

AI Enabled Career Advancement

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ABSTRACT - Choosing the right career is one of the biggest challenges faced by students today. With so many career options available, many students find it difficult to understand which field matches their interests, skills, and future goals. In most cases, students choose a career by following their friends, current trends, or social media without having proper guidance. This often leads to confusion, loss of time, and learning skills that may not be useful for their desired career. The proposed AI Enabled Career Advancement is to solve by providing personalized career guidance to every student. It uses Artificial Intelligence to understand a student's interests, learning style, personality, technical knowledge, and assessment performance before suggesting suitable career options. Along with career recommendations, the platform provides learning roadmaps, study resources, adaptive quizzes, AI mentoring, progress tracking, and internship or job recommendations. Unlike existing platforms that provide the same content to everyone, this system creates a customized learning experience based on each student's profile. The main aim of this project is to help students make better career decisions, improve their skills in a structured manner, and become more confident while preparing for future job opportunities.

Keywords - Artificial Intelligence (AI), Machine Learning (ML), Adaptive Learning, Career & Employability.

1. INTRODUCTION

In today's fast-changing technology industry, students have access to a wide range of career opportunities. While this provides many possibilities, it can also make choosing the right career path more confusing than ever. Many students begin learning programming languages, tools, or technologies simply because they are popular or because their friends are learning them. Without a clear understanding of their own interests, strengths, and learning preferences, students may spend considerable time pursuing unsuitable career paths and eventually switch between options. This can affect their learning progress and make career planning more difficult.

Although many online learning platforms, career guidance websites, and AI-based tools are available, most existing systems provide general information or recommendations that may not fully address the individual needs of students. Students have different interests, technical skills, personalities, learning

preferences, and levels of academic performance. Therefore, providing the same learning content or career guidance to every student may not always lead to suitable outcomes.

An **AI-enabled Career Advancement** website is proposed to support students in making more informed career decisions through personalized recommendations. It analyses relevant student information and uses an AI-based assessment to identify suitable career options. Based on the assessment results, students can receive career suggestions along with explanations, customized learning roadmaps, relevant study materials, adaptive quizzes, AI-based mentoring, and progress reports.

By bringing career guidance and learning support together on a single platform, it aims to make career planning more structured, personalized, and accessible. Rather than focusing only on recommending a career, the system is intended to support students throughout their learning journey by helping them understand suitable career options, identify the skills they need to develop, and monitor their progress.

2. PROBLEM STATEMENT

Many students struggle to choose the right career because they are not aware of the different opportunities and skills available in the job market. Instead of making decisions based on their own interests and abilities, they often follow market trends or suggestions from friends and family. This can result in choosing an unsuitable career path, wasting time on unnecessary courses, and feeling uncertain about their future.

Existing career guidance platforms mainly provide general suggestions and are not capable of understanding the unique strengths, interests, or learning preferences of individual students. Most systems fail to continuously monitor student progress or recommend learning resources based on performance. Because of this, students need to depend on multiple websites for learning, assessments, mentoring, and job opportunities.

3. OBJECTIVES

1. To develop an online system for personalized career recommendation.

2. To recommend suitable career paths based on student interests and skills.
3. To consider personality traits during career analysis.
4. To identify skills already possessed by the student.
5. To identify skills that need improvement for the recommended career.
6. To provide career-specific assessments.
7. To provide a structured learning roadmap.
8. To maintain student assessment history and performance information.
9. To provide a single platform for career exploration and skill development.

4. LITERATURE SURVEY

Several researchers have explored the use of Artificial Intelligence and recommendation systems to improve career guidance and personalized learning. AI-based recommendation systems analyse a student's interests, skills, academic performance, and learning behaviour to suggest suitable career paths and learning resources [1, 2].

Personalized learning platforms have also been developed to provide customized study materials and adaptive learning experiences, helping students learn more effectively according to their individual needs [3, 4].

Recent studies have shown that machine learning and data analytics can improve career prediction by identifying patterns in student performance and recommending suitable career options [5]. In addition, intelligent mentoring systems and educational chatbots are existing to provide real-time guidance and answer student queries, making career planning more interactive and accessible [6].

However, most existing systems focus only on specific aspects such as online learning, career recommendations, or internship opportunities, requiring students to use multiple platforms [2, 7].

Based on the literature survey, there is a need to develop an AI-enabled career advancement system to provide better career options to the end users effectively.

5. PROPOSED METHODOLOGY

The system uses an organized approach of providing personalized career recommendations to the Computer Science students. Firstly, the user needs to register and create a profile. Then, the students' academic, interests, skills, and personality data are gathered. By utilizing the recommendation engine, the system matches the student with their appropriate career. Once a career is

recommended, the system performs a skill assessment, determines the missing skills, performs a career-specific assessment, and concludes with a learning roadmap. The complete process of the proposed methodology is shown in Figure 1.

5.1. SYSTEM WORKFLOW

Figure 1 shows how the system works. It follows a step-by-step process to give each user personalized career advice. First users sign up. Create their profile. They enter information.

