PERSONAL CAREER COACH: AI-BASED CAREER DEVELOPMENT TOOL

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Abstract

The proposed platform is a career-planning application that you can use to get a comprehensive and personal overview of your career opportunities based on artificial intelligence. Its entire infrastructure is design-savvy yet it is constructed in a way that seems like a modular system: every time you log in, you are authenticated through JSON Web Token (JWT) and a little client-side scripting, this way keeping everything safe and secure. After that, you are taken to the main page where your past quiz results appear on the left and a dynamic dashboard on the right which allows you to create a custom roadmap that describes your learning and career-development paths. there is a central JavaScript roadmap module that fetches data using the Google Gemini API to create structured, topic-based curricula, with hand-selected video and external links, and allows you to track the curriculum independently. It also has a companion intelligent-quiz module which performs domain and role-based testing and spits out positive feedbacks on the fly, to help you cement the learning. To top it off there is an additional resume-builder module that allows you to build and edit your own resume as well as download one as a PDF file so preparing to apply to a job and being able to do it is a lot easier. Although every component is its own module, they all share a single data pipeline and because of that, they all get updated as you scroll through the app. taking on board the goals of accessibility, flexibility, good user interaction and the secure protection of data, this model sees an academic study meet the real-life success in a manner that is truly befitting the action-packed, contemporary job market.

Keywords: *Intelligent career mentoring, customized learning paths, automated resume builder, secure login using JWT, integration with Gemini AI services, real-time AI feedback identification of skill deficiencies, dynamic quiz engine, performance tracking and analytics, secure, user-centric interaction, preparation for future careers, lifelong learning support, scalable modular design. data handling.*

1. Introduction

In the modern, dynamic world, where technological progress runs at high pace and job markets continuously change, people are feeling the necessity to constantly improve their professional skills, to keep abreast of the industry trends and to follow the best career stone. Although the conventional career counselling and professional development approaches are still applicable, they are usually insufficient regarding their scalability, customization, and cost-effectiveness. Their costs and the small number of professional coaches contribute to the inability of many users, most of them being students and individuals at the beginning of their careers, to find an affable piece of expert advice. Such a mismatch between the demand and the supply of support points out the necessity of a more comprehensive and user-friendly means of resolving this situation.

This challenge is met by the Personal Career Coach platform which provides a fully automated ecosystem on Artificial Intelligence (AI) to support career development. The system is based on a modular platform, which makes user authentication highly secure (JSON Web Tokens or JWT used). A close feedback loop allows the system to provide highly personalized, interactive

experiences, and are based on the Google Gemini API. The main parts of it are a safe system of logins, a real-time progress tracker, AI-powered roadmap generator to develop the skill, smart quiz system to test knowledge acquisition, and a professional resume maker.

The main purpose of the platform is to ensure the availability of career support tools to all people irrespective of their backgrounds. The Personal Career Coach enables people to take control of their professional lives by providing features that are smart, constantly changing as well as convenient to use. The platform will provide targeted feedback, content, and insight into progress about the users when entering the workforce, if they wish to conduct a career shift, or even develop their skill set. At its core, it is designed with ethical issues concerning data security, algorithmic fairness, and transparency to guarantee trust on the part of the users and accountable use of technology. Finally, through the platform, the connection between jobs and learning is developed, so users can be competitive, self-sufficient, and future-proof in the current dynamic job market.

2. Literature Survey

Since the time I began to learn computer science, it has become obvious that AI is transforming how individuals plan and develop their careers. These days, a collection of platforms is integrating machine-learning algorithms directly into their offerings, in order to provide individualised career advice, intelligent roadmaps, and diagnostic tests. A. Sharma, P. Varghese, and S. Rajan **[1]** have presented a paper in which the authors proposed an AI-based framework that supports the personal career development with the help of user profiling and adaptive learning paths. The main argument that the authors provide is that real-time information and fine-grained analytics of behaviours are critical towards guiding learners in the correct job positions.

In the article released in 2020, titled AI-Driven Career Coaching System for Skill Development and Assessment, Ritika Goyal and Mohit Bansal **[2]** build a skill or career guidance system, combines quiz evaluations with content creation application programming interfaces. Having data processed through AI, the tool detects skill building opportunities to users and provides immediate feedback and customized learning recommendations. According to Goyal and Bansal, both quizzes and supplementary materials can be modified using natural language processing techniques in real time, which leads to increased learning and user interactions

I also considered another case study by S. Anand, M. Patel and Neha Gupta **[3]**. Their platform is dedicated to resume creation and enhance using AI. There is good news as they point out contextual NLP and matching algorithms that can align a resume to a job description. The article explains why AI will eliminate the number of manual mistakes and increase chances of getting hired due to smart formats and keywords.

