INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD)
© 2026 IJNRD | Volume 11, Issue 4, April 2026 | ISSN: 2456-4184 | IJNRD.ORG

AI Career Paths and Learning Planner

[1]ARYA PAWASKAR, [2]YASH SHEKHADA, [3]SRAJAN SHETTY, [4]RAJ PANCHAL, [5*]SILVIYA D'MONTE
[1] Computer Engineering, Universal College of Engineering/Mumbai University, Vasai, India
[2] Computer Engineering, Universal College of Engineering/Mumbai University, Vasai, India
[3] Computer Engineering, Universal College of Engineering/Mumbai University, Vasai, India
[4] Computer Engineering, Universal College of Engineering/Mumbai University, Vasai, India
[5*] Computer Engineering, Universal College of Engineering/Mumbai University, Vasai, India

Abstract: Artificial Intelligence (AI) is advancing quickly, which means there is a growing need for skilled workers. However, the lack of structured and personalized career guidance makes it hard for people who want to learn. Current methods depend on scattered and general resources, which makes learning paths unclear and less effective. This paper introduces an intelligent system, the AI Career Paths and Learning Planner, aimed at delivering data-driven and tailored career guidance. The suggested system uses a mix of machine learning and a rule-based framework to match user profiles, such as their skills, interests, and background, to the right AI career roles. It also makes a structured, step-by-step learning plan by connecting the skills you need with carefully chosen learning materials. The system architecture combines a cloud-based backend with APIs from outside the system that can parse resumes, make recommendations, and get content. The proposed system works better than traditional methods in terms of accuracy, scalability, and user experience, as shown by experimental results. The solution seeks to reconcile individual competencies with industry demands, facilitating effective career planning and skill enhancement in the AI sector.

Keywords **- Artificial Intelligence (AI), Career Planning, Machine Learning (ML), Learning Path Optimization, Recommendation Systems**

I. INTRODUCTION

Career planning is a process that helps people choose the right educational paths and job opportunities based on their skills, interests, and what the job market needs. Most of the time, traditional career guidance systems make broad recommendations without taking into account the unique needs of each person. This can lead to confusion and bad choices. Artificial Intelligence (AI), Machine Learning (ML), and Big Data have all made career planning systems smarter and more tailored to each person. These technologies help you look at big sets of data and make good career suggestions.

AI-based career planning systems use various algorithms to understand user behavior, preferences, and abilities. Machine learning techniques such as decision trees and predictive models are used to suggest appropriate career paths and improve accuracy over time. These systems also help in reducing uncertainty by providing information about job requirements, salary expectations, and future career opportunities.

One significant issue in career planning is the gap between students' expectations and the real requirements of jobs. Students frequently overestimate or underestimate the education and skills necessary for a position. This disconnect can result in poor academic performance and misguided career choices. AI systems assist in addressing this issue by offering realistic, data-driven insights about education and employment.

AI also employs sophisticated tools like NLP and recommendation systems to enhance interactions and guidance. Algorithms for generating optimal learning paths, including Apriori and Ant Colony Optimization (ACO), are employed for creating efficient learning paths based on career objectives.[2]

Some of the critical elements of AI-based career planning systems:

- Prediction/classification algorithms for machine learning
- Communication/guidance tools for natural language processing
- Suggestion systems for courses and careers
- Learning path generation algorithms for efficient learning
- Data analysis tools for big data

Career planning systems that utilize artificial intelligence offer multiple benefits, including personalized assistance, improved decision-making, optimized learning paths, and greater compatibility between education and employment. However, such systems may encounter some limitations, such as problems related to data protection, ethical considerations, and dependence on data quality. Nevertheless, AI-based systems have become crucial elements of modern career planning systems and assist people in making more informed decisions regarding their careers.

II. Proposed System

This suggested AI Career Paths and Learning Planner will be a hybrid as well as an intelligent system for providing customized career guidance in the area of Artificial Intelligence. This system has been suggested keeping in view the drawbacks of the present systems, which can be overcome using a combination of techniques.

