responses. Such multimodal inputs allow assessing the technical competence and interpersonal communication skills comprehensively.

All the module outputs are normalised and aggregated based on weighted scoring strategy in which the weight can be modified according to job-role requirements. The system is also able to give interpretable feedback, and this indicates the major factors that affect the final score like clarity, confidence, technical accuracy, and resume quality.

The outcomes of evaluation are safely saved in the AWS RDS and allow monitoring the performance of the evaluation in several sessions and contribute to the constant advancement of improving the preparation of the candidates.

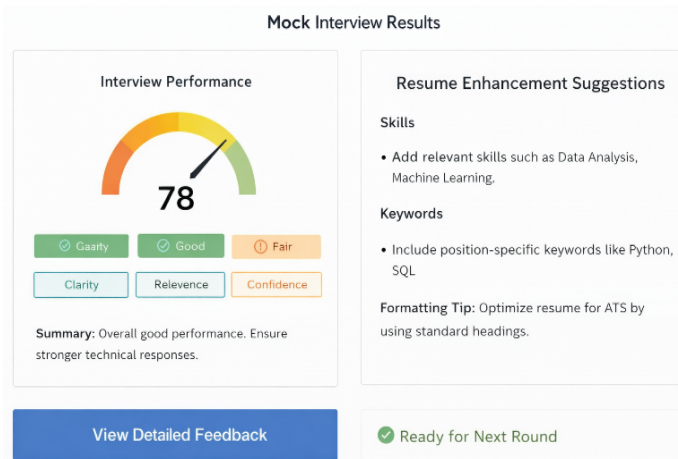


Figure 7. Mock Interview Performance and Suggestions

## G. Website Design

The interface of the platform will be based on the principles of responsive web design, which will allow it to be used on desktop, tablet, and mobile computers. The system is user-friendly even to first time users because there is a structured navigation workflow that guides the user needed in the resume analysis, interview preparation, and performance evaluation.

**Resume Analyzer:** The Resume Analyzer is an assessment tool based on the quality of resumes, including the relevance of keywords, suitability with ATS, and correspondence with job descriptions. Resumes uploaded are scanned to detect key role-specific words and the lack or under-representation of competencies, which is reflected in the compatibility score and generates improvement recommendations.

The module also conducts ATS-friendly formatting where it detects components that are considered complex like fancy layouts, pictures, or multi-column format that can interfere with automated parsing. An ultimate ATS Compatibility Score tells how well the resume can be handled by recruitment systems. In order to quantify job relevance, TF-IDF vectorisation and cosine similarity methods are used, which allow distinguishing both exact keywords and similar terms.

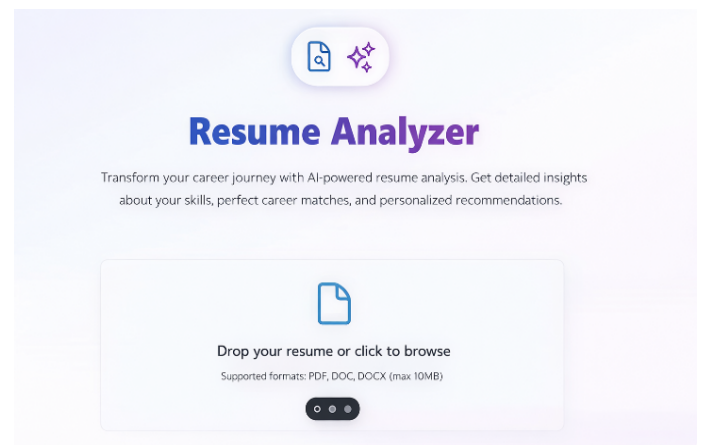


Figure 8. Resume Analyser Dashboard

**Suggestion Provider:** Suggestion Provider gives individualised suggestions to enhance candidate profiles. The system proposes the use of programmed languages, tools, frameworks, and technical skills as suggested by identifying skill gaps concerning the chosen job position. It also suggests industry accepted certifications and training courses which assist the candidates to increase their score in resume compatibility and employability.

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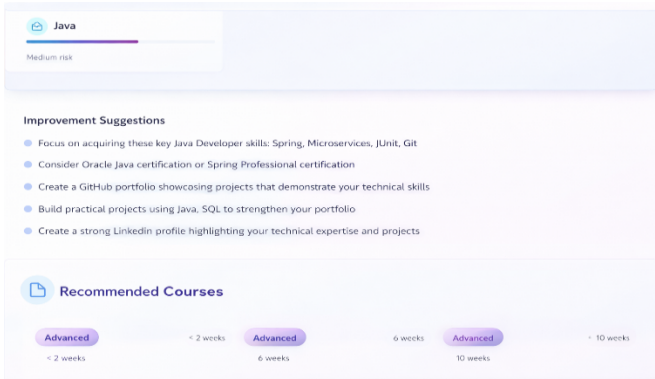


Figure 9. Suggestions Provider

**Interview Dashboard:** The Interview Dashboard will enable the candidates to begin and engage in mock interview sittings. Users can have a preview of the information, including job role, level of difficulty, and form of interview prior to the start of the interview with a readiness check confirming the presence of a webcam and microphones.

