
ADVANCED SUPPORT FOR CAREER EXPLORATION AND NAVIGATING DIRECTIONS

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ABSTRACT

Career counselling and guidance play a vital role in shaping students' academic and professional trajectories. However, in India, a significant gap exists in accessible and effective career guidance, often leading students to make uninformed career choices influenced by societal expectations rather than personal interests and aptitudes. This paper presents an innovative AI-powered career guidance system that integrates machine learning, mentorship programs, interactive tools, and comprehensive resource portals to support students from middle school to postgraduate levels. The proposed solution leverages artificial intelligence to analyze students' skills, interests, and aspirations, providing personalized recommendations for suitable career paths. Additionally, mentorship programs connect students with industry professionals, while interactive tools enhance self-assessment and decision-making. This system aims to bridge the career by enabling informed choices, skill development, and better career planning.

I. INTRODUCTION

Career counselling and guidance play a pivotal role in shaping students' academic and professional futures. The process of choosing a career is a significant decision that requires careful consideration of an individual's interests, strengths, and aspirations. However, in India, many students and their families lack access to structured career guidance, often relying on limited information, societal expectations, or peer influence to make career-related decisions. This lack of proper guidance can lead to mismatched skills, job dissatisfaction, and, in some cases, unemployment. The increasing complexity of career options, driven by technological advancements and evolving job markets, further highlights the necessity of a comprehensive career counselling system. Traditional career guidance in India is primarily available through school counsellors, coaching centres, or parental advice. However, these sources often do not provide personalized insights tailored to individual students' skills and aspirations. Moreover, students from rural or economically weaker backgrounds may not have access to any form of structured counselling. While online resources and career aptitude tests have gained popularity, they often lack interactive and personalized elements, making them less effective in guiding students toward suitable career choices. To address these challenges, this paper proposes an AI-powered career guidance platform that integrates machine learning, mentorship programs, interactive tools, and resource portals. The platform aims to provide personalized career recommendations based on students' academic performance, interests, and skillsets. Additionally, mentorship programs will connect students with industry professionals, offering them real-world insights and practical career advice. Interactive self-assessment tools and up-to-date career resources will further assist students in making informed decisions about their education and professional paths. This paper explores the design and implementation of the proposed solution, highlighting its potential to bridge the career guidance gap and empower students in making well-informed career choices. By leveraging artificial intelligence and digital solutions, the system aims to provide accessible, data-driven, and customized career counselling, ultimately contributing to better skill development and employment outcomes.

II. LITERATURE SURVEY

Several studies highlight the importance of structured career guidance in helping students make informed choices and reducing career-related stress. However, despite the growing need for such services, traditional career counselling methods in India remain inadequate, often limited to urban areas and elite educational institutions. This literature survey reviews existing research and technological advancements in career

guidance, potential improvements through AI-driven solutions.

It provides AI-powered personalized career guidance by analyzing users' skills, education, and experience to recommend suitable career paths, facilitate informed career decision-making [1]. Career Dendrogram Hierarchical Prediction Model using the Random Forest Algorithm to predict career paths by analyzing user skills, education, and experience, improving career decision-making accuracy [2]. However the existing systems can handle only limited number of industries whereas our system can handle number of industries. Introduces a Career Dendrogram Prediction Model using Clustering and Random Forest Algorithm, analyzing career pathways to provide structured career recommendations. To explore how digital technologies enhance career guidance by improving accessibility, personalization, and decision-making for students and professionals in the digital age [3]. However, we also deal with career shift and unemployed freshers. To demonstrate the effectiveness of API-driven systems in aggregating real-time job data to provide efficient and relevant job recommendations for users [4]. Along with search APIs we include GenAI that shows openings depending upon resume. To cluster skill sets with K-means and word2vec for enhanced career pathway recommendations, emphasizing granularity in skill analysis [5]. To integrate RapidAPI and a GenAI API (GPT-4) for real-time job data retrieval and conversational guidance, focusing on usability [6]. However, used Gemini API in which data is updated. To evaluate early chatbots' utility, providing a baseline for interview bots' conversational potential [7]. To develop a GenAI bot with mock interview capabilities using Hugging Face Transformers [8].