Just like hybrid methods have been employed for predicting results (such as logistic regression and decision trees) for greater accuracy and generation of rules under control, a similar combination of techniques (such as supervised learning models and rules) has been employed in this case for accurate predictions and learning processes.

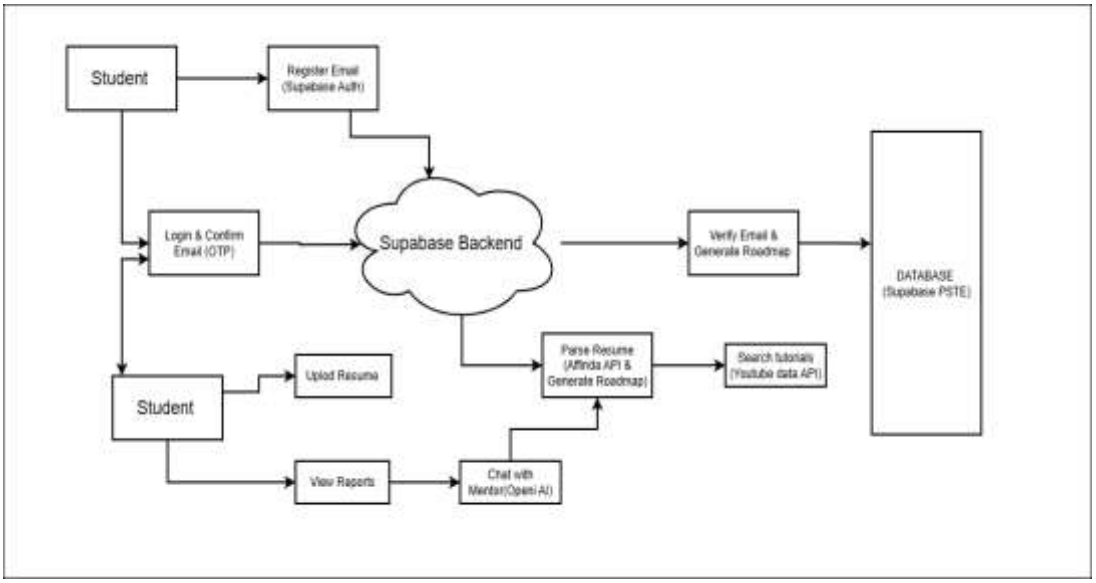
The system gathers information about users like their education history, skills, hobbies, and career objectives. All this information is analyzed using back-end technology that utilizes APIs and machine learning algorithms to offer suitable career paths for the individual in AI, such as Machine Learning Engineer, Data Scientist, or NLP Engineer.

Unlike other traditional techniques, such as Naïve Bayes (which may face problems with scalability with respect to big data) or Apriori (which leads to an overload of rules), the following hybrid approach guarantees:

- Meaningful recommendations
- Scalability
- Increased efficiency
- The ability to understand the obtained results better

In addition, the suggested algorithm creates a learning roadmap for the users, which includes required skills and courses that should be taken in order to develop them.

II.I System Architecture



The architecture begins with the **User Interaction Layer**, where users sign up, log in (using one-time password [OTP] authentication), upload their resume, or fill in details, and see career suggestions. The **Backend Layer (Supabase)** handles authentication, data storage, and communication between the front end and processing layers.

Functions of the **Processing & Intelligence Layer** include resume parsing using APIs, Artificial Intelligence based Career suggestions, learning pathways creation, content search, and chatbot-based mentorship services.

The External APIs Layer is used for functionalities like resume parsing, career suggestions, and content search using safe API integration.

Lastly, the **Database Layer** (Supabase PostgreSQL) serves as a store for all kinds of data related to users, careers, and learning.

