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AI-Based Framework for Career Advancement

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Abstract - The advancement of artificial intelligence (AI) has opened new possibilities in education and career development. With rising demand for skilled professionals in the digital era, there is a growing need for scalable platforms that provide real-time feedback and personalized career guidance. Existing platforms lack voice-based interaction, personalized guidance, and comprehensive feedback mechanisms. This project addresses these gaps by developing an integrated AI-Based Framework for Career Advancement that combines voice-enabled mock interviews, personalized career planning, resume generation, knowledge assessment, and progress tracking. Its modular architecture enables continuous learning and provides assistance throughout the user's career development journey.

The project aimed to design and implement a web-based career advancement platform where each module was powered by AI. The core methodology included developing a voice-interactive mock interview system, building an AI-driven career roadmap engine for personalized growth paths, and creating tools for automated resume generation and quiz-based assessments. The developed system successfully empowers users to navigate career development through an AI-driven interface. Real-time data handling and secure authentication mechanisms contribute to a scalable, reliable solution that ensures a smooth user experience through integrated AI voice interaction and automation.

Key Words: Voice based interview simulation, AI career guidance, career roadmap generator, resume parser, ATS compliance, AI-powered feedback.

1.INTRODUCTION

In today's rapidly evolving digital landscape, the transition from education to employment presents a significant challenge for students and job seekers. While academic qualifications play a critical role, employers prioritize soft skills, technical proficiency, problem-solving ability, and real-world readiness. Many individuals lack access to personalized career guidance and interview practice that can help them bridge the gap between education and industry expectations. This gap often results in underprepared candidates struggling to navigate the competitive job market effectively. An AI-driven solution can address these challenges by offering tailored guidance and interactive learning.

AI-Based Framework for Career Advancement was developed to address these challenges by providing an integrated platform that empowers users to enhance their employability through a combination of AI-driven tools. This platform offers a voice-interactive mock interview system that simulates real interview scenarios and generates feedback reports. It also includes a personalized career roadmap engine, a resume builder, and a skill-based quiz system with auto-certification. By leveraging Artificial Intelligence (AI), Natural Language Processing (NLP), and modern web technologies, the system enables users to prepare for their careers with minimal dependency on human intervention or external resources. This comprehensive approach ensures a seamless and scalable career development experience tailored to individual goals and capabilities.

This framework stands out by offering a holistic, personalized experience. The AI-powered mock interview module provides real-time feedback, enabling users to practice and improve iteratively. The career roadmap generator tailors learning paths based on individual goals and current competencies, offering users a clear direction for growth. The resume builder simplifies professional document creation, while the quiz module evaluates domain knowledge and generates certificates, enhancing users' portfolios. Together, these modules form a unified platform that not only supports career readiness but also boosts the candidate's confidence and self-awareness. The system encourages continuous improvement by tracking user progress and adapting recommendations accordingly. The framework ultimately empowers users to take control of their career journey with confidence, clarity, and personalized support.

2. LITERATURE REVIEW

[1] The research titled, titled "Ensuring Accessible AI Based Students Cognitive Assistance for Improving Career Growth" by Deepakraj S. and Radha Krishnan K.R, presented at the IEEE Conference in 2025, introduces an intelligent student assistance system that leverages machine learning, natural language processing (NLP), and graph-based recommendation models. The platform aims to provide real-time career support by analyzing student behavior and interests. A sentiment-driven goal analysis is integrated to enhance the accuracy of career path suggestions.

[2] The research paper titled 'A Student Career Guidance using Generative AI" by Rahul Waikar, Tanmai Tale, Rujul Talkar, and Tanish Singla, presented at the IEEE Conference in 2024, focuses on designing an AI-driven web application that utilizes generative AI models to offer tailored career counseling. The system incorporates behavioral counseling principles alongside user-provided data such as interests,

academic background, and skills. The generative AI engine produces dynamic career suggestions aligned with the user's personal goals and market trends, thus bridging the gap between traditional counseling methods and modern AI solutions.

[3] The IEEE Conference paper "Career Navigator: Your AI Career Counsellor" authored by Vedant Bhagwan, Aryan Thaploo, and Arjun Tyagi in 2024 proposes an AI-powered career advisor system using a K-Nearest Neighbors (KNN) algorithm for predicting suitable job roles. The system is built using Flutter for frontend development, Flask for backend services, and Scikit-learn along with Google APIs for model implementation. The study includes a comparative analysis of KNN with other algorithms like Random Forest and Decision Tree.

