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Original Article

CareerMate - One Stop Solution for Job Preparation

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Abstract: *CareerMate AI is an integrated solution designed to assist students in the entire job preparation pro-cess by bringing together assessment, practice, feed-back, and resume-building activities in one system. Current job preparation solutions work in a discon-nected manner, requiring students to work on differ-ent systems that lack integrated performance mea-surement and individualized feedback, making it challenging to track progress and adjust job prepa-ration approaches accordingly. The proposed solu-tion will be developed by bringing together four AI-based modules: adaptive MCQ-based skill assess-ment modules, an AI-based mock interview mod-ule that offers structured feedback on answers, a smart resume builder module that produces ATS-compliant resumes, and an automated resume re-view module that analyzes the relevance of content and keyword alignment for particular job roles. Nat-ural Language Processing methods will be applied to assess text-based answers, improve resume con-tent, and offer feedback, and adaptive logic will be applied to adjust question difficulty levels based on user performance. The four modules will be inte-grated into a single workflow system that allows for systematic assessment and progress measurement at various stages of job preparation.*

Keywords: *Job Preparation, Career Guidance, Interview Preparation, Resume Building, Placement Training, Aptitude Training, Mock Interviews, Career Development, Soft Skills Training, Communication Skills, Technical Skills, Problem Solving, Logical Reasoning, Coding Practice, Time Management.*

1. Introduction

With increasing competition in the job market, stu-dents rely heavily on digital platforms for skill as-sessment, interview preparation, and resume develop-ment. However, most existing solutions address only isolated aspects of job preparation, such as resume building, MCQ-based assessments, or interview sim-ulations, without offering a unified evaluation frame-work. This fragmented approach often results in incon-sistent feedback, limited progress tracking, and ineffi-cient preparation strategies, making it difficult for stu-dents to systematically improve across multiple stages of job readiness.

Recent advancements in Artificial Intelligence (AI) and Natural Language Processing (NLP) have enabled automated assessment, adaptive learning, and person-alized feedback generation. AI-driven systems can now evaluate text-based responses, analyze performance trends, and provide targeted recommendations for im-provement. Despite these advancements, the integra-tion of multiple job preparation components such as skill assessment, interview practice, and resume op-timization into a single comprehensive platform re-mains limited.

This paper presents CareerMate AI, an integrated AI-based job preparation platform that combines four major modules within a unified workflow: adaptive MCQ-based skill assessment, AI-driven mock inter-view simulations with structured feedback, a smart re-sume builder that produces ATS-compliant resumes, and an automated resume review module that evaluates content relevance and keyword alignment for specific job roles. The system applies NLP techniques to assess user responses, improve resume content, and deliver individualized feedback, while adaptive logic dynam-ically adjusts question difficulty based on user perfor-mance.

2. Literature Review

Recently, there have been studies on how Artificial In-telligence (AI) can be used in various aspects of educa-tion/training, including preparing individuals for jobs. While there have been various reports of AI use in gen-erating study materials, assessment mechanisms, mock interviews, recruitment software, etc., these often tend to be based on individual aspects of education.

There are also several studies that are highly focused on the generation of AI-based study materials as well as exam preparation. For example, an AI-based SaaS platform for educational study material generation [1] points to the automated generation of study materials for exams and job preparation only. Similarly, AI-based study planners [5] and AI-based exam preparation using artificial intelligence [6] seem to be limited to academic study and exam preparation without extending AI-based evaluation to other aspects of job preparation, includ-ing interviews and resumes. Furthermore, AI-based personalized learning note generation [8] seems to only further individualize and separate study materials from overall student evaluation and interview preparation.

Another substantial collection of related research is centered on AI-based interview systems for prepara-tion. IntelliView [2], HireIQ [3], and PARIKSHAN.IO [12] are software tools designed for conducting inter-view simulations, with some systems offering behav-ioral analysis capabilities. While these systems aid in interview preparation, there is no emphasis on adaptive learning, resume creation, or tracking across various preparation areas. Research on MAG-BERT-ARL [9] and Psychometric analysis-based interview assessment systems [10] concentrates on fairness and bias, empha-sizing competency evaluation in AI-assisted interviews. Again, these systems stand alone from learning, assess-ment, and resume creation areas.