This study draws inspiration from AI-driven career exploration platforms that use machine learning, such as Random Forest and hybrid recommendation systems, to provide personalized, accessible career guidance for students. A literature review will evaluate traditional career guidance methods, highlighting the scalability and user-friendliness of these advanced frameworks. The project aims to build a robust solution that improves career decision-making accuracy while ensuring inclusivity in educational settings. However, existing platforms often lack interactive, real-time mentorship, personalized AI recommendations, and comprehensive skill tracking. The proposed system addresses these gaps by integrating AI-powered career suggestions, real-time mentor chat, interactive assessments, and a resource portal, delivering a more adaptive and personalized career guidance experience.

III. PROBLEM STATEMENT

To develop an AI-powered career guidance platform that provides students with personalized career recommendations, real-time mentorship, interactive assessment tools, and a comprehensive resource portal, ensuring informed career decision-making and skill development.

Many students and fresher's in India lack access to structured career counselling, often relying on limited information, societal expectations, or generalized assessments, leading to skill mismatches, job dissatisfaction, and unemployment. Existing platforms offer career assessments and advisory services but do not integrate AI-driven personalized recommendations, real-time mentorship, or dynamic career tracking, reducing their effectiveness. AI-powered platforms like Mindler provide career suggestions but lack interactive mentorship and adaptability to students' evolving interests.

This project aims to develop career guidance system where students can receive AI-driven career recommendations, interact with mentors in real-time, take personalized self-assessments, and access structured career resources. By utilizing machine learning and digital engagement strategies, the platform enhances career exploration, improves decision-making, and increases employment outcomes. The proposed system empowers students with data-driven insights, skill-aligned career paths, and continuous career tracking, ensuring a more accessible and effective career counselling experience.

IV. METHODOLOGY

1. Overview

The proposed system is an AI-powered career guidance platform that helps students explore and choose careers that align with their skills and interests. Many students lack access to structured career counselling, leading to uninformed decisions and skill mismatches. To address this, the system integrates personalized career recommendations, real-time mentorship, interactive career exploration tools, and a career resource portal, ensuring informed decision-making and skill development.

By leveraging machine learning, the platform provides tailored career suggestions, helping students discover suitable career paths while improving employability. Additionally, the mentorship program connects students with industry professionals, offering real-world insights and guidance. The integration of interactive tools and resource portals enables students to explore job roles, track industry trends, and access learning materials, ensuring a seamless and effective career planning experience.

