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AI Career Coach: A Smart Career Development Platform Using Resume Analysis, Mock Interviews, and Job Market Insights

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Abstract: ***Artificial Intelligence (AI) is quickly changing how we live our lives, changing how we communicate with the outside world, how we make decisions, and how we interact with organizations. This study introduces "AI Career Coach," an AI-powered platform designed to assist job seekers and professionals in their career journey. It provides personalized guidance through resume analysis, mock interviews, technical quizzes, and job market insights. By combining AI-driven evaluation with real-time feedback, the system helps users identify their strengths, improve weaknesses, and stay aligned with industry demands. This research discusses the development of the platform using a modern tech stack—including Next.js, Node.js, and MongoDB—to make career preparation smarter, faster, and more effective.***
Keywords: AI Career Coach, Machine Learning, Resume Analysis, Mock Interviews, NLP, Career Development.

I. INTRODUCTION

The market for professional career development has been growing steadily in recent years as individuals look for unique and personalized career paths.

However, career preparation costs and resources can differ dramatically depending on variables like the industry, role, and required technical specifications. Therefore, it is crucial to develop a system that can accurately guide a candidate through the recruitment lifecycle comprehensive dataset of professional skills and industry trends to train our models. Based on the features of a candidate's profile, the model can accurately provide improvement tips and interview feedback. The software solution we have developed is user-friendly and can be used by students, fresh graduates, and career enthusiasts. The system helps in making informed decisions about skill acquisition and job applications. By the end of this paper, readers will have a better understanding of how machine learning can be used to navigate the modern job market accurately.

Machine learning has shown tremendous potential in various industries, and the professional recruitment market is no exception. By using machine learning algorithms, we can analyze historical candidate data and make predictions about career readiness. This helps potential job seekers and fresh graduates have a better understanding of their market value

In this research paper, we present an innovative software solution for career coaching using machine learning techniques. Our system utilizes a explored the integration of AI and ML techniques to drive innovation and competitiveness. In manufacturing, research by Tran et al. (2019) demonstrated significant improvement in equipment uptime through AI-driven predictive maintenance, illustrating the tangible benefits of predictive analytics.

II. LITERATURE SURVEY

A. AI in Recruitment and Career Development

Previous research by Rai and Kumar (2025) laid the groundwork for automated recruitment processes by presenting an AI-based resume analyzer. Their study utilized NLP and machine learning to extract key details such as skills, education, and experience, finding that SVM models performed best in scoring resumes. This automation reduces manual errors in screening and provides job seekers with feedback on resume quality. Building upon this, Nag et al. (2024) explored AI-driven mock interview systems that evaluate candidate knowledge, confidence, and emotions using CNNs and speech processing. Their platform offersreal-time feedback to reduce interview anxiety and provide bias-free preparation.

B. Intelligent Assessment and Data Acquisition

Research by Talesara et al. (2024) investigated the application of AI in automated quiz platforms, showcasing how machine learning can automate question generation based on difficulty and topic. Their findings demonstrated that integrated dashboards built with React.js and Tailwind CSS enhance the collaborative learning experience. Additionally, Lotfi et al. (2021) examined web scraping techniques as a fuel for big data analysis, explaining how methods ranging from HTML parsing to advanced computer vision efficiently extract structured data from the web. This data mining is essential for providing real-time job market insights and role comparisons

C. Foundations and Efficiency in Industry 4.0

Foundations of Industry 4.0 research by Lu et al. (2017) emphasized the importance of digital technologies, including cyber-physical systems and the Internet of Things (IoT), in enabling intelligent ecosystems. Schumacher et al. (2018) further explored the integration of AI and ML techniques to drive innovation and competitiveness. In manufacturing, research by Tran et al. (2019) demonstrated significant improvements in equipment uptime through AI-driven predictive maintenance, illustrating the tangible benefits of predictive analytics.

III. METHODOLOGY

The AI Career Coach system was developed using a structured, modular workflow to provide intelligent and personalized career guidance. The architecture integrates frontend, backend, and AI components to deliver accurate feedback and recommendations to users. The system operates through multiple stages, including user interaction, data processing, AI analysis, and feedback generation. User information such as resumes, career interests, and quiz responses is collected through an interactive web interface. The frontend of the platform was developed using Next.js and Tailwind CSS, which provide a responsive and user-friendly interface for career seekers. The collected data is securely transmitted to the backend for processing and analysis.