Research on AI technology concerning assessment and quiz generation is also gaining prime attention. In-telligent Quiz Generation Systems, like Quizify [7], show promising results for generating MCQ types, but they are found to be devoid of adaptive feedback mech-anisms and linking long-term user progress. These systems assess the knowledge at a given time but do not show integration of assessment with interview skills and resume building techniques. In parallel to this, ca-reer facilitation and recruitment platform development using modern web stacks has also been proposed. Job Bridge [15], MERN stack-based job portals [16], and candidate prediction platform development [19] mainly target features related to recruitment, job postings, and candidate suitability prediction, respectively. This is not discouraging because hiring processes are also be-ing streamlined in an efficient manner; however, the aspect of effective user skills enhancement is not ad-dressed. Although Career Verse [18] offers an inte-grated career platform concept, the concept still does not provide adaptive feedback and analysis of cross-feature data analytics for skills, interview preparation, and resume building.

Survey-based research for reviewing the application of NLP and computer vision in interview systems [13] also provides useful theoretical information and re-search, yet it does not offer any unified, user-centric framework containing different preparation tools. Also, different personalized education support systems us-ing large language models [14] only offer assistance in the context of learning and do not offer any assis-tance in career preparation and interviews. In parallel, platforms that facilitate careers and recruitments, de-veloped through modern web technologies, have been suggested. Platforms like Job Bridge [15], MERN-stack-based job portals [16], and candidate prediction platforms [19] are more geared toward recruitment, job posting, and candidate prediction, respectively. These platforms help in making the recruitment process effi-cient but do not contribute to improving the skills of users or assist users in interview and career readiness. While Career Verse [18] offers a more comprehensive career guidance platform, it does not offer dynamic feedback mechanisms and analytics across different fea-tures.

Various survey-based studies carried out on the usage of NLP and CV techniques for interviews, as reviewed in [13], offer interesting theoretical views, but imple-menting a unified user-oriented platform that combines different tools for preparing for interviews is still a prob-lem. On the other hand, personal education support systems, which use large language models, as reviewed in [14], mainly offer educational support, but the tools will not be extended to other areas of career preparation.

3. Proposed Methodology

The proposed methodology aims to develop a complete AI-powered job preparation platform that integrates all essential aspects of placement readiness into a single unified system. The platform supports learning, adap-tive assessments, mock interview practice, and resume evaluation through an interactive web-based applica-tion.

The system is built using modern full-stack technolo-gies and AI services. The backend and database func-tionalities are managed using Supabase, while advanced AI capabilities such as study material generation, inter-view feedback, and resume analysis are enabled using Gemini APIs. Additionally, adaptive testing is imple-mented using the Item Response Theory (IRT) algo-rithm to provide personalized difficulty progression.

3.1. System Architecture

The overall architecture follows a three-tier design:

- Frontend Tier: Developed using React.js and Tailwind CSS to provide a responsive and in-teractive user interface. Users can access mod-ules such as Study Material Generator, Adaptive MCQs, Mock Interview Simulator, and Resume Review.
- Backend Tier: Supabase provides backend ser-vices including authentication, API handling, and secure data management. It connects various mod-ules and ensures real-time synchronization be-tween the platform components.
- Database Tier: Supabase PostgreSQL database stores user profiles, learning progress, MCQ per-formance history, interview feedback reports, and resume review results. This enables long-term personalization and analytics.

3.2. Implementation of AI/ML

Artificial Intelligence forms the core intelligence layer of the platform, enhancing personalization and feedback mechanisms.

- Natural Language Processing (NLP): Gemini APIs analyze user input to generate customized study notes, concept explanations, summaries, and interview response evaluations. It also provides feedback on clarity, confidence, and communica-tion skills.
- Adaptive Learning using Item Response The-ory (IRT): The MCQ testing module uses the Item Response Theory algorithm to dynamically adjust question difficulty based on the user's estimated ability level. This ensures a smarter evaluation compared to fixed-level assessments.
- Speech and Communication Feedback: During mock interviews, AI models assess speech tone, fluency,

and confidence. The platform provides structured feedback on verbal responses and soft skills improvement.

- Resume Keyword Optimization and Matching: AI-driven resume review extracts important key-words, matches resumes with job descriptions, and suggests improvements for better Applicant Track-ing System (ATS) compatibility.