2. Recommendation System Implementation

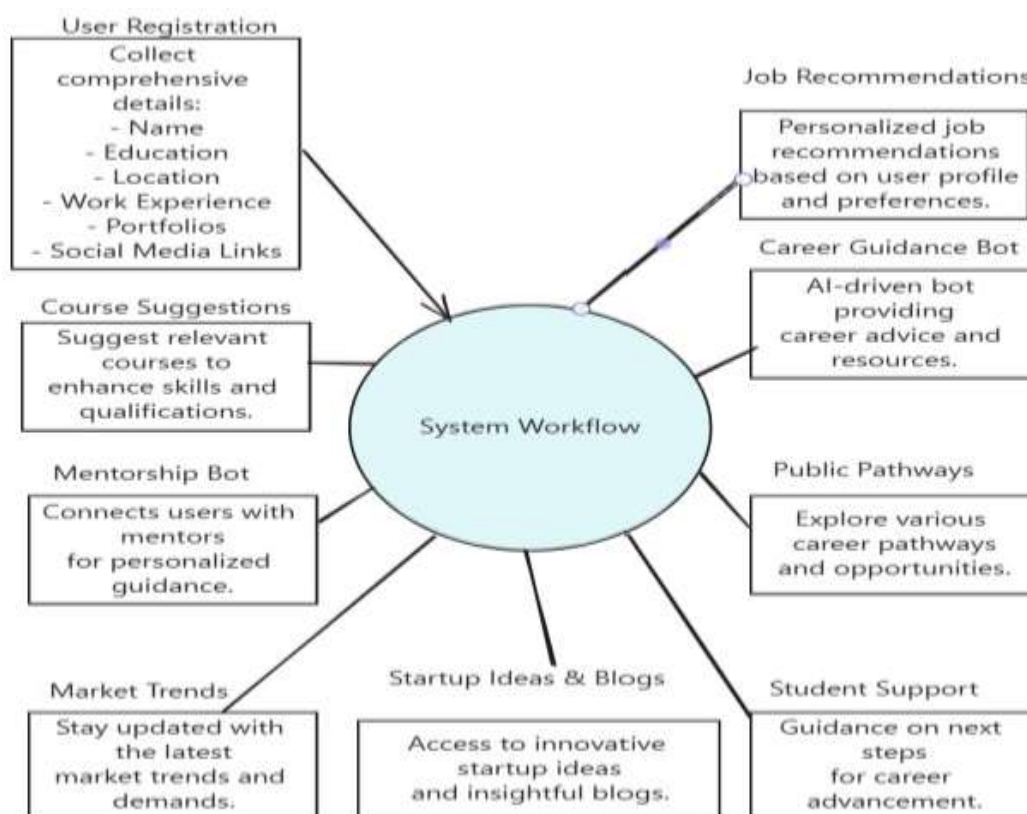
The recommendation system plays a crucial role in enhancing user engagement within the career exploration platform by providing personalized job role suggestions. It consists of multiple strategies: popularity-based recommendations suggest trending job roles based on market demand from Rapid API and user activity in Firebase, benefiting new users. Content-based filtering uses cosine similarity, powered by Scikit-learn and word2vec embeddings, to recommend roles that match users' skills or interests from the "Skill Assessment" module. Collaborative filtering predicts user preferences based on past interactions stored in Firebase, generating personalized career recommendations. The hybrid system, utilizing Random Forest via Flask, dynamically selects between these approaches to optimize recommendation accuracy and relevance for career guidance.

3. Career Guidance Bot

The "Career Mentor Bot" landing page introduces a chatbot designed to provide personalized career guidance. It features a user-friendly interface with a welcoming greeting, a button menu offering options for career advice, resume tips, job search help, and interview preparation, and a text box with a "Send" button for user queries. This page serves as the primary entry point, facilitating seamless interaction with the chatbot for various career-related support services.

4. System Workflow

The system workflow optimizes efficiency for job seekers and fresher's by enabling user registration with comprehensive details, including name, education, location, work experience, portfolios, and social media links. It grants access to various platform features, such as job recommendations, course suggestions, skill-based job applications, a Career Guidance Bot, a Career Mentorship Bot, Public Pathways, Market Trends, Student Support (next steps), startup ideas, and blogs, catering to diverse career needs.



5. Advantages of the Proposed System

The proposed model provides an innovative solution integrating AI-powered platforms, mentorship programs, interactive tools, and resource portals to guide students from middle school to postgraduate levels in career exploration and selection based on their interests and strengths. The AI platforms leverage machine learning models like Random Forest and word2vec to analyse students' skills and preferences, recommending personalized career paths and learning plans. Mentorship programs connect students with industry experts for tailored guidance, fostering professional growth. Interactive tools, such as chatbots and career simulations, engage students in hands-on exploration of job roles and industries. Resource portals provide access to up-to-date market trends, job descriptions, and educational pathways via APIs like RapidAPI and News API. The system also includes skill assessment modules to suggest relevant courses or certifications. By empowering students to explore diverse opportunities, develop essential skills, and plan their education strategically, this solution bridges the gap between academic preparation and career readiness

V. RESULTS AND DISCUSSION

The implementation of the proposed career exploration platform demonstrated significant enhancements in personalized career guidance for students. The platform enabled seamless interaction through features like the "Sia" chatbot, skill-based job recommendations, market trend insights, and mentorship connections, ensuring tailored career pathways. Key components such as the Job Finder,

Career Mentor Bot, and Skill Assessment modules, powered by Scikit-learn, Random Forest, and RapidAPI, improved user engagement and decision-making transparency. By leveraging AI-driven solutions, students gained direct access to relevant job roles and resources, reducing dependency on generic career advice. The system's user-friendly interface, built with HTML, CSS, and JS, allowed students with varying technical skills to navigate effortlessly. Additionally, it bridged communication gaps between students, mentors, and industry trends, fostering informed career choices.

