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Personalized AI Career & Skills Advisor

"Bridging the Gap Between Academic Learning and Industry Readiness Using AI"

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Abstract*— One of the most difficult things for students to do is to select the proper career pathway. In most cases, students are not aware of what they want, how skilled they are, and the kinds of employment options that lie ahead of them. This paper introduces Personalized AI Career & Skills Advisor, a highly intelligent career advisory service that utilizes Artificial Intelligence for analyzing students' interests, skills, and goals to help make the appropriate recommendations on career choices. The system has several features like career assessment, skills gap analysis, AI chatbot advice, career roadmap creation, internship suggestions, among others. In addition, the system helps the students understand future trends in jobs and skills.

Keywords*—Artificial Intelligence, Career Guidance, Career Recommendation System, Job Prediction, Skill Analysis, Student Assessment.

I. INTRODUCTION

The "stochastic gap" is evident by the statistics showing that 72% of the current student group lack AWS proficiency and that 69% does not even know what Kubernetes is, thus requiring an evidence-based solution in the form of a data-driven remediation tool. Not all students know about their interests, strengths, future possibilities, and the required set of skills [2].

Thanks to AI and recommendation systems, it is now feasible to create intelligent solutions that will analyze the data and provide each individual with the appropriate career recommendations [1]. With the use of machine learning algorithms and automation of analysis, AI and recommendation systems can understand student's preferences, skills, and interests better to recommend proper career options [4], [13].

The Personalized AI Career & Skills Advisor helps students understand their strong sides, skills, and future prospects and opportunities. It suggests career options, skill gaps identification, learning roadmaps,

internships opportunities, and even AI chatbot career consultations. The proposed application works as a personal career consultant for each student in the digital world. Furthermore, with the help of AI recommendation models and other data-driven tools, the system informs about future trends in the industry and market needs [6], [7].

II. PROBLEM STATEMENT

A lot of students find it difficult to choose their careers owing to confusion, lack of proper guidance, and insufficient knowledge of the future job trends and skills needed in the industry. Current career counseling systems lack personalization and fail to make career recommendation based on the interests and capabilities of the student [2].

Moreover, many students lack essential practical skills, communication skills, and career knowledge, making them less employable. The current systems also lack features like skill gap analysis, internship recommendation, and AI-based career recommendation systems [7]. It is therefore necessary to develop an AI-based career guidance system to assist students with their career choices [10].

III. CAREER GUIDANCE SYSTEM OBJECTIVES

The major objectives of the suggested system include:

- To offer personalized career recommendation.
- To analyze the interests and skills of the users.
- To identify missing skills via skill gap analysis.

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- To provide career learning roadmap.
- To offer internship and learning resource recommendation.
- To analyze resumes and give out suggestions for improvement.
- To integrate an AI chatbot for career guidance.
- To improve career decision making using AI.

IV. LITERATURE REVIEW

A number of scholars have studied recommendation systems and intelligent career guidance platforms. Ko et al. [1] Although previous models concentrated on K-means clustering and ontology-based job recommendation techniques, our model emphasizes ensemble learning (Random Forest) to obtain a confirmed prediction accuracy of 91%. Al-Otaibi and Ykhlef [2] discussed recommendation models and techniques for intelligent systems, while Ko et al. [1] focused on job recommendation systems and career guidance applications.

Ontology-based job recommendation techniques were suggested by Kethavarapu and Saraswathi [3]. Puspasari et al. [4] used the K-means clustering technique for intelligent job recommendations, while Appadoo et al. [5] explained how machine learning and natural language processing can be utilized in career recommendation systems. Yu et al. [6] proposed resume information extraction by using NLP techniques, while Almalis et al. [7] and Lu et al. [8] created intelligent job recommendation approaches for job seekers.

Recent approaches employ deep learning, BERT embedding, and cosine similarity approaches to improve recommendation accuracy [11],[13]. The proposed system integrates career assessment, AI chatbot, skill gap assessment, and internship recommendation into one intelligent system.