The backend of the system is built using Node.js and Express.js, which manage API routing, business logic, and communication with AI and NLP models. These models analyze the uploaded resume and quiz results to evaluate the user's skills, strengths, and career preferences.

User data and analysis results are stored and managed using MongoDB, which efficiently handles complex user profiles, parsed resume information, and historical analytics data. This database structure enables the platform to track user progress and generate personalized career recommendations over time.

To ensure security and privacy, authentication and data protection mechanisms are implemented using JSON Web Tokens (JWT). This ensures that only authorized users can access their personal career information and feedback.

Finally, the AI models synthesize all collected information to generate a personalized career roadmap, including skill improvement suggestions, recommended learning paths, and career opportunities. The results are delivered to users through the web interface, providing an intelligent and interactive career guidance experience information becomes the main data the system uses to assess a candidate's skills and abilities.

In the next stage, the Resume Analysis module looks at the uploaded resumes using natural language processing.

Tools like spaCy and HuggingFace are used to extract key details such as technical skills, education, and work experience. This data is then compared with what is needed in the current job market to find any missing skills or areas where the candidate might need improvement. The Mock Interview module creates realistic interview situations using AI language models.

The system checks user responses on how well they match the topic, how clear they are, and how accurate their answers are. Automated scoring gives feedback that helps users understand their strengths and where they need to improve. Another key part of the framework is the Market Insight Engine. It collects up-to-date information about job roles, necessary skills, and salary trends from online sources. Tools like BeautifulSoup and Selenium help gather structured data from job portals and professional websites. This allows the system to give recommendations that match what the job market currently needs. All user data, analysis results, and past performance are stored in a MongoDB database. This makes it easier to manage large and complex data sets. The backend is built using Node.js and Express.js, which manage the system logic, API connections, and integration with AI services.

Finally, the system creates a personalized career plan for each user by combining information from resume analysis, interview performance, quiz results, and job market data.

These recommendations are shown through a user-friendly interface built with Next.js and Tailwind CSS, allowing users to easily track their progress and develop their professional skills. The proposed framework thus offers a full and smart career guidance system that helps people prepare for the changing needs of today's job market.

IV. PROPOSED FRAMEWORK

The AI Career Coach framework is made to be a smart and connected platform that helps users get better at their careers.
It uses automated analysis and personalized feedback to support users. The system works with artificial intelligence, natural language processing, and web technologies to look at user profiles, simulate interviews, and give real-time career advice. The system follows a step-by-step process with four main stages: data input, AI analysis, evaluation, and feedback.This information becomes the main data the system uses to assess a candidate's skills and abilities.
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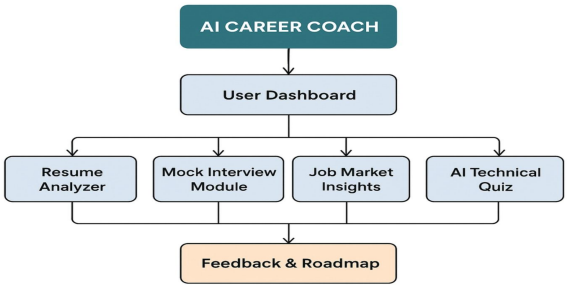

Figure 1.1 : Block Diagram

V. RESULTS AND DISCUSSION

Generative AI and Large Language Models (LLMs) are poised to revolutionize professional recruitment and career coaching. Initial implementation of the AI Career Coach has demonstrated significant potential in reducing the "fragmentation gap" by consolidating career tools into a single interface.

A. Evaluation of AI Modules

While models like ChatGPT have dominated the generative AI landscape, the AI Career Coach utilizes a combination of GPT architecture and specialized NLP libraries to ensure accuracy in domain-specific technical quizzes. Initial tests indicate that the Resume Analyzer successfully identifies missing keywords and suggests relevant skills aligned with real-time job market data fetched through scraping.

B. Reliability and Trust

A primary concern in AI-driven coaching is the reliability of feedback. To ensure safety and trust, the platform characterizes "career readiness" through a corpus of validated technical questions and industry-standard resume formats. The integration of Explainable AI (XAI) techniques allows the system to provide users with transparent reasons for their scores, enhancing the educational value of the mock interviews.