Interview Bot

The "Interview Bot" enhances interview preparation by analysing a user-uploaded resume in PDF or document format to extract skills, education, and achievements, then simulates an interview with targeted questions on skills, projects, technical knowledge, behaviour, and experience. Users type responses, which the bot evaluates using NLP techniques for clarity, relevance, and quality, providing feedback to improve interviewing skills. While focused on practice rather than direct career path matching, it indirectly informs career decisions—e.g., highlighting technical weaknesses for further skill development or reinforcing strengths in specific fields. Career path matching is supported by other platform modules handling personalized recommendations and exploration tools.

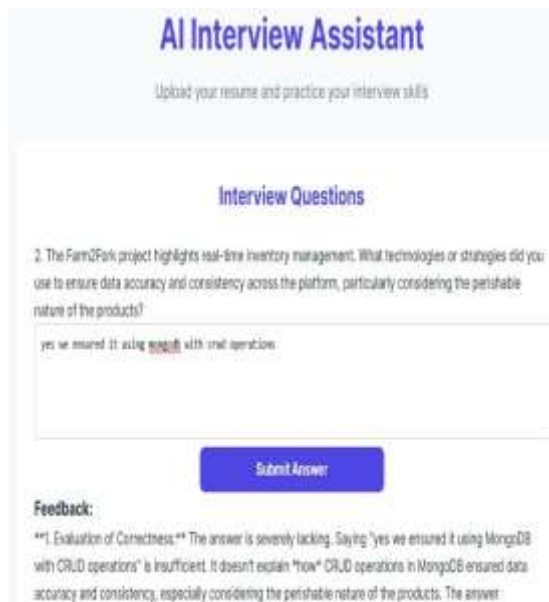


Fig 1: User using Interview Bot

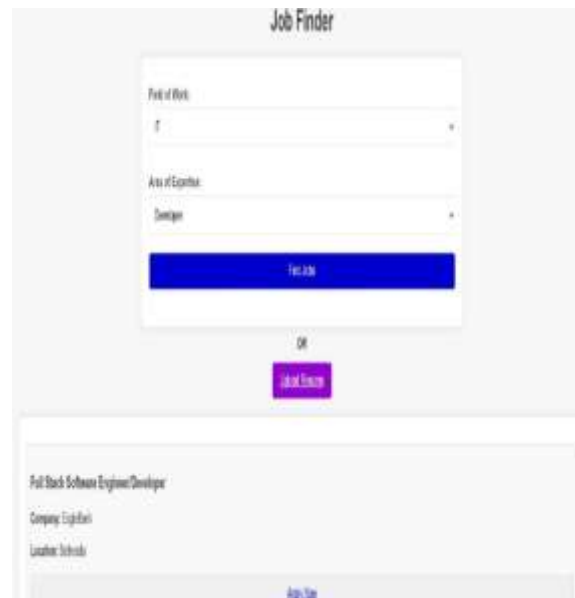


Fig 2: Prediction of job by manual input

As depicted in Fig. 1, the user-friendly interface enables users to upload their resume, after which the Gemini API generates 10-12 tailored interview questions based on their skills, certifications, and projects. Users can type their responses in a provided text box and submit them using a button, receiving immediate feedback on their performance. The system also highlights correct answers if the user's response is suboptimal, facilitating improvement in interview skills.

Job Finder

The Job Finder page displays a curated list of relevant job opportunities within non-governmental organizations. Each job listing includes:

1. Field of work: Area of expertise
2. Company Name: Name of the non-governmental organization
3. Location: Geographical location of the job
4. Apply Link: Direct link to the external application page

These apply links redirect users to external websites or platforms where they can submit their applications. The application process is handled by the external site, and is not part of the platform's functionality.

As illustrated in Figure 2, the manual input feature prompts users to specify their Field of Work, Area of Expertise, and Preferred Location to generate tailored job recommendations.