[4] The paper titled AI Driven Virtual Mock Interview Development by Thanga Mariappan, Gina Rose, and In-Ho Ra, presented at the IEEE Conference in 2024, introduces a virtual mock interview system powered by GPT-4 and natural language processing techniques. The platform offers intelligent, personalized interview sessions designed to simulate real-world interactions. By utilizing GPT-4's language capabilities, the system generates dynamic and context-aware questions, providing tailored feedback.

[5] The research paper "Enhancing Employability Through an Advanced Mock Interview Platform for Fresh IT Graduates" by Nelum Amarsena, Shamim Fernando, and Nirmal Chandrasiri (EEE Conference, 2024) explores developing a mock interview platform using large language models for question generation and convolutional neural networks for non-verbal cue analysis. The system provides holistic feedback by combining linguistic and visual data, with real-time evaluation and adaptive question flow to improve personalization and effectiveness for IT graduates' employability.

3. PROBLEM STATEMENT

Preparing for a professional career requires more than academic knowledge. It demands communication skills, confidence, technical expertise, and effective interview readiness. However, many students and job seekers lack access to personalized support systems. Traditional career development methods like offline coaching, generic interview videos, and resume templates are often outdated, fragmented, or inaccessible to diverse user groups. These limitations make it difficult for individuals to identify their strengths and weaknesses, prepare strategically for interviews, or map out a realistic career path.

To address these challenges, this project proposes a unified, AI-powered platform for career advancement. The system integrates voice-based mock interviews, AI-generated feedback, personalized career roadmaps, resume generation, and auto-certifying skill assessments. Leveraging technologies such as Natural Language Processing (NLP), machine learning, and voice interaction, the platform delivers a scalable, intelligent, and adaptive career support experience. It empowers users with tailored guidance, real-time feedback, and progress tracking—helping them build confidence and prepare effectively for the competitive job market.

4. OBJECTIVES

The primary objective of this project is to design and implement an AI-based, web-enabled platform that empowers students, fresh graduates, and job seekers to prepare effectively for their professional careers. The platform aims to provide an integrated, end-to-end career support system that replaces fragmented, generic, and manual methods of career counselling with an intelligent, interactive, and personalized experience. This comprehensive solution addresses the growing need for accessible, technology-driven career guidance in today's competitive job market, and succeed in a competitive job market.

Key Objectives:

- **AI-Powered Mock Interview System** - Develop a realistic interview simulation using AI and NLP that conducts domain-specific technical and HR interviews with voice-based questions, analyzing responses for tone, clarity, and content to provide detailed feedback on strengths and improvement areas.

- **Dynamic Career Roadmap Generator** - Build an intelligent engine that creates personalized growth plans based on users' current skills, interests, and career goals, recommending specific skills, certifications, and timelines through a visual dashboard interface.

- **AI-Enhanced Resume Optimization** - Create a resume parser that helps users develop and optimize professional-quality resumes with AI-driven content analysis, ATS compliance checking, grammar corrections, keyword enhancements, and role-specific suggestions.

- **Skill Assessment and Certification Module** - Implement a comprehensive quiz system that evaluates technical knowledge across various domains and automatically generates certificates upon completion, providing verifiable credentials for users' portfolios.
- **Integrated Career Preparation Experience** - Deliver a smart, inclusive, and confidence-building platform that combines all modules into a unified system, helping users gain clarity on career direction and succeed in the competitive job market.

5. SYSTEM ARCHITECTURE

The architecture of the AI-Based Framework for Career Advancement adopts a multi-layered architecture that integrates AI processing, user interaction, voice communication, and data storage. Each module operates independently but shares a unified user interface and centralized data access for optimal performance. The platform is logically divided into several core components, each responsible for specific functionality. These components interact over RESTful APIs and share authentication and database resources to ensure data consistency and security.