3.3. Functional Process

The complete workflow of the platform is described below:

- User Registration and Login: Users create an account and securely log in through Supabase Au-thentication. All user activities are stored and tracked for personalization.
- Adaptive MCQ Testing with IRT: The sys-tem provides topic-based MCQs and continuously adapts the difficulty level using Item Response Theory based on user performance.
- Mock Interview Simulation: Users participate in AI-driven interview sessions where responses are analyzed in real time. Feedback is provided on technical correctness, communication clarity, and confidence.
- AI Resume Review and Optimization: The re-sume module evaluates resumes against job de-scriptions, suggests missing skills, and improves keyword relevance for ATS-based screening.
- Progress Dashboard and Analytics: Users can view detailed performance insights, strengths, weaknesses, and improvement areas through an integrated dashboard.

3.4. Resume Review Algorithm Comparison

To ensure accurate resume evaluation, multiple machine learning and similarity-based algorithms were tested to determine the most effective approach for matching resumes with job descriptions.

The performance comparison is shown below:

Table 1: Resume Review Algorithm Performance Com-Parison

Algorithm	Accuracy	F1 Score
TF-IDF + Logistic Regression	0.6833	0.7669
TF-IDF + SVM	0.6875	0.7664
Cosine Similarity (Keyword-Based)	0.9942	0.9950
Semantic Matching (Embeddings)	0.9875	0.9892

Best Performing Algorithm: Cosine Similarity (Keyword-Based)

Among all approaches, Cosine Similarity achieved the highest accuracy (99.41%) and F1 score (99.50%). It was selected because it provides highly efficient keyword-level matching, which is crucial for ATS op-timization and job-specific resume tailoring. It also enables real-time resume feedback with minimal com-putational overhead, making it ideal for deployment within the platform.

3.5. Technology Stack

The complete technology stack used in the platform is as follows:

- Frontend: React.js, Tailwind CSS
- Backend Services: Supabase (Authentication, APIs, Storage)
- Database: Supabase PostgreSQL
- AI Integration: Gemini APIs for NLP-based gen-eration and evaluation
- Adaptive Testing: Item Response Theory (IRT) algorithm
- Deployment: Cloud-based scalable hosting with real-time synchronization

4. Results and Discussion

This section presents the results obtained after imple-menting the proposed AI-powered job preparation plat-form. Each module of the system is evaluated based on its functionality, user interaction, and AI-driven out-comes. The following subsections describe the working of different components along with the corresponding interface outputs.

4.1. Homepage Interface

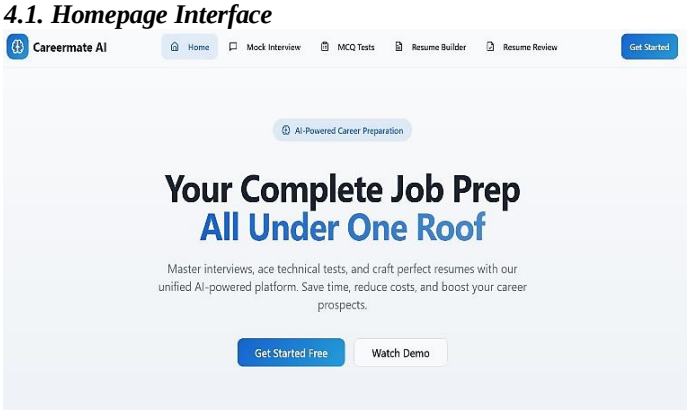

Fig 1: Homepage of the Careermate Platform

Figure 4.1 illustrates the Homepage of the Career-Mate AI platform. This is the primary entry point for users and provides an overview of the complete job preparation system.

The homepage is designed with a clean and modern user interface using React.js and Tailwind CSS. At the top, a navigation bar is displayed which allows users to seamlessly access the major modules of the platform, including:

- Mock Interview Simulator
- Adaptive MCQ Tests
- Resume Builder
- Resume Review

The central banner highlights the main objective of the system with the message *"Your Complete Job Prep All Under One Roof"*, emphasizing that the platform integrates all essential placement preparation features into a single unified solution.

4.2. AI Mock Interview Module

The Mock Interview module provides an interactive environment for users to practice real interview scenar-ios with AI-driven feedback. It supports both video-based and text-based interview formats along with per-formance analytics.

Figure 4.2 shows the Mock Interview dashboard where users can choose between Video Interview, Text Interview, and Interview Analytics for tracking progress.