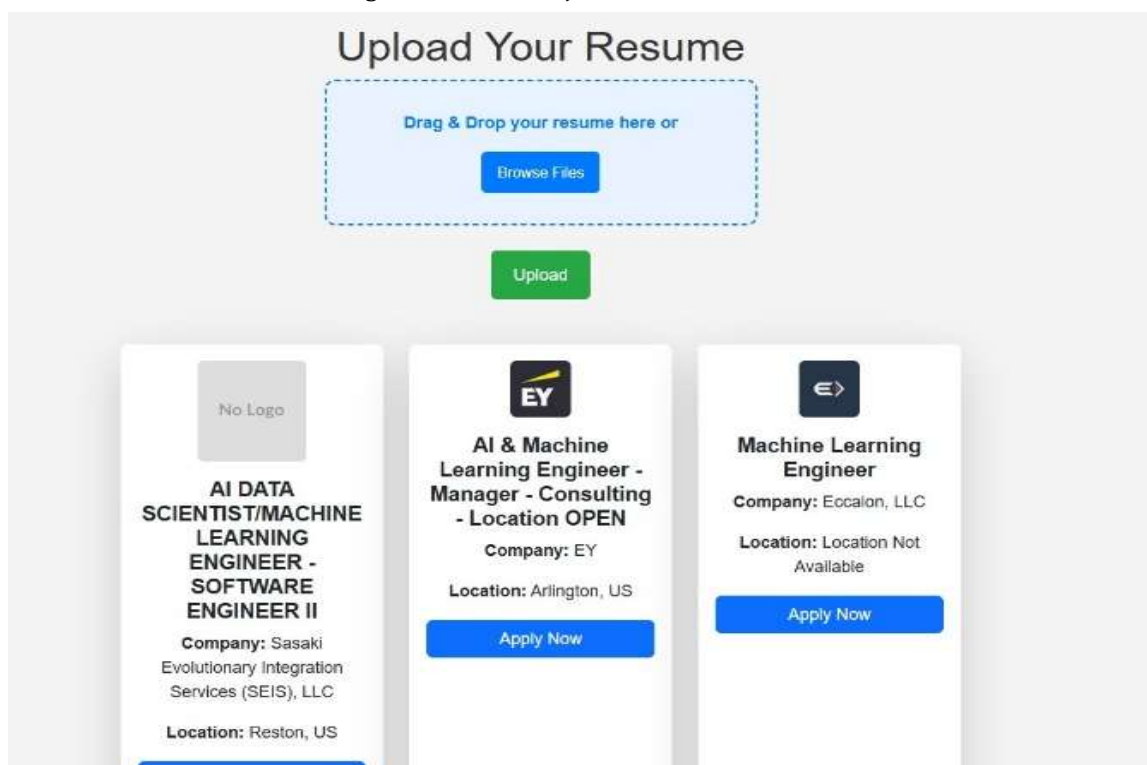


Fig 3: Recommended Jobs after uploading resume

Alternatively, the resume upload feature utilizes the Gemini API to parse uploaded resumes, extracting skills, experience, and education, then integrates with RapidAPI to automatically retrieve and display matching job listings. This dual approach enhances user convenience and ensures strong alignment between user qualifications and NGO job requirements, supporting effective career exploration.

Sia Bot

The chatbot assists users in understanding the website's features by providing brief explanations of functionalities such as job recommendations, course suggestions, and skill-based job applications. It also covers the Career Guidance Bot, Career Mentorship Bot, Public Pathways, Market Trends, Student Support (next steps), startup ideas, and blogs. Users can inquire about any feature, receiving clear insights to navigate and utilize the platform effectively. This enhances user engagement and ensures a comprehensive understanding of available career exploration tools.



Fig 4: Functionality of SIA Bot

Figure 4 showcases the SIA Bot's functionality, enabling users to ask queries about the project and its features. The bot offers a user-friendly interface, assisting with navigation and clarifying the purpose of each feature. It enhances user experience by providing seamless guidance.

Career Compass (Next Step)

The "Student Support: Career Compass" page, is a comprehensive resource guiding students in career exploration and educational planning. It offers detailed insights into career options and courses after 10th, 12th, and degree levels, segmented for easy navigation. The page supports stream selection, college planning, and career roadmaps, addressing pressures to pursue conventional paths by highlighting diverse opportunities, including entrepreneurship. It provides in-depth descriptions of further education (e.g., MPC, BIPC), required skills, and career outcomes for each stage. Integrated with a search functionality, it enables deeper exploration of specific careers. This platform empowers students to make informed decisions, enhances career awareness, and encourages exploration of interests for more fulfilling career paths.