Fig 1: System Architecture Diagram

The figure 1 represents the system architecture diagram of the AI-Based Career Advancement Framework. The authentication and authorizations layers are managed by Clerk, which handles both traditional email/password sign-ins and OAuth-based logins. Clerk also manages session tracking using JWT tokens and enables role-based access control, ensuring that different user types such as students, mentors, and administrators have appropriate permissions. Additionally, Clerk provides support for organization-level access control, allowing multi-tenant usage and secure isolation of user groups within the same platform.

The AI service integration layer is responsible for all the intelligent processing and decision-making within the system.

OpenAI APIs are used extensively to generate interview questions, evaluate user responses, analyze resumes, and provide intelligent feedback and suggestions. This layer also includes the use of local machine learning models.

The voice interaction layer integrates the Retell AI API to enable voice-based mock interviews. This includes real-time voice-to-text transcription, text-to-speech synthesis, and managing natural conversations with users. Retell AI connects with the application via WebRTC and Web Audio APIs, enabling a browser-native voice interface that simulates real interview scenarios. This feature enhances user engagement and helps assess soft skills such as communication and confidence.

The data layer is managed using Supabase, which is a PostgreSQL-based backend-as-a-service. It supports real-time data synchronization and stores critical user data such as profiles, resumes, quiz results, and certificates. Supabase also integrates with Clerk to store authentication metadata and manage user roles. Serverless functions provided by Supabase are used for custom logic, such as storing resume scores and generating certificates based on quiz completion. The backend API layer is implemented using Next.js API routes, which serve as the bridge between the frontend and all integrated services. These routes handle secure communication with third-party services like OpenAI, Retell AI, and Supabase.

6. IMPLEMENTATION

This project focuses on building an AI-powered, web-enabled career advancement platform that integrates multiple modules, including voice-based mock interviews, an AI-driven resume parser, personalized career roadmap generation, auto-certifying quizzes.

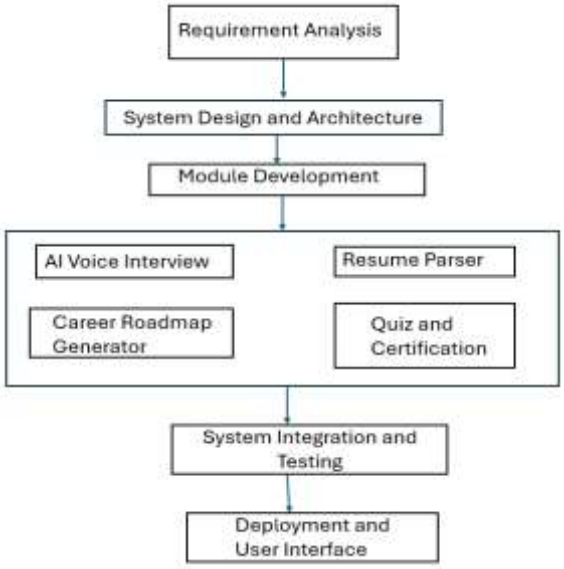

Fig 2: Implementation Process Flowchart

The figure 2 illustrates the systematic development approach for the AI-based career advancement platform. The implementation process follows a structured six-phase methodology, beginning with requirement analysis.

This is followed by system design and architecture planning to establish the technical framework. The third phase involves module development, which branches into four parallel components: AI Voice Interview module for conducting mock interviews, Resume Parser for document processing and optimization, Career Roadmap Generator for personalized career planning, and Quiz and Certification module for skill assessment. After individual module development, the process proceeds to system integration and testing to ensure seamless functionality across all components. The final phase focuses on

deployment and user interface implementation to deliver a comprehensive web-based platform for career development.

TypeScript and Next.js were selected as the primary languages for both frontend and backend development, offering strong type safety, improved code maintainability, and scalability ideal for building a unified full-stack application. On the backend, Next.js API Routes handle core server-side operations such as API routing, session management, and integration with AI services like the OpenAI API and Retell AI. These services power modules such as career roadmap generation, resume analysis, and real-time voice-based mock interviews. Retell AI specifically handles speech recognition and text-to-speech processing for spoken responses, while OpenAI enables natural language understanding and intelligent feedback generation.

Supabase was adopted for database management, offering a scalable PostgreSQL backend with real-time data handling and integration with the frontend via secure APIs, while Clerk manages authentication and user session control, enabling role-based access and organization-level permissions.