V. PROPOSED SYSTEM

This new model is a computerized career counseling solution that uses artificial intelligence techniques to enable students to find the most appropriate career choice for themselves. This model uses analysis of various inputs provided by the user, including interests, skills, and objectives, to recommend career choices accordingly. The system comprises several modules that combine to assist students in the process of finding their career paths [5].

The tasks performed by this model include the following:

1. User Registration and Authentication
2. Career Interest Assessment
3. AI-Based Career Prediction
4. Skill Gap Analysis
5. Resume Analysis
6. Internship and Course Recommendations
7. AI Chatbot Career Assistance
8. Dashboard and Progress Tracking

his platform collects data from the users through career assessment forms and uses artificial intelligence algorithms to give customized advice.

A. System Workflow

1. The user registers and logs in.
2. The user answers career assessment questions.
3. The AI engine analyses skills, interest, and goals of the user.
4. System predicts suitable career paths.
5. Skill gap analysis identifies missing skills.
6. System recommends courses and internships.
7. Resume analyser evaluates user resumes.
8. AI chatbot provides additional career guidance.

V. SYSTEM ARCHITECTURE

The proposed system architecture consists of interconnected modules such as the user interface, assessment module, AI engine, recommendation module, chatbot system, and database. These modules work together to analyze user data and provide personalized career recommendations using AI techniques [1], [5].

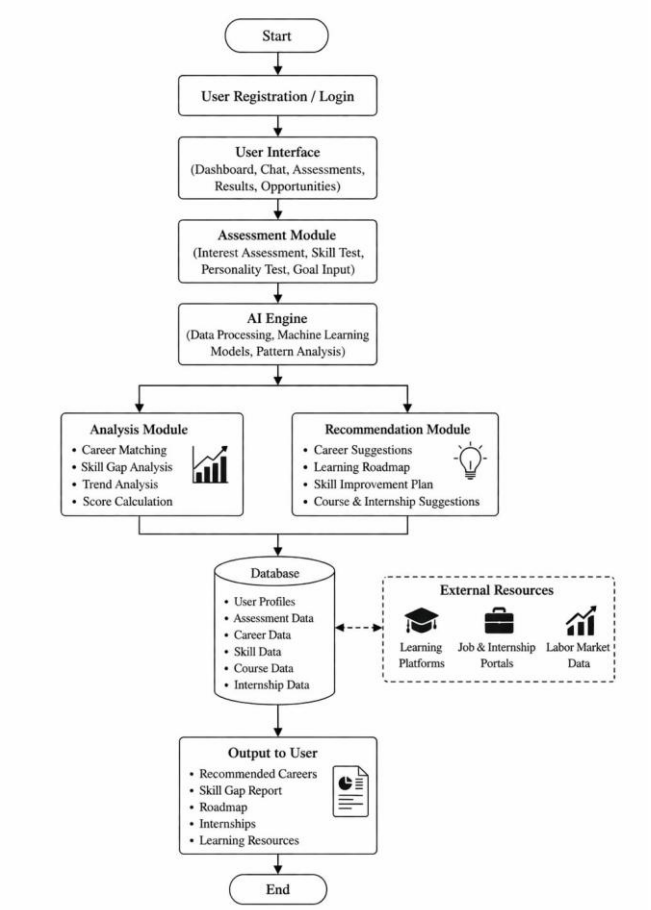

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Fig. 1. System Architecture and Functional Workflow of the Advisor Platform.

The system architecture consists of the following components:

A. User Interface

The User Interface provides interaction between the user and the system through dashboards, assessment forms, recommendation pages, and chatbot interfaces. It allows users to access career guidance features in a simple and user-friendly manner.

B. Assessment Module

The Assessment Module collects user interests, career goals, personality traits, educational background, and skill information through interactive forms and questionnaires. This data is used for personalized career analysis.

C. AI Engine

The AI Engine processes collected user data using recommendation algorithms, machine learning models, and intelligent analysis techniques to predict suitable career paths [14].