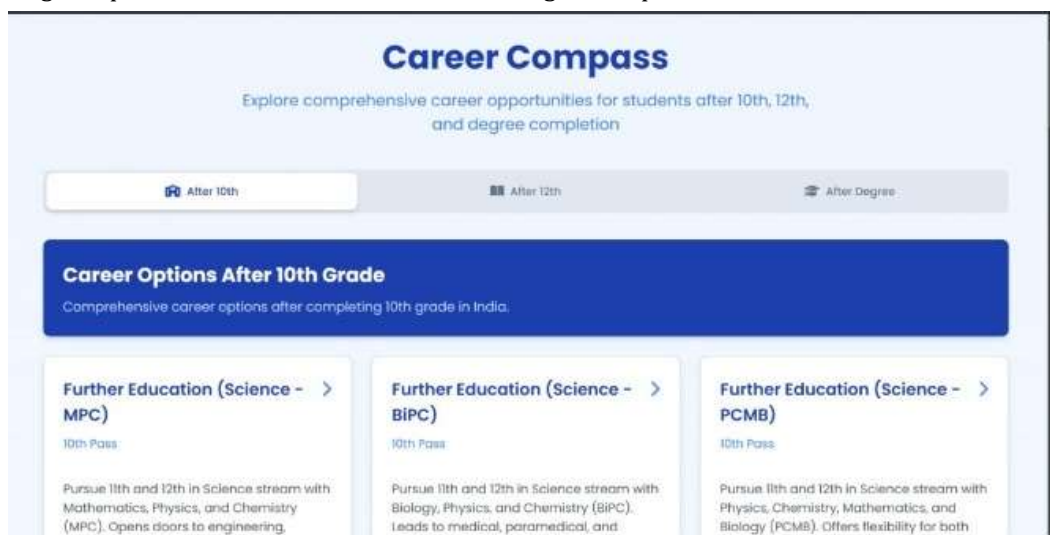


Fig 5: Navigation Direction for students

As depicted in Fig 6, users can explore detailed career options after 10th grade through the "Career Compass"

feature, enabling informed educational decisions. The system allows students to navigate pathways like Science (MPC, BIPC, PCMB), with clear descriptions of subjects and outcomes, ensuring they choose streams aligned with their goals.

Search and Filtering

The "Landing Page – Search Feature for Jobs," is a core component of the career exploration platform, enabling users to discover diverse job opportunities. It features a search bar on the landing page where users can input keywords related to job titles (e.g., Software Engineer), skills (e.g., Python), companies (e.g., Google), or locations (e.g., Remote). The search engine retrieves and displays relevant job openings across sectors like government, private, and entrepreneurial ventures. Pagination and navigation options allow users to explore additional results, ensuring comprehensive access to opportunities. This functionality provides detailed career insights, including overviews, required skills, and educational pathways, supporting thorough investigation of career options.