Then the system gathers data in four areas:

- It collects Qualification details to see academic results.
- It collects Interests to understand what careers the user likes.
- It collects Technical Skills to check programming and tool knowledge.
- It collects Personality Traits to learn about behavior and strengths.

Once all this info is in place the main system does a Career Recommendation. It matches the user's data with known career paths. At the time it runs a Skill Matching & Readiness Analysis to spot skills the user might be missing. Finally, the system gives next steps. It runs a Career-Specific Assessment creates a Learning Roadmap tailored to the user and lets them track progress with a Dashboard & Progress Tracking.

This whole flow helps users move forward in their career journey, with custom guidance.

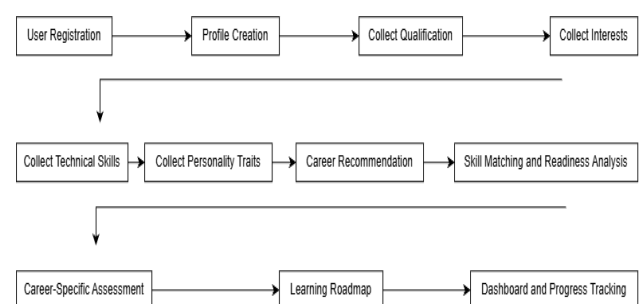


Figure 1: system workflow for Ai enabled career advancement

5.2. DATA COLLECTION AND USER PROFILING

The system gathers information, from the student using a profile form. The form contains details, interests, technical skills and personality traits. Table 1 lists the features that are collected from the user.

Table 1: User profile attributes

Category	Details Collected
qualification	Degree, branch, current year, academic performance
Interests	Preferred domains, hobbies, work style
Technical skills	Programming languages, tools, frameworks, core skills
Personality Traits	e.g. Analytical, creative, leadership

5.3 career recommendation process

The recommendation module analyses the collected information and matches it with predefined career profiles. Each career profile contains required skills, typical interests, personality traits and related qualifications. The system assigns a score to each career based on the similarity between the student's profile and the career requirements. The career with the highest score is recommended to the student.

Table 2: Factors Used in Career Recommendation

Factor	Description
Qualification Match	Comparison of academic background with career requirements
Interest Match	Similarity between student interests and career domain
Skill Match	Matching of existing skills with required skills
Personality Match	Alignment of personality traits with career characteristics

5.4 skill readiness analysis

After recommending a career, the system compares the student's current skills with the required skills for the selected career. The skill readiness percentage is calculated based on the ratio of matched skills to total required skills. The missing skills are also identified to help the student focus on improvement areas. The formula used for calculating readiness is shown in equation.

$$\text{skill readiness} = \frac{\text{Matched Skills}}{\text{Total Required Skills}} \times 100$$

5.5 CAREER-SPECIFIC ASSESSMENT

The Career-Specific Assessment is a specialized evaluation phase designed to test a student's core understanding of their recommended career path. It consists of multiple-choice questions focusing on mandatory technical concepts, relevant industry tools, and practical scenarios. The resulting score is securely saved in the database and tracked on the user dashboard.

5.6 Learning Roadmap Generation

Based on the recommended career and identified skill gaps, the system generates a structured learning roadmap. The roadmap includes necessary skills, suggested projects and learning resources such as courses, tutorials and documentation. An example roadmap for Machine Learning Engineer is shown in Figure 2.

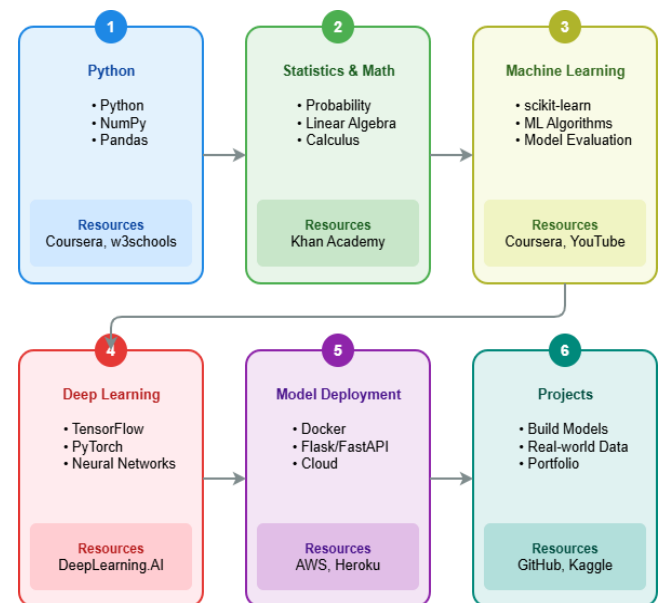


Figure 2: Example Career Roadmap-Machine Learning Engineer

5.7 Dashboard and Performance Tracking

The dashboard and performance tracking module gives users a view of their career assessment and learning progress. After completing quizzes or assessments the system records the scores. Shows key details such as total attempts, average score, best score and recent results. Progress is shown with charts and a timeline making it easier for users to see how they improve over time. The dashboard also points out the career-related assessment and score. This method helps users keep checking their performance, spot areas that need improvement and stay aware of their progress, toward their chosen career path.