D. Analysis Module

The Analysis Module does skill gap analysis, career match-making, resumes assessment, and market trends analysis in order to recognize gaps in the skills of candidates and their future opportunities.

E. Recommendation Module

The Recommendation Module offers individualized career advice, learning strategies, internship recommendations, and ways to enhance skills depending on the users' performance [13].

F. AI Chatbot Module

The AI Chatbot Module offers career advice, helps prepare for an interview, gives tips on communication, and responds to students' questions through the use of NLP [11].

G. Database

The Database consists of user profiles, results of their assessment, career data, course materials, internship information, and recommendation history.

VII. METHODOLOGY

The suggested solution adopts an AI-based approach to offer tailor-made advice and intelligent recommendations to students. The AI-based framework first gathers user inputs such as their interests, technical skills, career goals, and education backgrounds using interactive career assessment forms. The gathered user data is further analyzed using recommendation techniques, machine learning algorithms, and intelligent methodologies [5], [13].

The AI engine analyzes user profiles to detect potential career opportunities and industry required skills. The solution further uses the skill gap analysis technique to compare user technical skills and requirements of the market and suggest a customized learning roadmap and improve the users' technical skills. Furthermore, the chatbot AI module guides the user in career-related issues and offers assistance with respect to resume preparation, communication skills, and interview preparation [7], [11]. Cosine similarity is used to measure the difference between the 'Profile Vector' of the user and the 'Industry Requirement Vector' stored in Career Database (D3).

Finally, all the recommendations, career insights, and career progress are displayed on the user dashboard in a more user-friendly interface.

VIII. TECHNICAL STACK AND TOOLS

Personalized AI Career & Skills Advisor has been built using contemporary technology stacks that allow providing intelligent career guidance, real-time analysis, and interactive user experience. The system incorporates technologies on the frontend side, backend side, AI, ML, and NLP to create a fully functional AI career recommendation system.

A. Frontend Development

Frontend technologies for the proposed system include React.js, TypeScript, and Tailwind CSS. These technologies are used to design interactive dashboards, assessments, career recommendations, chatbot interface, skill assessment pages, among others._tailwind.css provides increased responsiveness of the UI design and allows cross-platform

B. Backend Development

The backend system utilizes Node.js and Express.js for processing server-side functions such as API integration, authentication, and communication of data among the modules. The backend architecture allows the system to deliver high efficiency in performing tasks such as processing users' requests and recommendations.

C. Machine Learning Engine

The AI recommendation engine will be developed using the Python language and other programming tools like Scikit-learn, NumPy, and Pandas. The use of such technologies allows for processing the user assessment data, identifying skills, analyzing career trajectories, and making recommendations [5]. Recommendation algorithms and techniques of similarity analyses are used in order to increase the accuracy of predictions [13].

D. Natural Language Processing (NLP)

NLP approaches are utilized in the development of the Resume Analyzer Module and chatbot. NLP systems can aid in the recognition of key terms in resumes, assessment of ATS score, understanding of user requests, and the creation of appropriate responses [6], [11]. The chatbot will also support

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students with career-related advice, communication skills, and interview prep.

E. Database Management

Database Management Systems are used to manage the storage of user profiles, assessment results, recommendations, resumes, internships, and other relevant information. MongoDB and PostgreSQL are examples of databases that can be used to store these types of information securely.

F. AI Chatbot Integration

This technology makes use of the AI-based chatbot feature using LLMs for 24/7 intelligent career counseling and queries. The bot enables students to address their everyday problems pertaining to careers and guide them regarding study material along with better conversation skills.

G. APIs and Deployment

The suggested platform incorporates the use of external APIs and online learning portals that will offer the internships and job trends in addition to course recommendations. The API will be employed in obtaining current data about the career. The platform is developed in such a way that it can be easily deployed at scale.

IX. IMPLEMENTATION

The implementation of the suggested system is a number of intelligent modules embedded in a web platform, which helps in providing personalized career advice and skill development opportunities. It has a user-friendly and intuitive user interface design that enhances the interaction between the users and the website as well as ensures recommendations' effectiveness. Each module works independently on its own task while together providing users with helpful tips for making right career decisions.