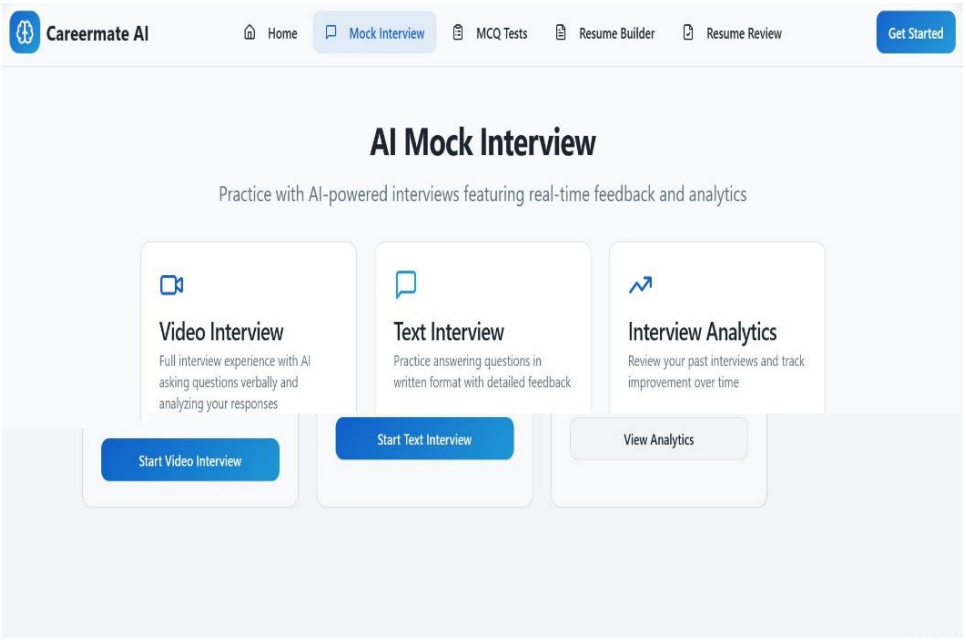

Fig 2: Mock Interview Module Options

Figure 4.3 illustrates the interview setup screen where users provide job description context and configure the number of questions before starting the AI-powered ses-sion.

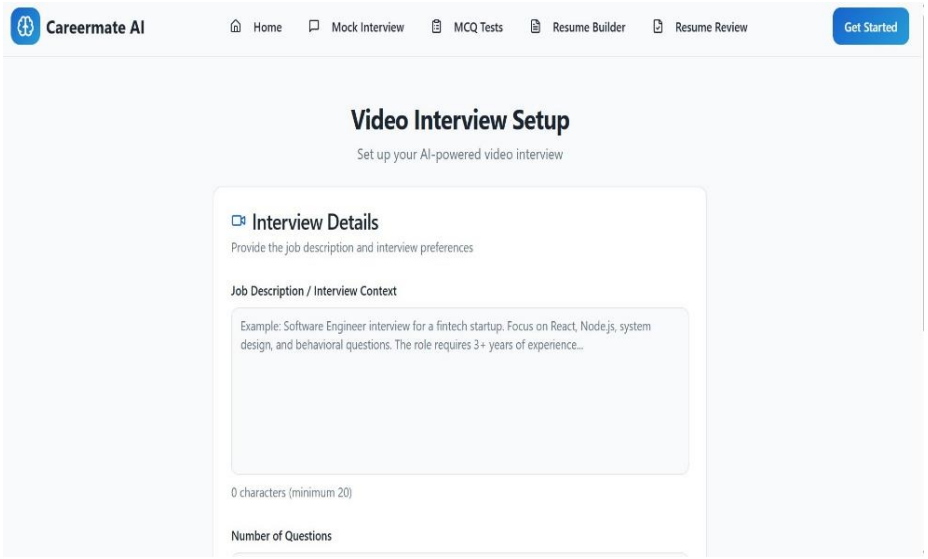

Fig 3: Video Interview Setup Interface

Figure 4.4 displays the interview guidelines provided to the user before starting the session. The AI con-ducts the interview using text-to-speech, transcribes re-sponses, and generates structured feedback after each answer.