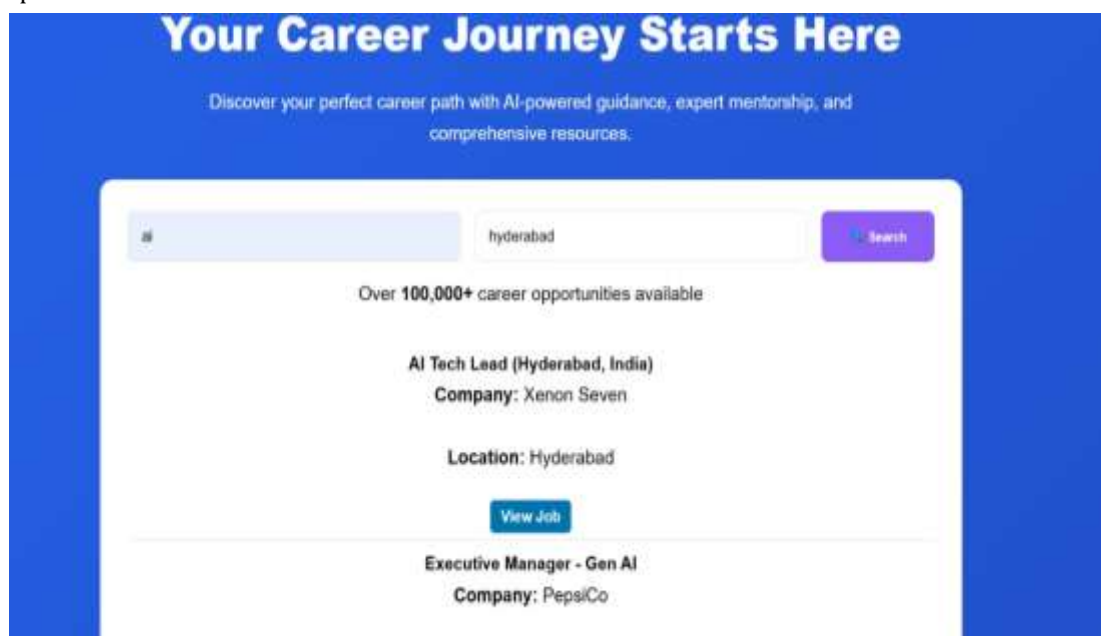


Fig 6: Searching of jobs based on skills, job title, company and location.

Fig 5 illustrates the real-time job search feature, ensuring accessibility and building trust in the career exploration platform. With a clear search mechanism, users can efficiently discover opportunities, reducing uncertainty about career options. The integration of automated job listings via RapidAPI streamlines the search experience, minimizing the need for repeated queries about job availability. In addition to enhancing user confidence, the job search system searches and ensuring better alignment with user preferences. By providing real-time insights into job openings, users can plan applications effectively and explore diverse career paths. This system also helps address mismatches in job expectations, further strengthening reliability and operational efficiency in the career guidance ecosystem.

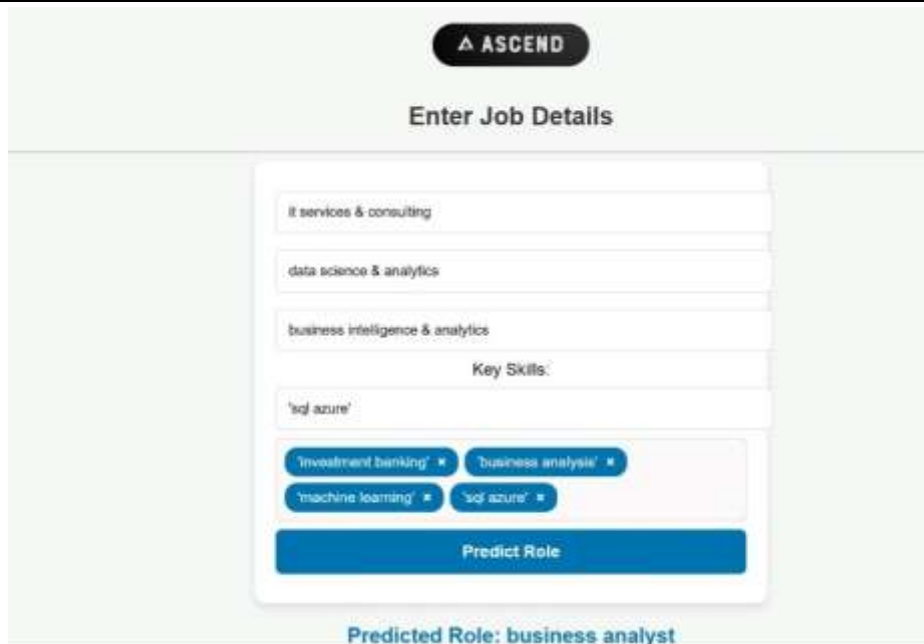
Role Prediction Model

The "Role Prediction" page facilitates input methods/mechanism as users select preferences via dropdown menus, structured as follows:

1. Industry Type: Choose from various sectors (e.g., IT, Healthcare, Finance)
2. Role Category: Select a category relevant to the chosen industry
3. Department: Choose a specific department within the role category
4. Skills: Select relevant skills based on previous selections

Predictive Role Matching

Based on user input, the system predicts relevant job roles, ensuring a strong match between the user's abilities and job role requirements.