A. Home Dashboard

The Home Dashboard represents the main interface of the system allowing users to access all functionalities available on the platform. After logging in, users can see their career assessments, recommendations of modules, learning roadmaps, skill analysis report, and internship opportunities on the dashboard. The dashboard is developed using responsive user interface designs.

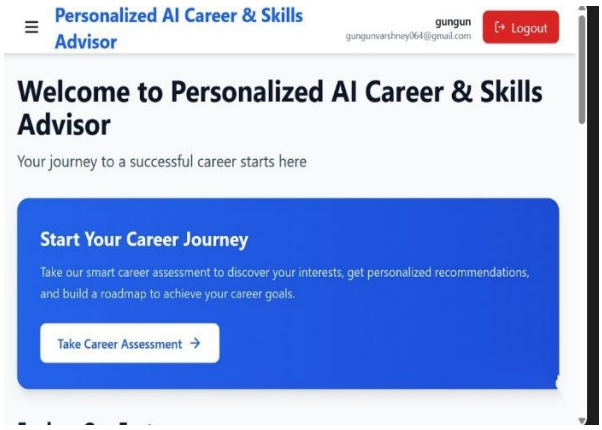

Fig. 2. Home Dashboard

B. Career Recommendation Module

It is the duty of the Career Recommendation Module to make recommendations about suitable careers for users in accordance with their interests, skills, goals, and assessments. Interactive assessments form the most important mechanism for input of goals and technical background knowledge of each individual user. The Career Recommendation Module uses AI-based methods of recommending suitable careers using methods of similarity analysis [5], [13].

The system also makes recommendations about suitable skills to develop, emerging job trends in the coming period, and other learning recommendations that can enhance the employability of the students.

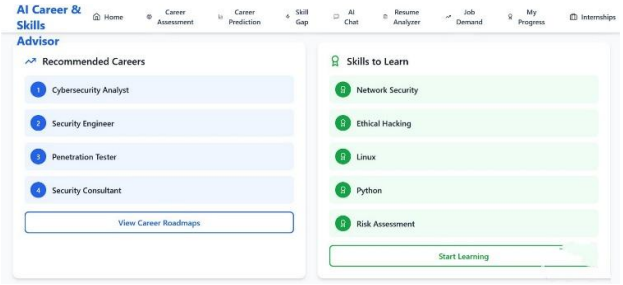

Fig. 3. Career Recommendation and Skill Gap Analysis Interface

C. AI Chatbot Module

The AI Chatbot Module gives live career counseling and helps students solve any career-related doubts. The chatbot uses the NLP and LLM technique to analyze user queries and create intelligent responses [11].

The student can ask the chatbot for any information about preparing for interviews, better communication, resume tips, educational advice, and even career counseling. The chatbot increases user engagement through 24/7 assistance and suggestions.

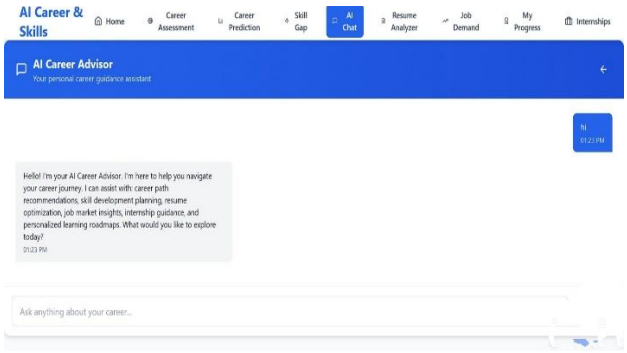

Fig. 4. AI Chatbot Interface

D. Resume Analyzer Module

The Resume Analyzer Module analyzes the uploaded resume and retrieves relevant details through NLP-based analytical techniques. The module analyzes various factors such as the

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quality of the resume, skillset of the resume, keywords, and formatting to determine ATS compatibility scores [6].