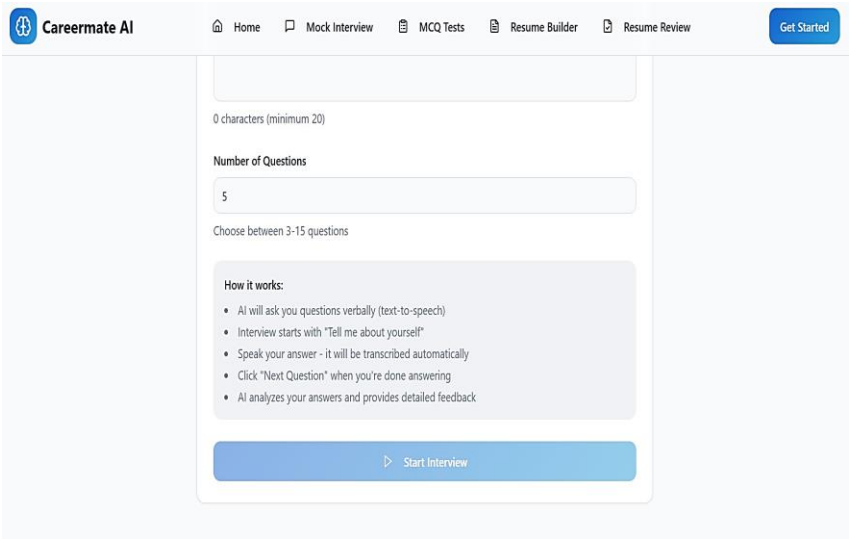

Fig 4: Interview Instructions and Start Screen

4.3. AI-Powered MCQ Tests Module

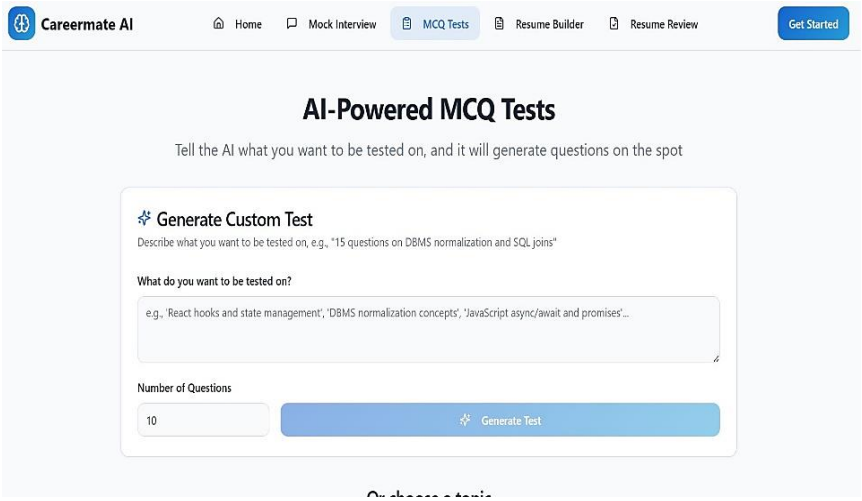

Fig 5: Custom MCQ Test Generation Interface

Figure 4.5 presents the custom test generation in-terface, where users can enter any subject or concept they want to be tested on. Users can also select the number of questions required, and the system dynami-cally generates an MCQ test based on the given prompt. This allows personalized practice tailored to the user's preparation needs.

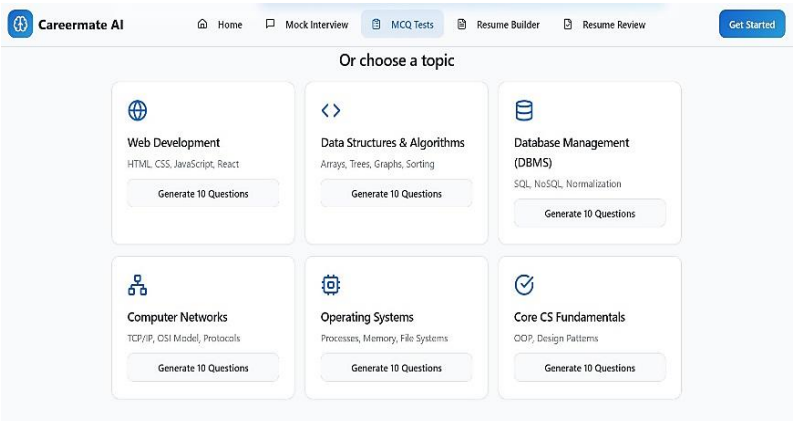

Fig 6: Popular Subject-Based MCQ Test Options

Figure 4.6 shows the topic-based test selection fea-ture, where popular core computer science subjects such as Web Development, Data Structures, DBMS, Oper-ating Systems, and Computer Networks are provided. Users can directly

click on the *Generate Questions* but-ton to instantly start a test without manually entering a prompt. This makes the learning process faster and more structured.