The screenshot shows a web interface titled "Enter Job Details". At the top, there is a button labeled "ASCEND". Below the title, there are three input fields for "it services & consulting", "data science & analytics", and "business intelligence & analytics". A section labeled "Key Skills:" contains four skill tags: "sql azure", "investment banking", "business analytics", and "machine learning". A large blue button labeled "Predict Role" is at the bottom of the form. Below the form, the text "Predicted Role: business analyst" is displayed.

Fig 7: Role Prediction by user inputs

Dataset Description

The dataset is sourced from Kaggle, based on past Naukri.com job postings, containing 16 columns with details like salary, company, ratings, experience required, location, post-date, applications, industry type, role category, UG, job roles, applicants etc. Which contains 14 categorical (String), 1 Integer and 1 Decimal Datatypes, for this study, we focus on **fresher's** and select five key features—four as inputs and one as the output. This dataset enables the AI-powered career guidance system to recommend optimal job roles for fresher's by analyzing industry trends and required skills.

Dataset Cleaning and Preprocessing

The dataset initially contained 16 columns with missing values. After performing feature engineering, we chose some relevant columns. They are - input features include Industry Type, Department, Role Category, and Key Skills, while the output is the Suitable Role based on these attributes. After selecting relevant columns, we found that the data was categorical, so missing values were handled using the most frequently occurring values (mode). For preprocessing, we first applied one-hot encoding, but it resulted in low accuracy due to the uniqueness of skill sets, leading to a lack of semantic understanding. To overcome this, we used Word2Vec, which improved the model's performance by capturing contextual relationships between skills and job roles.

Splitting and Model Implementation

Once the data is pre-processed, it is split into training and testing sets using a 70:30 ratio. To enhance accuracy in handling multiple job categories, the Random Forest model from the Jobs library is implemented. This model efficiently classifies job roles based on industry type, department, role category, and key skills, ensuring precise career recommendations. The decision trees within Random Forest collectively analyze patterns in the dataset, reducing overfitting and improving generalization. By leveraging this approach, the system provides personalized and data-driven job role predictions, enhancing career guidance for students.

Overall Impact

The results demonstrate that the proposed career exploration platform successfully bridges the gap between students and career opportunities, ensures personalized guidance, and enhances access to diverse job roles. The integration of AI-driven tools, such as Scikit-learn, Random Forest, and RapidAPI, streamlines the career planning process, boosting confidence and decision-making for students. The platform also contributed to reducing career indecision by enabling tailored recommendations, particularly for students at critical educational stages. Users could now make informed decisions about career paths and skill development based on real-time market trends and personalized assessments. Moreover, the scalability of this system makes it a

viable model for expansion across different educational levels and geographic regions. Educational institutions and career counselling organizations can leverage such platforms to promote informed career choices and encourage lifelong learning and professional growth.

VI. CONCLUSION

The proposed career exploration platform revolutionizes student career planning by providing direct access to personalized guidance, eliminating reliance on generic advice, and ensuring tailored career pathways. By integrating features like job recommendations, mentorship connections, and career roadmaps, the platform enhances transparency, efficiency, and trust between students and career resources. The hybrid recommendation system personalizes user experiences, improving career visibility and increasing the likelihood of informed decisions. Interactive tools foster seamless engagement, allowing students to explore opportunities directly, while career support features ensure clarity in educational and professional planning. Compared to traditional career guidance methods, which often involve limited awareness and pressure toward conventional paths, this digital solution offers a more inclusive, scalable, and student-centric alternative with broader career exposure and enhanced decision-making opportunities. Despite these benefits, challenges such as digital literacy barriers and adoption resistance need to be addressed for widespread implementation. Future enhancements will focus on expanding accessibility and incorporating advanced analytics for more precise career forecasting. By leveraging these advancements, the platform has the potential to create a sustainable, accessible, and transparent career ecosystem, ultimately empowering students, strengthening educational outcomes, and promoting informed career choices in the digital age.

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