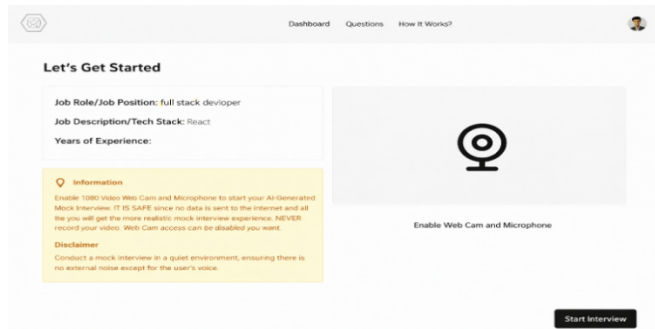


Figure 10. Interview Dashboard

In the interview, the questions, timers and progress indicators are shown on the dashboard, which makes a structured setting like the real conditions of an interview and allows the user to trace the performance during several sessions.

**Disqualification Window:** The Disqualification Window is a fair way of conducting interviews since it tracks the behaviour of the candidates.

The system is able to detect violations, including leaving the camera frame, multiple faces, microphone muting, too much movement, using a mobile phone, or switching tabs with the help of computer vision, audio monitoring, and tracking browser activities. The warning signs are issued at the first stage and the repeated infractions can lead to automatic interview termination.

**Result Window:** Result Window final evaluation is provided at the end of the interview session. The Performance Evaluator incorporates results of resume analysis, speech evaluation, behavioural assessment, and technical coding. The system

provides scores, visuals and personalised feedback to the candidates to know their strengths and areas to improve besides increasing interview readiness.



Figure 11. Result Window

## IV. RESULT AND DISCUSSION

The suggested AI-Based Mock Interview and Resume Screening System was tested on the basis of its main modules as resume analysis, speech processing, behavioural assessment, and technical skill evaluation. Multiple resumes were tested and mock interview session was done to evaluate the performance of the system.

The resume analysis module has increased much in terms of compatibility with the ATS with the semantic optimisation methods like TF-IDF and cosine similarity. Resume A, B and C all made an improvement of 60, 50 and 70 to 85, 70 and 50 respectively and this shows that contextual key word matching contributes to better resume job fit than the conventional key word screening.

Communication clarity, confidence, and non-verbal cues were also well assessed in the behavioural and speech analysis modules by the detection of facial expressions and speech features. Combined with the module of coding evaluation system offered an overall evaluation of technical and communication skills.

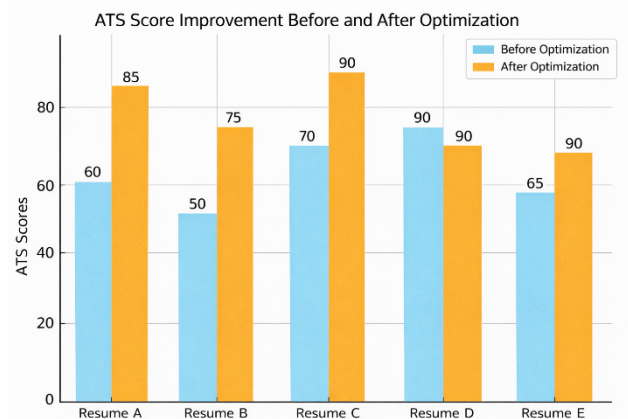


Figure 12. Bar Graph showing improvement in ATS score before and after NLP optimisation

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Generally, the findings suggest that the use of NLP, computer vision, and speech processing to enhance the accuracy of resume evaluation and the effectiveness of interview preparation is better than the traditional mock interview systems

Module	Accuracy (%)
Resume Analysis (NLP)	92
Speech Processing	89
Computer Vision Emotion Detection	93
Coding Sandbox Evaluation	90
Integrated Evaluation	95

Table 3. Module Performance Comparison Chart.

## V. CONCLUSION AND FUTURE ENHANCEMENTS

This paper introduces the AI-Based Mock Interview and Resume Screening System that enhances the preparation of candidates in the current recruitment process. The platform combines Natural Language Processing to analyse resumes, Computer Vision to evaluate behaviour, speech processing to evaluate communication and a technical coding sandbox to evaluate programming skills.

Integration of these technologies gives the system an all round assessment of the technical capability, clarity of communication, and behavioural confidence. It has been demonstrated that there is better ATS compatibility and successful verbal and non-verbal communication evaluation in the mock interviews conducted experimentally. On the whole, the platform provides a more comprehensive and efficient method of the interview preparation in contrast to the traditional systems.

As its further development, the platform will be able to become a two-user ecosystem between organisations and educational institutions. Through the system, organisations may screen resumes with the help of AI and conduct interviews with the help of AI to make quick recruitment of candidates. Schools may use the platform to assist students to practice mock interviews, track performance, and enhance the ability to become employable.

The platform can also serve as an integrated system of recruitment and training, closing the divide between academic preparation and industry expectations by allowing both institutions and recruiters to perform their activities in the same environment.

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