4.4. Resume Builder Module

The Resume Builder module in CareerMate provides an AI-assisted interface for creating professional, ATS-friendly resumes. It allows users to select templates, fill in structured details, preview the resume instantly, and download it in PDF format. This module ensures that candidates can generate job-ready resumes efficiently with proper formatting and keyword optimization.

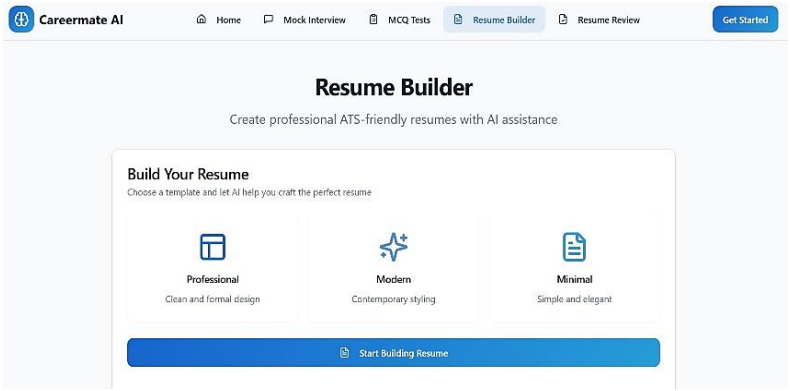

Fig 7: Resume Builder Template Selection Inter-Face

The above figure displays the initial interface of the Resume Builder module. Users are provided with multiple professional resume templates such as *Pro-fessional*, *Modern*, and *Minimal*. This helps candidates choose a layout suitable for their job role before starting the resume creation process. Users can start building the resume by clicking the button ”Start Building Re-sume” and fill in their details.

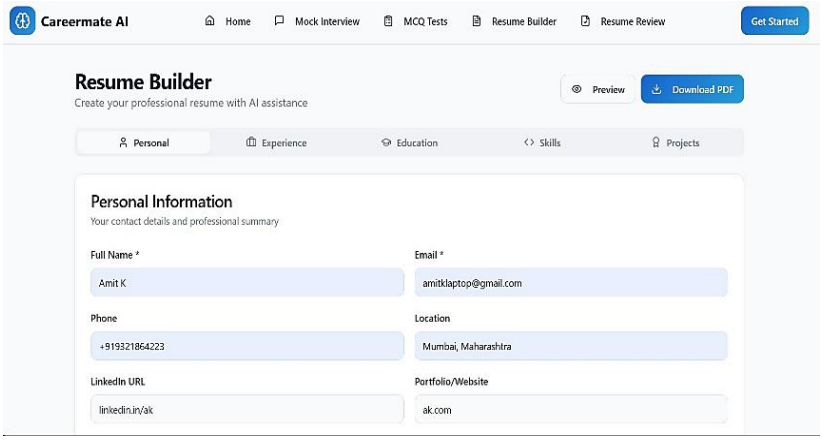

Fig 8: Resume Information form with Structured Sections

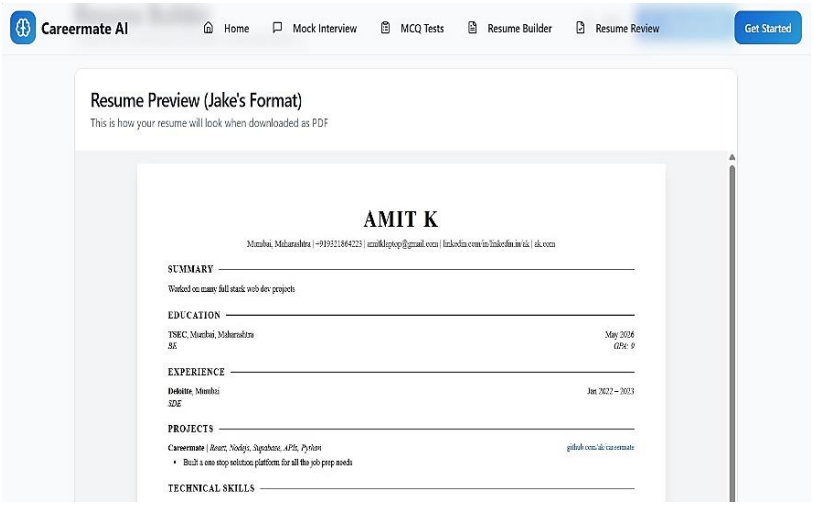

Fig 9: Generated Resume Preview in PDF Format

4.5. Resume Review Module

The Resume Review module in CareerMate provides an AI-powered evaluation system that analyzes resumes for ATS compatibility and role alignment. It generates a compatibility score, identifies strengths and issues, per-forms keyword analysis, and provides actionable im-provement suggestions to enhance resume quality.