7. RESULTS

The AI-Based Career Advancement Framework was successfully developed and deployed as a comprehensive web application that effectively addresses the career preparation needs of students, fresh graduates, and job seekers. The platform demonstrates seamless integration of all four core modules, providing users with an intuitive interface to access voice-based mock interviews, personalized career roadmaps, resume optimization tools, and skill assessment quizzes. Each module was tested independently and then integrated into the full-stack application to validate end-to-end functionality.

The performance of the AI-Based Career Advancement Framework was evaluated across multiple modules including the voice-based interview system, AI-generated quiz module, career roadmap generator, and resume parser with ATS scanning. Each module was tested for usability, accuracy, responsiveness, and system integration.

Fig 3: Home Page of the AI-Based Career Advancement Framework

The figure 3 shows the home page of the AI-Based Career Advancement Framework, titled nextSteps.AI. This centralized interface allows users to navigate between key modules such as Interviews, Interviewers, Career Roadmap, Resume Parser, and Quiz Generator. The mock interview system accurately processes voice inputs through Retell AI integration, delivering comprehensive feedback on communication skills, technical knowledge, and overall interview performance within seconds of completion. The resume parser demonstrates high accuracy in extracting and analyzing resume content, successfully identifying improvement areas and providing ATS-compliant suggestions that enhanced user resume quality.

The overall impact assessment reveals that the AI-Based Career Advancement Platform successfully bridges the gap between academic preparation and industry requirements, providing users with a comprehensive toolkit for career development. The platform's ability to provide instant, personalized feedback and actionable insights has proven valuable for career preparation, while the automated certificate generation and progress tracking features enable users to document their skill development journey effectively. The successful integration of cutting-edge AI technologies with user-centric design principles has resulted in a scalable, efficient, and impactful solution that transforms traditional career counseling approaches into an intelligent, accessible, and comprehensive digital experience that empowers users to navigate their professional growth with confidence and clarity.

7. CONCLUSION

The AI-Based Framework for Career Advancement successfully integrates multiple intelligent modules—voice-based interview simulation, resume parsing and ATS optimization, AI-generated career roadmaps, quiz generation, and result-based certification into a single cohesive system. This project demonstrates how artificial intelligence can be leveraged to personalize career development paths, assess user strengths, and provide constructive feedback in an interactive environment.

Each module contributes uniquely to the overall goal. The voice interview simulator helps users practice and receive feedback on communication and technical articulation. The resume parser and job matcher evaluate resumes for compatibility with job roles and offer suggestions for improvement. The roadmap generator assists users in navigating their skill-building journey, while the quiz module tests conceptual understanding and encourages self-paced learning.

Through iterative testing and UI refinement, the system has proven to be an effective tool for learners, job seekers, and career coaches. The project's architecture ensures modularity,

allowing for easy scalability and maintenance. Overall, the platform bridges the gap between learning and real-world readiness, making career planning more data-driven and adaptive.

8. LIMITATIONS

The AI-Based Career Advancement Framework integrates several AI-powered modules to support users in their career growth. The current implementation presents certain limitations that affect its real-world applicability. One of the key limitations is the restricted variety of AI interviewer personas. The platform currently includes only two virtual interviewers with fixed personalities. Introducing a broader selection of interviewers with varying difficulty levels could make the mock interview experience more realistic and effective.

Another limitation lies in the lack of multilingual support throughout the platform. All core modules including voice interviews, resume analysis, and career roadmap generation are available only in English. This reduces accessibility for users who are more comfortable with other languages. Overcoming these limitations in future iterations would allow the system to reach a broader audience and offer a more personalized, accessible, and impactful career development experience.

8. FUTURE ENHANCEMENTS

Future enhancements can be introduced to improve the functionality, inclusiveness, and real-world relevance of the AI-Based Career Advancement Framework. The integration of multilingual support across all modules would make the platform accessible to non-English speakers and learners from various linguistic backgrounds, expanding the user base while providing personalized experiences for individuals in multilingual regions.

Additionally, connecting users with mentors or career coaches through scheduled sessions or chat-based guidance could add a human layer to the platform's AI-driven feedback system. These future enhancements will help make the AI-Based Career Advancement Framework more inclusive and better suited to meet the needs of different types of users. By adding features like community support, and live job connections, the platform can grow beyond just a learning tool and become a complete solution for career development.

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