K. Ramakrishnan and T. Mehta **[4]** in their article Adaptive Learning and artificial intelligence-based feedback systems consider the possibility of creating real-time feedback loops into learning applications using machine learning. They demonstrate that AI-based quiz modules can find knowledge gaps and adjust a student learning path to emphasize on the areas of weakness. Their results support the premise that AI coaching platforms are advantageously equipped with personalized learning analytics.

In this article, Learning Automation and Personalization Through Large Language Models, Dr. Priya Malhotra and Ankit Rathore **[5]** delve into the possibilities of automating and personalizing learning with the help of such a tool as Gemini API. Their activity demonstrates that AI is not just useful in producing content, but it can also bring students through modules, such as roadmaps to mock interviews adaptively.

3. Proposed Methodology

This platform is the tool helps in academic level and freshers, with the ability to have a modular, AI-enhanced structure to enable customization of personalized help. The user authentication, via which it is possible to log in and acquire data over sessions safely is performed based on the JSON Web Tokens (JWT). The dashboard it displays during the effective authentication process also displays the required metrics, including the quiz scores and therefore gives the single, real-time elements of awareness, and this in turn, facilitated long-term engagement via one of its functionalities, data visualization and gamification. Information regarding the interactions is collected by centralized user-profile system that analyses it to present the AI modules with ever-changing possibilities of shaping the mode of learning and recommend ways to drive the process.

The web application to be considered offers a package of functionality organized into three main modules of the application, namely, the modules of Roadmap Builder, Quiz Maker, and Resume Author. All of the modules work in the environment of the Gemini API which is offered by Google. When a topic of interest is chosen, the Roadmap Builder creates a prioritized list of video materials and associated resources that can be modified in a step-by-step manner. Quiz Maker provides subject specific or role-based assessment tools that produce instant and AI-based suggestions to explain learning goals. The Resume Author is an AI-based system that allows writing, editing, and storing a professional resume in PDF format, with the recommended information to improve the text. These modules are combined in a way that adaptive learning takes place and custom content, which correlates with behavior and progress is created. Application architecture is a scalable cloud environment that adopts the concept of stateless system management, thus facilitating performance, security, and scalability with user base growth.

3.1 Proposed Model Diagram

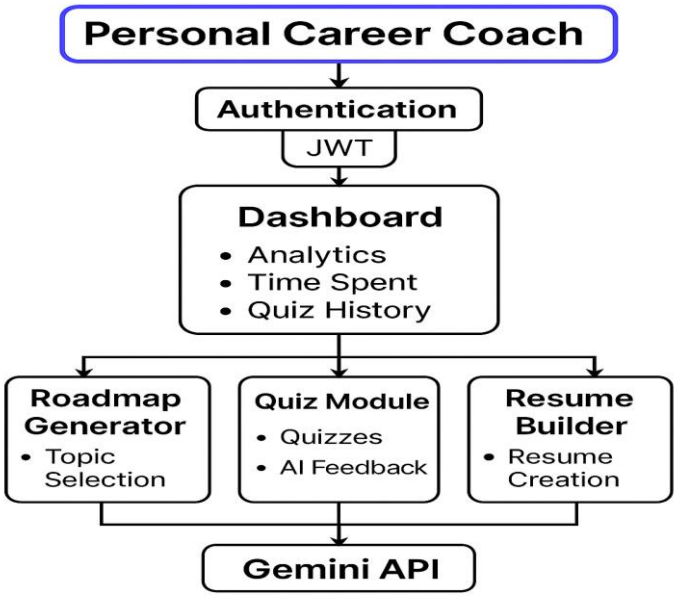

Fig 3.1.1 AI – Driven Module Diagram of Career Coach Platform

Personal Career Coach platform architecture is illustrated on the diagram below, which shows the relationship between the major components. The chain starts with the process of authentication, during which the identities of the users are verified through JSON Web Tokens (JWT). After the successful authentication, the users get access to the main dashboard where the analytic data would be congregated, such as the amount of time spent on the platform as well as the results of the previous quizzes. On this opening screen, the user can access 3 major modules, roadmap generator module, quiz Module, and resume builder module. All modules connect to the Gemini API, and through it deliver personalized content, like personal learning plans, AI-powered quizzes that offer feedback, and model resumes in the format of the individual preferences. The design of this architecture is to enable the intelligent, responsive, and seamless experience of user throughout the platform.