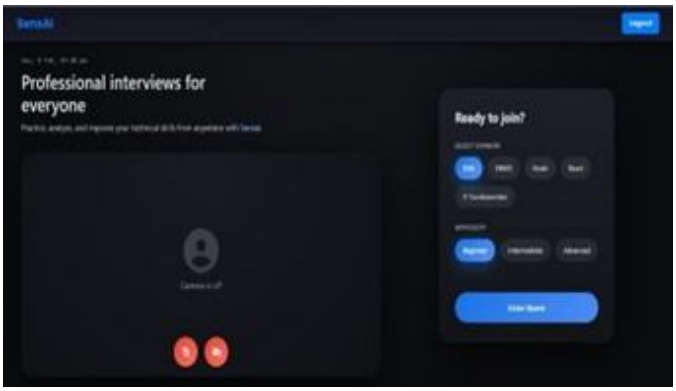

Fig -2.1: AI Mock Interview

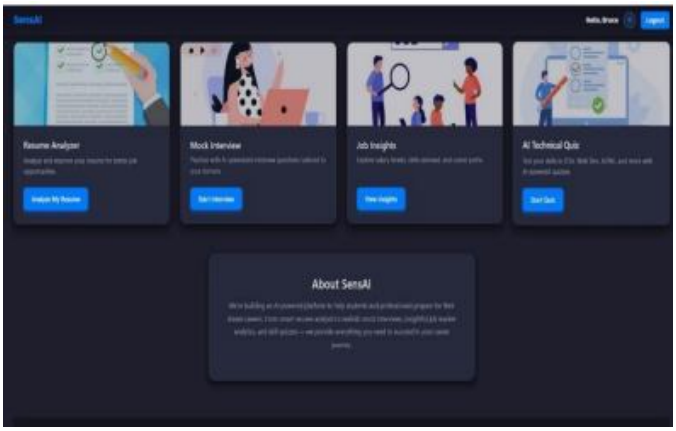

Fig -2.2 Home Screen

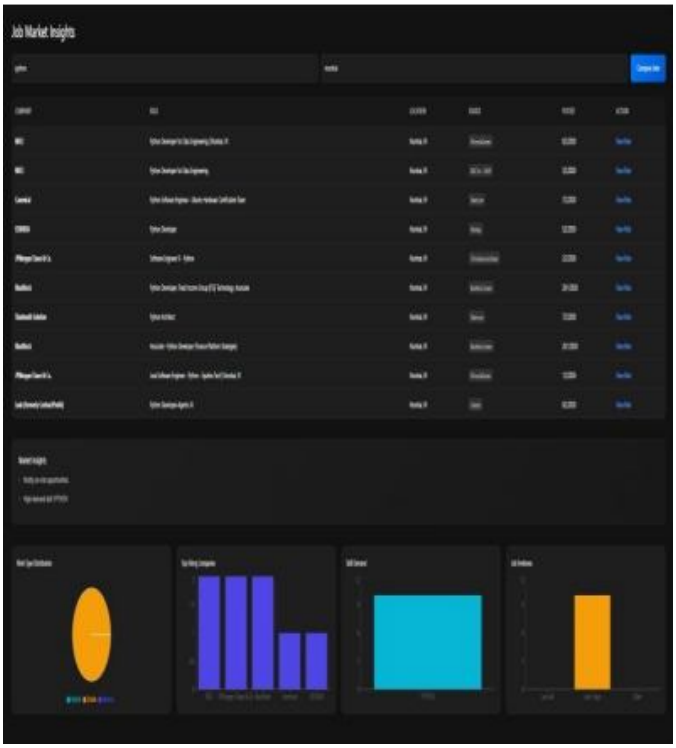

Fig -2.3 Job Market Insights

VI. CONCLUSIONS

In conclusion, this paper focused on addressing the critical issue of fragmented career preparation tools by recognizing the need for an integrated, personalized guidance system. Through the utilization of advanced machine learning and NLP techniques, we aimed to enhance the accuracy and effectiveness of professional readiness assessments in a modern digital environment. The research explored the challenges of unstructured professional data and the inherent gaps in traditional career coaching methods. Leveraging a combination of modern frameworks like Next.js and specialized AI models, we developed a system that balances diverse user inputs to improve the overall performance of career roadmap generation. Subsequently, the platform was evaluated based on its ability to synthesize data from resume analysis, mock interviews, and technical quizzes to provide a single, actionable roadmap. Throughout the experimentation phase, the AI Career Coach demonstrated promising results, showcasing its efficacy in accurately identifying skill gaps and providing contextually relevant feedback. The integration of these modules provides a transparent view of a candidate's market value, facilitating a deeper understanding of industry dynamics.