II.II Working Flow of the System

1. User registers and logs into the system
2. User uploads resume or enters details manually
3. Backend processes the data using parsing and ML models
4. System generates:
   - Suitable AI career path
   - Personalized learning roadmap
5. Additional features:
   - Tutorials fetched from APIs
   - Mentor interaction enabled
6. Results are displayed to the user via dashboard

III. Literature Review

Zhiwei Shi, Zhifeng Wu, Zhe Zhang, Yutong Chen, and Xuemeng Liu [3] introduced an innovative approach to learning path planning by integrating the concept of career objectives and artificial intelligence techniques into the design. The Position-Apriori-ACO algorithm utilizes Apriori along with Ant Colony Optimization algorithms to produce optimal learning paths. The paper also discusses the shortcomings of the existing recommendation system and demonstrates better performance.

Chen I-C, Bradford L, Schneider B [4] suggested a new framework for a career planning tool based on AI gamification and machine learning methodologies. The research emphasizes the importance of coordinating career objectives with educational demands and expected salaries. The researchers proposed a platform named Init2Winit. They used decision tree methodology for creating personalized career advice for students. According to the findings, the use of AI-based simulation helps enhance students' career awareness and decision-making skills.

Duan J, Wu S [5] analyzed the effects of generative AI in the context of vocational education and career planning. The study discusses how various technologies such as natural language processing and machine learning can help provide customized career advice to students.

Duan, Jingyi, and Suhan Wu [6] examined further into how generative AI can be used in career planning systems. The researchers underscored the significance of embedding AI into education systems for the provision of intelligent decision-making and career information. The researchers found that AI-powered career planning systems are more personalized and effective.

The quick development of Artificial Intelligence (AI) has opened up various career prospects. However, without adequate guidance, students usually find themselves at a loss on how to go about choosing their career paths. Most of the available literature is general, not personalized, and therefore ineffective. Therefore, an AI system that can offer personalized career advice would be beneficial.

IV. System Methodology

IV.I. System Overview

The Personalized AI Career and Learning Planner went through a two-step development process. This included a research-based methodology for the generation of content and a software development methodology for prototyping. This dual strategy ensures that the system not only functions effectively but is grounded in accurate data.

A. Research Methodology

The research methodology aimed at developing a solid and reliable database, directly targeting the issue of fragmented data in the current system. This was an iterative procedure that entailed the following actions:

1. Literature and Data Acquisition: An extensive literature review was carried out where academic articles, industry whitepapers from credible companies (Gartner, McKinsey), personal blogs, and leading online course platforms were assessed to determine the most sought-after AI careers, necessary skills, and learning materials.
2. Data Curation and Filtering: Raw data collected from multiple sources was subjected to manual curation and filtering. It was essential to filter out irrelevant and outdated information and arrange data according to the established data structure for the project.
3. Filling Knowledge Base: Verified data was used to populate the internal database of the project, setting up connections among careers, skills, and learning resources.

B. Development Methodology

The design process of the prototype was done using Agile & Iterative Development Approach. This methodology allowed the development process to take place continuously and in steps to enhance flexibility and efficiency by dividing the whole project into phases, which include:

1. **Planning and analysis:** In the first stage, the problem statement and scope of work were defined; system functions like career recommendation engine and learning roadmap generator were described.

2. **Design and Modelling:** At this stage, the architecture design was done, taking into account all system's features mentioned at the previous stage. Thus, the database model (entity-relationship model), overall architecture of the project, and logical workflow (data-flow diagrams, UML diagrams) were developed as its basis.

3. **Implementation:** This is the major phase of coding, during which the entire project was coded using Python language. The core functions of recommendation engine (including algorithms based on some libraries, e.g., Scikit-learn) were coded together with the User Interface, and Knowledge Base component was created.

4. **Testing & Enhancement:** In the final stage, the testing of the prototype's functionality was done. The accuracy of recommendations and the logic behind generating the learning roadmap were checked. After testing, modifications were made to enhance the algorithm's efficiency and the overall user interface.