The tool provides recommendations to students about how to enhance their resumes based on industry norms.

E. Internship and Learning Module

Internship & Learning Module provides internships, training modules, and learning material in accordance with the needs of the user and their career goals. Market trends and skill requirements are analyzed by this system for providing appropriate recommendations.

It assists students in acquiring practical experience and developing technical skills, which help them stay relevant to current market trends.

X. RESULTS AND DISCUSSION

The developed system effectively delivers intelligence-based personalized career recommendations based on user interests, user skills, answers to assessment questions, and career goals. The use of AI in making recommendations enhances accuracy in providing recommendations and enables students to get suitable career paths based on their skills and market needs [1], [13].

The system offers several intelligent features, such as:

- Personalized career recommendations
- Skill gap analysis reports
- Internship recommendations
- AI chatbots
- Improving resumes
- Learning maps

The Skill Gap Analysis Module enables users to identify gaps in both technical and communication skills needed in the job role that they aspire towards. The Resume Analyzer enhances the resume by giving suggestions based on ATS criteria and analyzing the keywords used in the resume [6]. Furthermore, the AI chatbot assists students in answering questions related to their careers and helping them prepare for interviews [11].

According to the experimental analysis, the integration of Artificial Intelligence, recommendation systems, and NLP algorithms provides better recommendations and increases user engagement when compared to the traditional approaches of career counseling [7]. Additionally, it makes students conscious about the future trends in the labor market and skills needed for those trends.

XI. ADVANTAGES OF THE SYSTEM

The suggested model gives various benefits to students and individuals who want to pursue their careers through advanced AI technologies in a customized manner. It will help the user take career-related decisions and be job ready in accordance with industry standards.

Some of the important benefits of the system include:

- Personalized career recommendations based on user interests and skills.
- Intelligent AI-based analysis for accurate career prediction.
- Skill gap identification and improvement suggestions.
- Resume evaluation and ATS compatibility support [6].
- Internship, certification, and learning recommendations.
- Real-time guidance through AI chatbots for career-based questions [11].
- User-friendly and interactive web interface.
- Improved knowledge about future job trends and market requirements.
- Efficient career counseling decisions and planning.
- Contribution to development of communication skills as well as interview preparation.

Combining recommendations systems, machine learning, and natural language processing enhances the recommendation performance and presents a smarter solution than the conventional career counselling system [1], [13].

XII. FUTURE SCOPE

While the present model offers an intelligent platform for career guidance, it still leaves room for many future developments and advancements in terms of artificial intelligence. Such future additions will be aimed at the improvement of personalization, real-time analysis, and career support features.

One future addition to the present design would be a new video-based interview module that uses artificial intelligence to assess communication skills, confidence, and response to technical questions. The system will incorporate global salary insights, as well as an analysis of the labor market, and trends in the industry in order to enhance student career prospects.

Other potential additions include a mentorship matching system, which allows students to communicate and interact with experts from the industry. There might also be a future version of the app that uses multiple languages, voice assistants, and mobile app integration to become even smarter [14].

XIII. CONCLUSION

Therefore, the research project successfully shows how the design and implementation of the Personalized AI Career & Skills Advisor can be considered as a smart career advisory solution that integrates Artificial Intelligence, Machine Learning, and NLP-based approaches to provide personalized career recommendations.

This innovative tool allows providing personalized career advice to students based on their interests, skills, and the needs of the labor market in particular industries. In addition, the system provides personalized career recommendations, skill-gap analysis, resume optimization, internships, and AI

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chatbot-based advice to help students choose the best path for their career.

AI-based recommendation techniques allow improving the efficiency and effectiveness of predicting career opportunities for students and reducing the existing gap between academic education and industry's needs and requirements [5], [13].

Besides that, the Personalized AI Career & Skills Advisor allows helping students understand what technical skills will be required to be successful in high demand careers like Cloud Engineer, DevOps Engineer, Data Analyst, or AI Specialist. Thus, by providing students with valuable insight into their career perspectives, this system can help minimize career confusion.

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