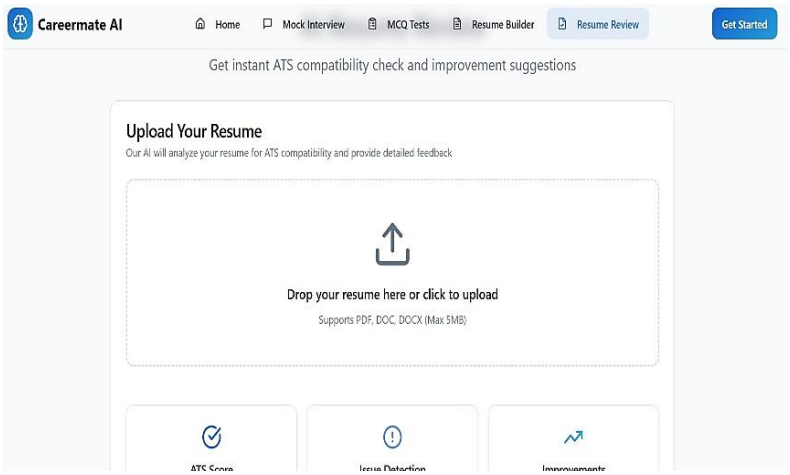

Fig 10: Resume Upload Interface for AI Review

The above figure shows the resume upload inter-face of the Resume Review module. Users can upload resumes in PDF, DOC, or DOCX format (maximum 5MB). The system initiates automated ATS compati-bility analysis after upload.