V. Result and Analysis

The proposed AI Career Paths and Learning Planner application has been proven successful in delivering recommendations for career development based on information provided in the form of the user profile. The application combines recommendation techniques and a knowledge base to categorize appropriate career paths in the field of artificial intelligence and create a personalized roadmap for the users to follow. The findings reveal that users are able to examine potential career paths like Machine Learning Engineer, Data Scientist, and NLP Engineer using the interactive dashboard.

Graphical user interface allows users to browse through the different career paths, perform self-assessment, look for recommended course materials, and use mentoring functionalities.

In comparison to the current methods used for providing career counseling, the proposed system offers better personalization, road map generation, and availability of learning materials. The conventional techniques are mostly dependent on various sources and generic information, but the suggested method caters to the needs of specific roles in the industry.

Unfortunately, the current model relies on a static database and does not take into account any current changes in the job market. Future developments could incorporate the use of databases in real time, use adaptive learning models, and improve accuracy of recommendation using machine learning.

Overall, it has been shown that the proposed system helps to decrease the confusion in choosing a career path in AI, providing an easily manageable route towards achieving career goals.

1. Home Page Interface

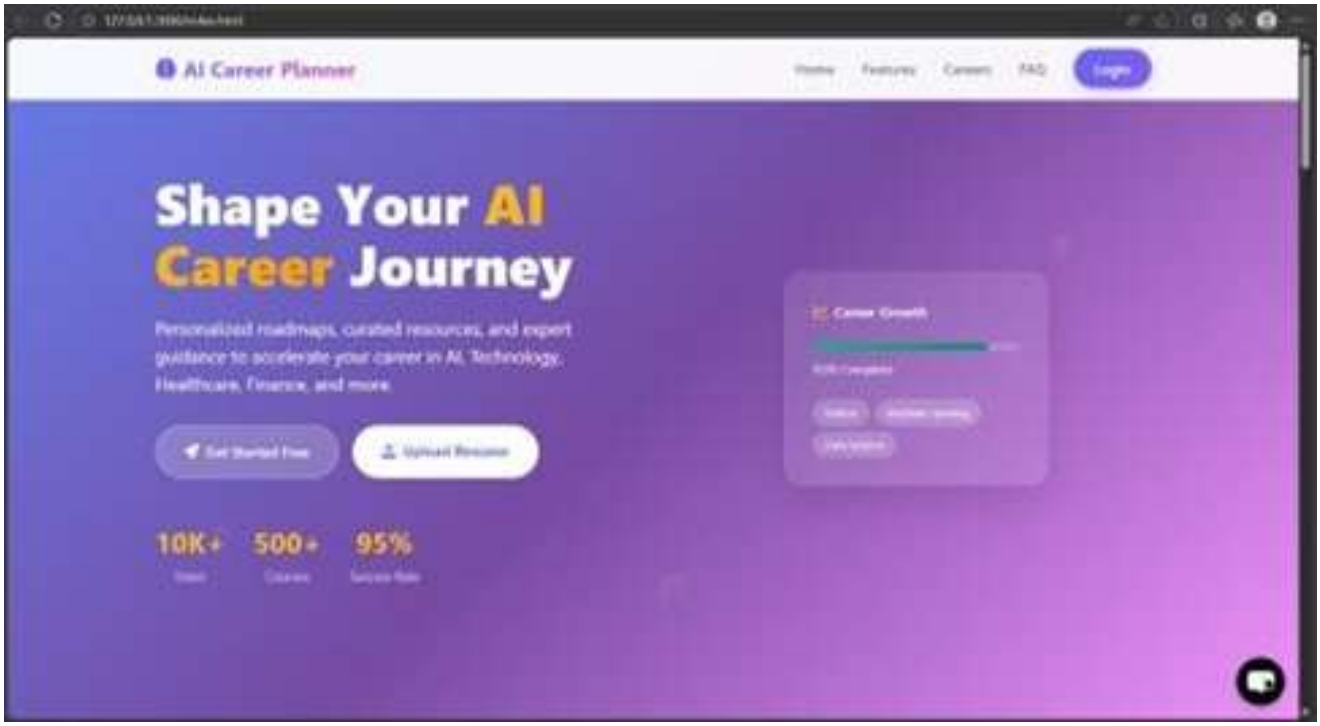


Figure 5.1: Home Page Interface

Figure 5.1 shows a sleek homepage design that promotes the AI Career Planner along with some navigation buttons, highlights and calls-to-action.