6. EXPERIMENTATION

6.1 User Assessment Experimentation

The proposed Career Mitra system was tested by giving student profile information to the career assessment module. The assessment looks at qualification, interests, technical skills and personality traits. After the assessment is submitted Career Mitra system processes the information. Gives a suitable career recommendation. The recommendation includes identified skills, skills that need improvement and a learning roadmap. This experiment checked if Career Mitra system could give career guidance instead of the same recommendation, for every user.

6.2 Career Recommendation Experimentation

The recommendation module was tested with combinations of student interests, skills and personality traits. For one sample student profile the system suggested Machine Learning Engineer as the career path. It found a match in Python as a skill. Pointed out areas like Scikit-learn, Machine Learning, TensorFlow, PyTorch ML algorithms, data, CNN and RNN where the student needs more growth. The system also gave a reason for the recommendation and provided a step-by-step learning plan. This experiment shows how the system links what the student already knows to what a career like Machine Learning Engineer requires. It helps build a path from current skills to future goals.

6.3 Assessment and Quiz Performance

The career-specific quiz module was evaluated using the Machine Learning Engineer assessment that contains seven questions. The dashboard records the student assessment history. Provides assessment-related information. In the project demonstration the dashboard displays 16 total attempts, an average score of 4.9 and a best score of 7. The latest recorded result is 7/7, for the Machine Learning Engineer quiz. These values show how the system keeps assessment history and lets students monitor their quiz performance over attempts.

Table 3: Dashboard Performance Summary

Performance Parameter	Recorded Value
Total Attempts	16
Average Score	4.9
Best Score	7
Latest Quiz	Machine Learning Engineer
Latest Score	7/7
Number of Questions	7

6.4 Career Roadmap Experimentation

The recommended career was further tested through the career roadmap module. For the Machine Learning Engineer recommendation, the system shows a path of learning stages that include Python, Statistics, Mathematics, Machine Learning, Deep Learning, Model Deployment and Projects. The system also lists skills such, as Python, Scikit-learn, TensorFlow and PyTorch and it gives project ideas and learning resources. This experiment shows that the recommendation module is linked with the career roadmap and gives students steps after they receive a career recommendation.

7. IMPLEMENTATION

Ai Enabled Career Advancement is built as a web-based application. The backend uses Python Django. The user interface is created using HTML, CSS, JavaScript and Bootstrap. This gives students a responsive way to work with the system.

Django handles user registration, user login, career assessment, quiz processing, recommendation tasks and storing user details. MySQL or SQLite can be used as the database to keep student profiles, assessment results, quiz scores, skills and performance records.

Python tools, like Scikit-learn can be added to handle the recommendation and assessment functions. The dashboard shows the assessment history and performance data using charts and graphs. This helps students track their progress and see where they need to improve.

7. RESULT AND DISCUSSION

The system gathers parts of career planning into a single platform. It offers career exploration, career recommendation, skill analysis, assessments and learning guidance. When the system was tested it used student data like interests, technical skills and personality traits to create a career recommendation. This makes the career recommendation fit each student. The recommendation page shows more than a career name. It displays the skills that already fit the chosen career and points out the skills the student should improve. It also gives an indicator letting students see their current level and where extra learning is needed. This makes the career recommendation more useful for planning the steps in the students' career preparation. The assessment module was tested with questions to check how well the student understands the recommended field. The assessment results stay in the system. Are shown on the dashboard. The dashboard lets students see attempts, scores, average performance and best score. This gives students a way to see their progress and spot areas that need more practice.

The career roadmap links the recommendation to skill development. For instance, the Machine Learning Engineer roadmap in the system begins with Python then moves through Statistics and Mathematics Machine Learning, Deep Learning, Model Deployment and project development. Thus, the roadmap gives students a path for building the skills needed for their recommended career.

Overall, the results show that Ai Enabled Career Advancement offers a linked approach to career planning. It brings career recommendation, skill-gap identification, career-specific assessment, performance tracking and learning guidance together in one platform. Of stopping at career selection, the Career system gives students details, about their current skills and a clear path to improve them.

8. Conclusion

Career choice can be tough for students because each job path needs a mix of abilities what you like doing and your personal strengths. The AI Enabled Career Advancement system helps with this problem by offering a way to link job suggestions with skill checks, testing and help with learning. The system gathers details like the student's education what they enjoy, their technical skills and their personality to find a career option. Once they get a suggestion students can see which skills they have and which ones need work. Career related tests are another way to check how much they know while the career plan shows a list of learning steps and project work. The dashboard also lets students follow their test results and how they do over time. The system does more than just give one idea about a job. It brings together exploring careers, building skills, testing and keeping track of progress in one place.

In the future the AI powered Career Advancement system can be made better by using sets of student data more advanced ways to suggest jobs more areas of work to cover, better ways to test personality and better checks, on how good the suggestions are. These changes can make the system more flexible and helpful for students who come from schools and have different job goals.

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