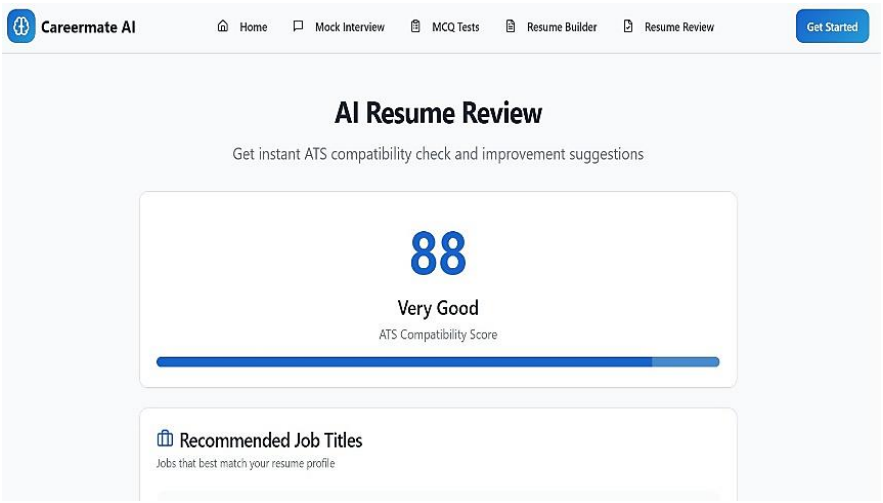

Fig 11: ATS Compatibility Score Display

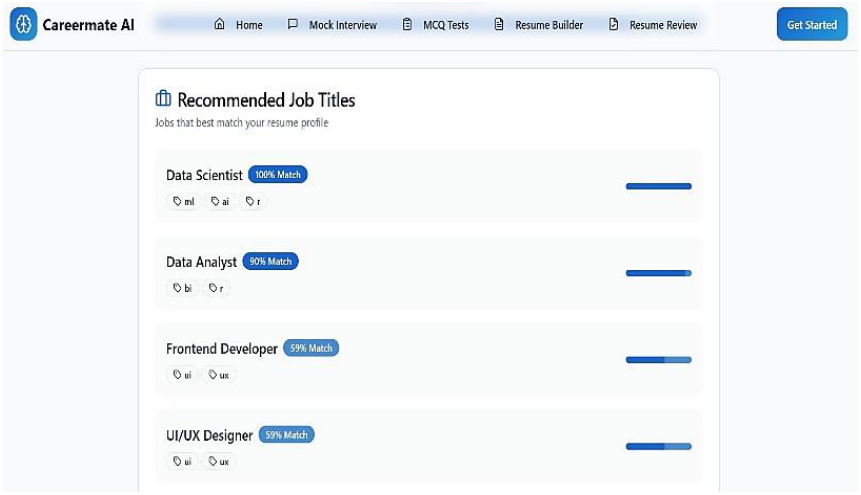

Fig 12: Recommended Job Titles with Match Per-centage

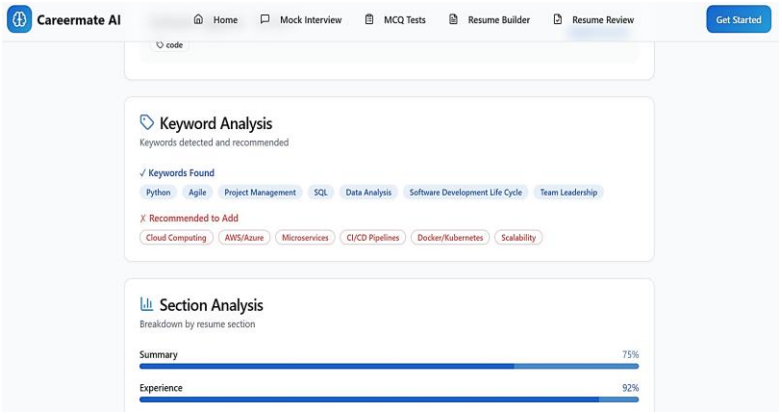

Fig 13: Keyword and Section-wise Resume Anal-ysis

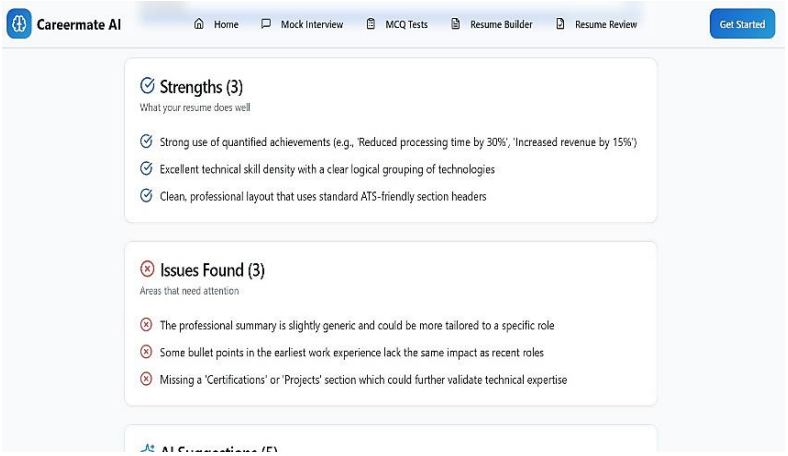

Fig 14: Strengths and Issues Identified by AI

5. Conclusion and Future Work

In this paper, we introduced CareerMate AI, an integrated AI-based job preparation tool designed to over-come the limitations of the fragmented preparation tools commonly used by students today. Unlike existing plat-forms that focus only on specific aspects such as ap-titude tests, mock interviews, or resume creation, the proposed system provides a holistic solution by integrat-ing adaptive MCQ tests, AI-powered mock interviews, automated resume generation, and AI-driven resume review into a single platform. These functionalities are implemented using Natural Language Processing tech-niques to ensure intelligent assessment and feedback.

A functional prototype of the complete system was developed and tested to demonstrate its feasibility and practical applicability. The evaluation results indicate that integrating assessment, feedback, and resume anal-ysis within a unified system enhances usability, simpli-fies progress tracking, and improves overall preparation efficiency. Furthermore, the system enables users to identify skill gaps effectively by aligning preparation strategies with specific job roles.

Although the system demonstrates promising results, it currently relies primarily on text-based analysis and user-scale evaluation metrics. Future work will focus on incorporating speech-based interview analysis to en-hance realism and effectiveness. Additionally, large-scale user studies will be conducted to validate the system's performance across diverse user groups. Fur-ther enhancements may include readiness analytics, ad-vanced performance insights, and long-term behavioral personalization to provide tailored career guidance.

Overall, the proposed integrated AI-driven frame-work highlights the potential of intelligent systems in transforming career preparation processes in highly competitive professional environments.

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