2. Career Paths Exploration

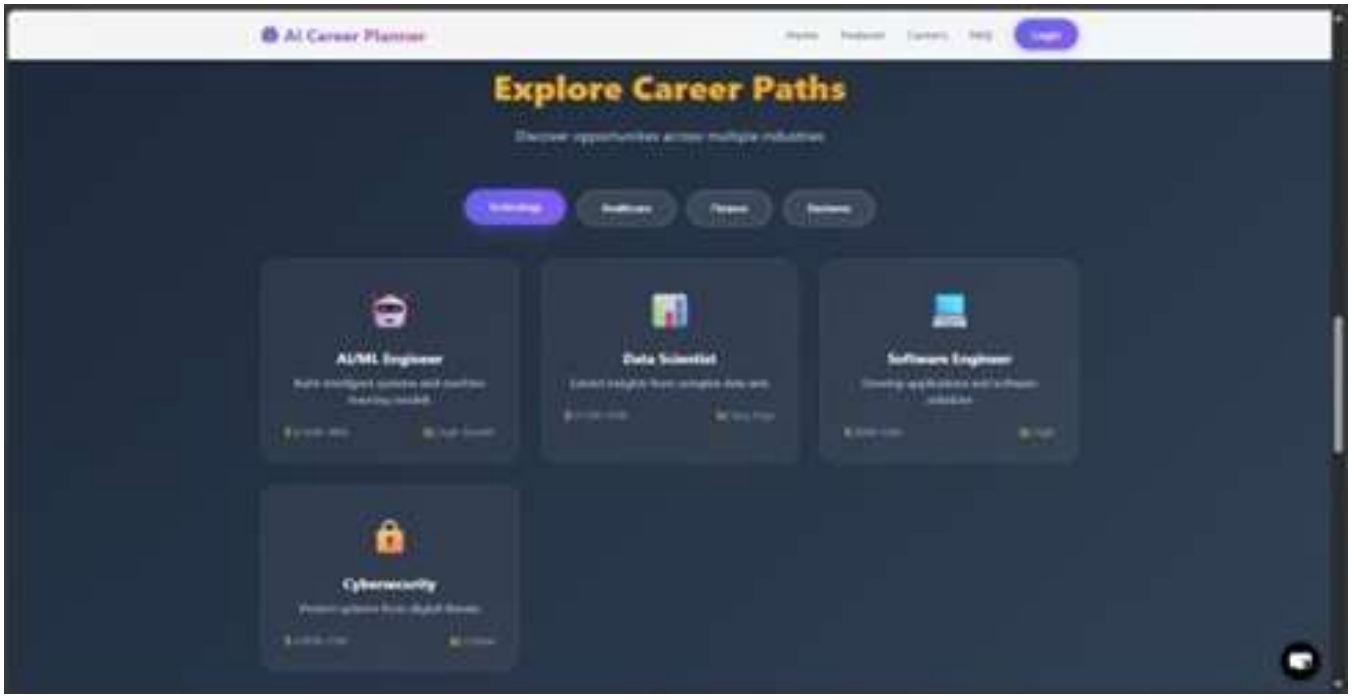


Figure 5.2: Career Paths Exploration

Figure 5.2 shows a section of the AI Career Planner where users can explore different AI career paths and get more information on them.