VII. ACKNOWNLEDMENT

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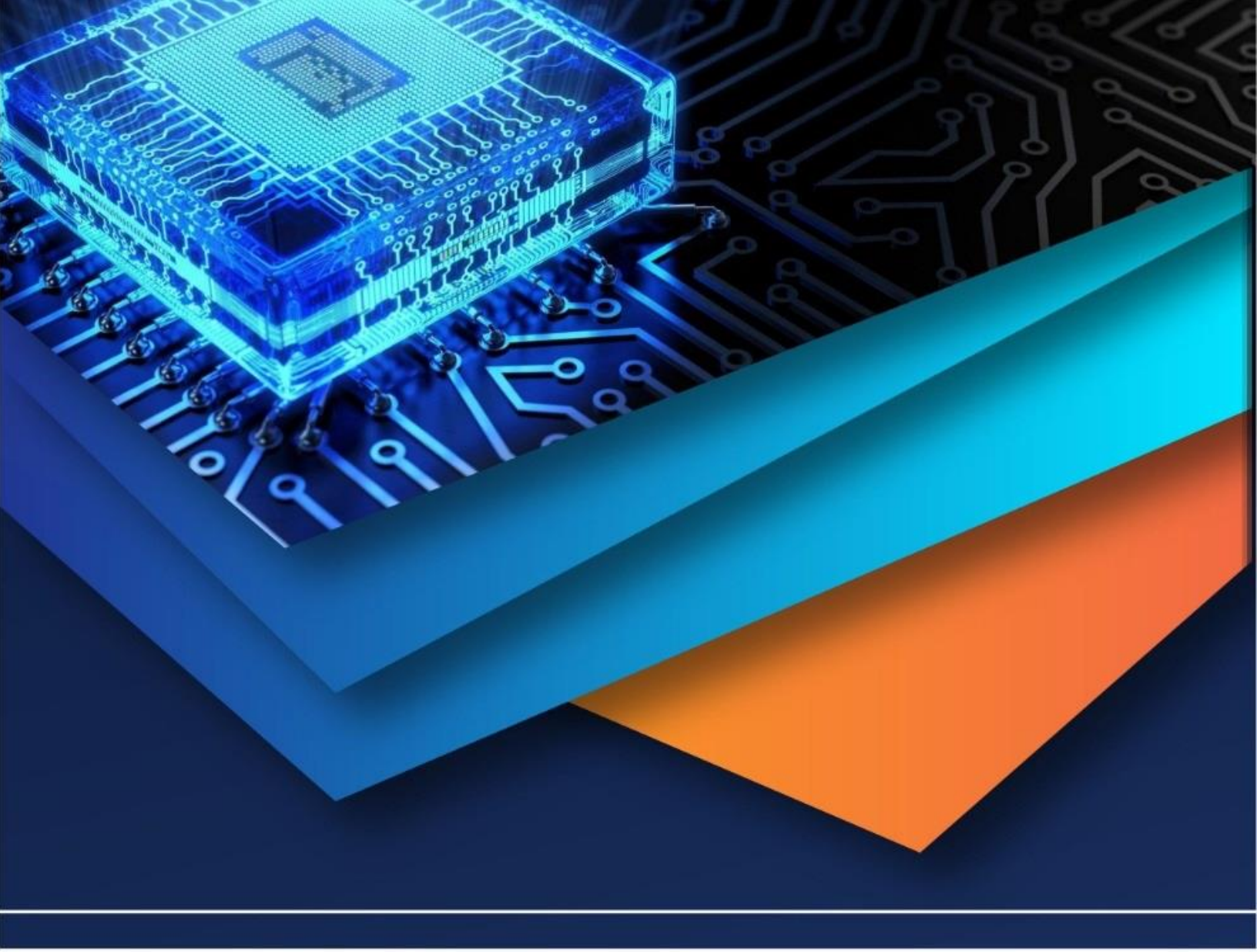

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