3. Dashboard

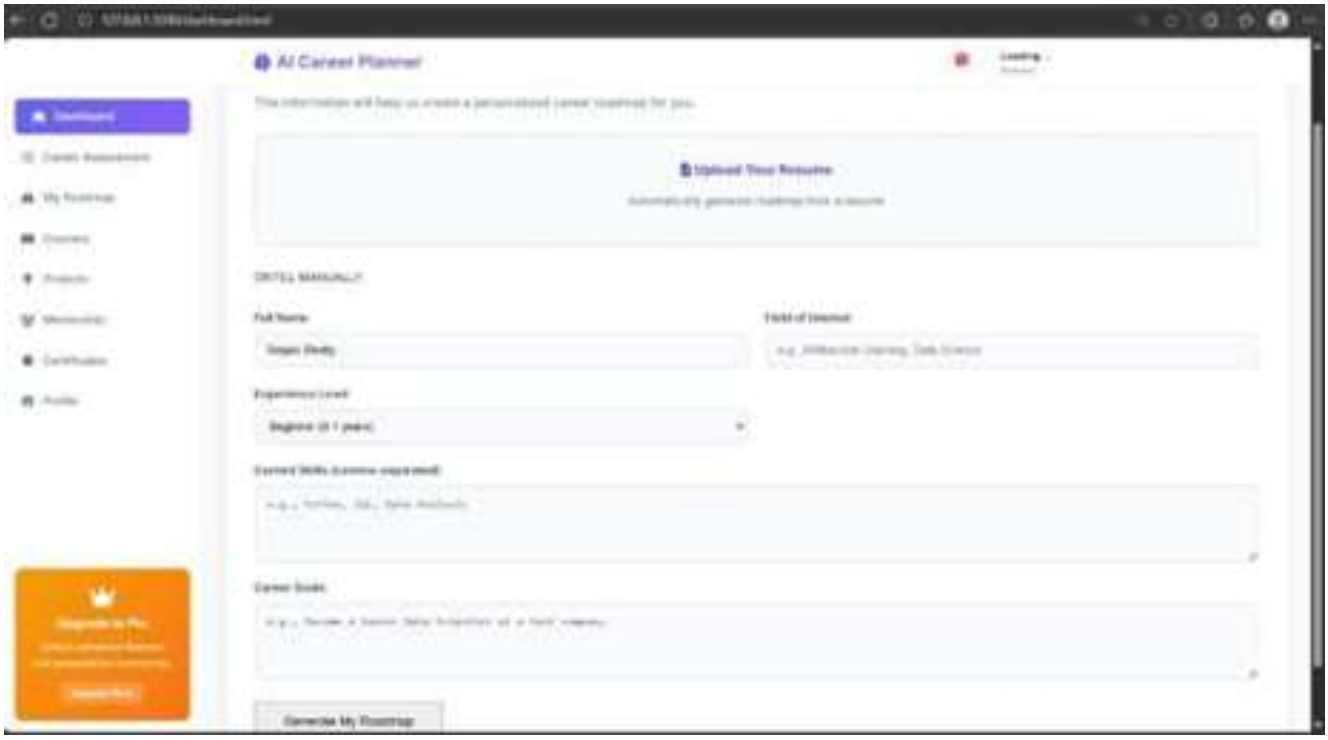


Figure 5.3: Dashboard

Figure 5.3 shows a personalized dashboard that helps users input their data and monitor their progress.

4. Career Assessment Tools

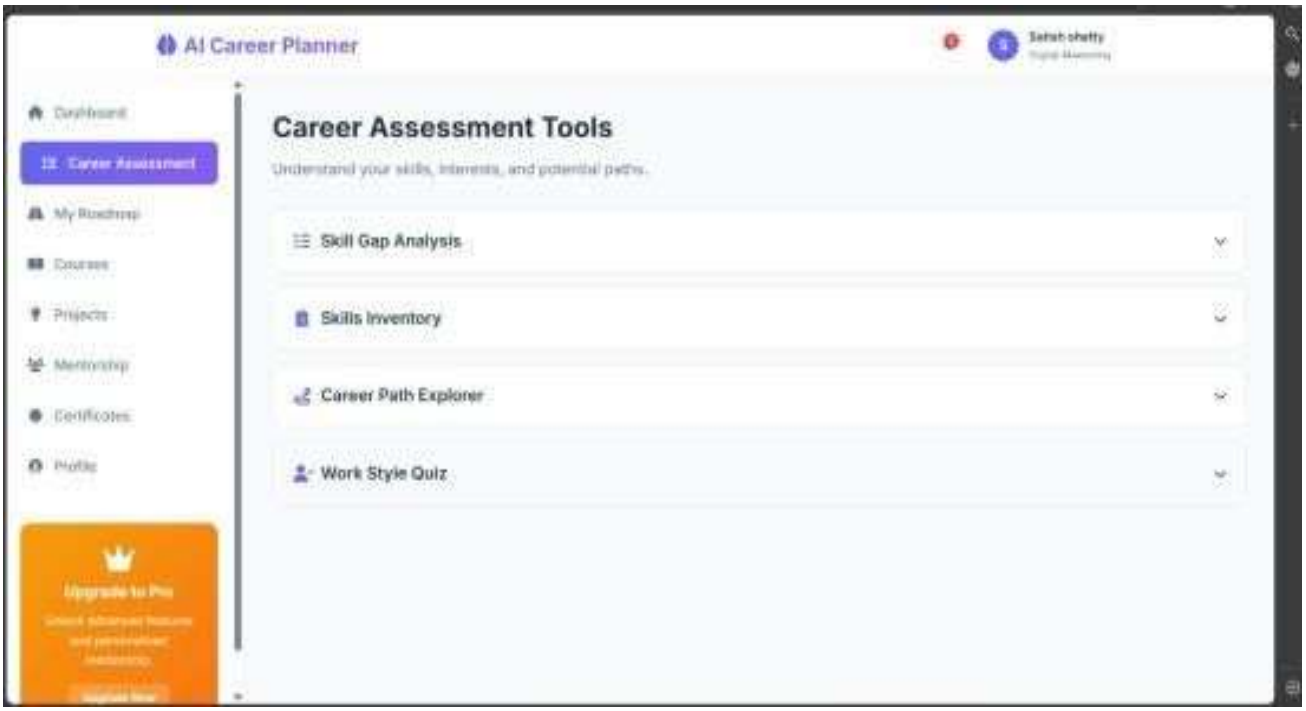


Figure 5.4: Career Assessment Tools

Figure 5.4 shows an assessment tool that analyzes skills, interests, and strengths to suggest suitable AI career paths and reveal skill gaps.

5. Courses and Mentorship Section

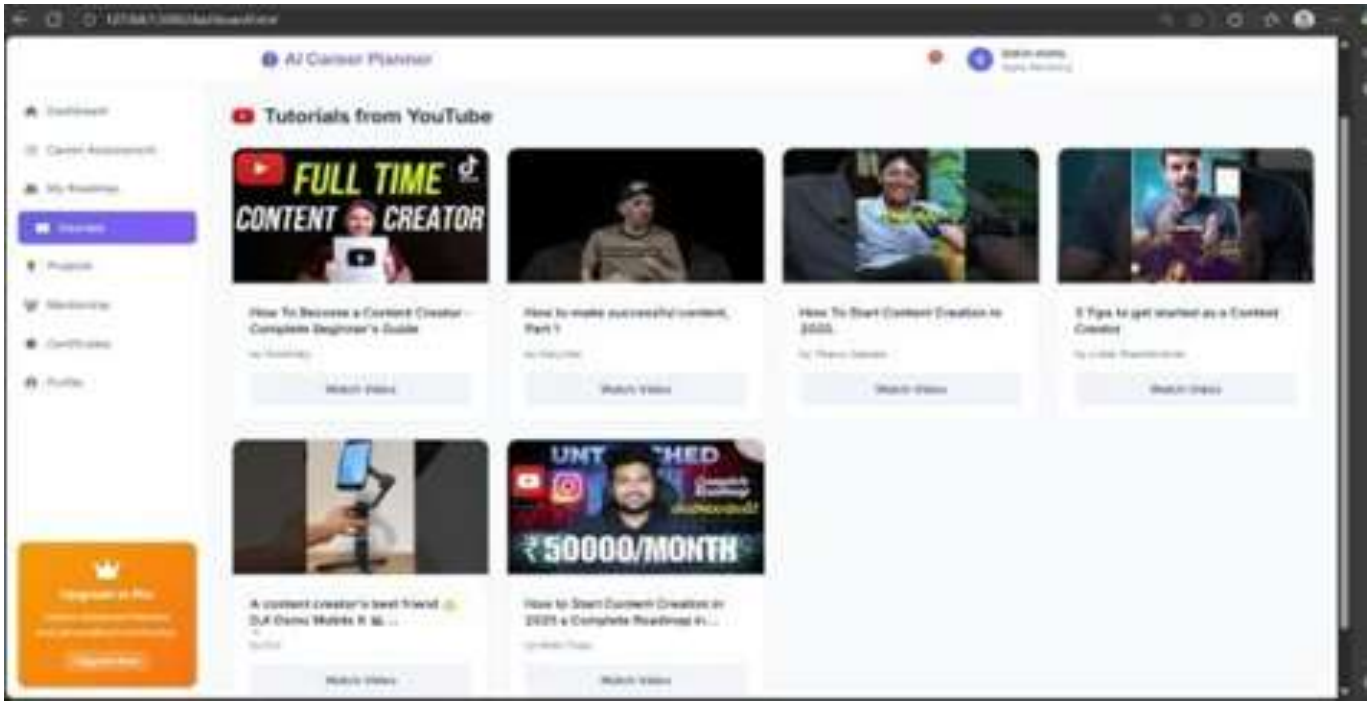


Figure 5.5: Courses and Mentorship Section

Figure 5.5 shows a section that suggests suitable courses and connects learners to industry experts for mentorship.

VI. Conclusion

The designed system successfully provides users with a structured way of identifying suitable career paths and creating an appropriate learning plan in the field of artificial intelligence. With machine learning techniques incorporated into a centralized database, the system solves the problem of disconnectedness inherent in existing approaches. Users receive a recommendation for suitable AI career paths and a learning plan to guide their learning process.

VI.I Future Work

There are several enhancements that can be done in the future. Some of these include incorporating current job market data for improved recommendation accuracy and including deep learning models. Features such as AI mentorship, adaptation of courses depending on a user's progress, and multilingual support should also be considered in future work.

VII. References

[1] Reile D M, Harris-Bowlsbey J. Using the Internet in career planning and assessment[J]. Journal of Career Assessment, 2000, 8(1):69-84.
[2] Pope M. A brief history of career counseling in the United States[J]. The career development quarterly, 2000, 48(3):194-211.
[3] Zhiwei Shi, Zhifeng Wu, Zhe Zhang, Yutong Chen, Xuemeng Liu, “Learning Path Planning Algorithm Based on Career Goals and Artificial Intelligence”, International Journal of Emerging Technologies in Learning (iJET), Vol. 17, No. 10, 2022.
[4] I.-C. Chen, Lydia Bradford, Barbara Schneider, “Learning Career Knowledge: Can AI Simulation and Machine Learning Improve Career Plans and Educational Expectations?”, AI in Learning: Designing the Future, 2023.
[5] Jingyi Duan, Suhan Wu, “Beyond Traditional Pathways: Leveraging Generative AI for Dynamic Career Planning in Vocational Education”, International Journal of New Developments in Education, Vol. 6, Issue 2, 2024.
[6] Jingyi Duan, Suhan Wu, “Generative AI for Dynamic Career Planning in Vocational Education”, International Journal of New Developments in Education, 2024.