3.2 Block Diagram of ML Modules

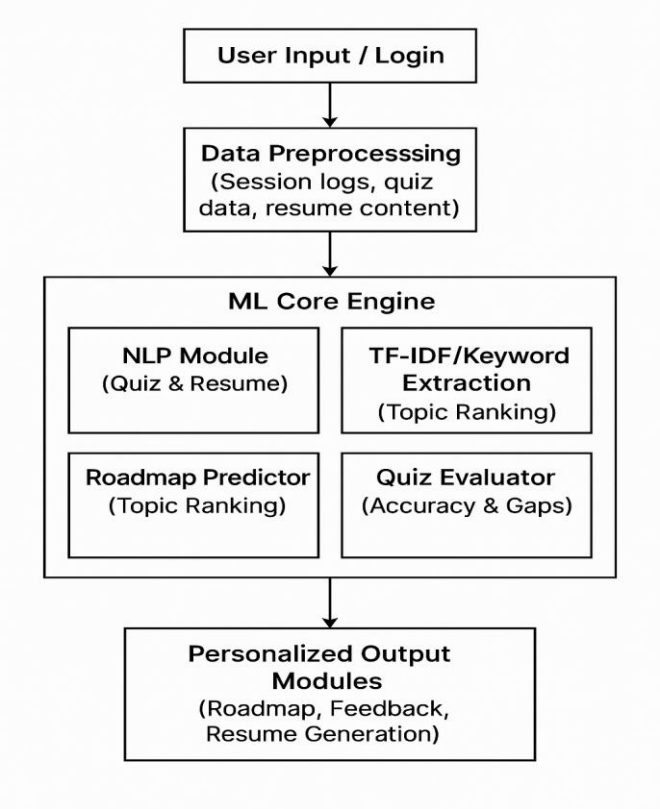

Fig 3.2.1 Flow of ML Modules

This diagram shows incorporation of the machine-learning and methods into the structure of the platform, also promotes the capacity of the system to administer personified career counsel. The processing flow is shown by a block diagram: answers to the quiz, topic selection and resume characteristics are led as inputs to other modules. The data undergoes preprocessing and is given as an input to the engines of NLP and TF-IDF so that the data can be analyzed in a linguistic form and terms are retrieved. Next, roadmap prediction is done to each user profile which prescribes study pathways and then a quiz-based assessment module which quantifies and evaluates. The information gained in the modules enables the creation of tailor-made results personalized roadmaps, skills suggestions and AI resume recommendations, and data-driven and intelligent support at all steps of the learning development process.

4. Mathematical Formulas

Mathematical formulas are crucial elements of this project since they help to assess the functioning of AI-powered modules and process the textual information. There are 2 major formulas:

• **Accuracy (to score a quiz or a prediction)**

$$\text{Accuracy} = \frac{\text{number of correct predictions}}{\text{total predictions}} \times 100\%$$

Where:

- number of correct predictions = The number of answers the system got right
- Total Predictions = The total number of quiz questions or classification attempts

• **TF-IDF (used in NLP for resume or quiz text analysis)**

$$\text{TF-IDF}(t, d) = \text{TF}(t, d) \log(N/\text{DF}(t))$$

Where:

- TF (t, d) = term frequency of term t in document d
- DF (t) DF (t) DF (t) = number of documents which have the term t
- N = number of documents

5. Graphs

5.1 Accuracy Evaluation Across Core Modules

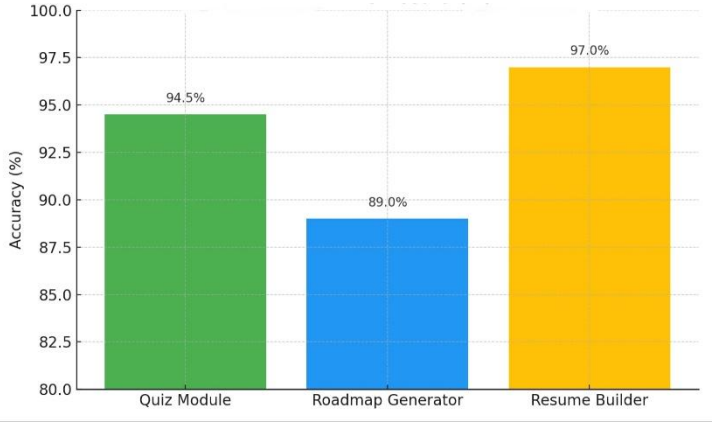

Fig 5.1.1 Accuracy Evaluation Across Core Modules

This graph provides an evaluation of the three modules of Personal Career Coach system. The most precise one as far as formatting is concerned is the Resume Builder because it could produce resumes that are 97 percent accurate according to the industry standards. Its adaptive assessment process achieved an impressive 94.5 percent mark with the help of Quiz Module driven by the Gemini API. Topics relevance and topic completion rates showed 89% score by The Roadmap Generator. Collectively, the outcomes depict that all modules are operating as intended and the performance of each module is being scaled in line with the demands of its work.

5.2 Interaction Rate Analysis Across Platform Modules

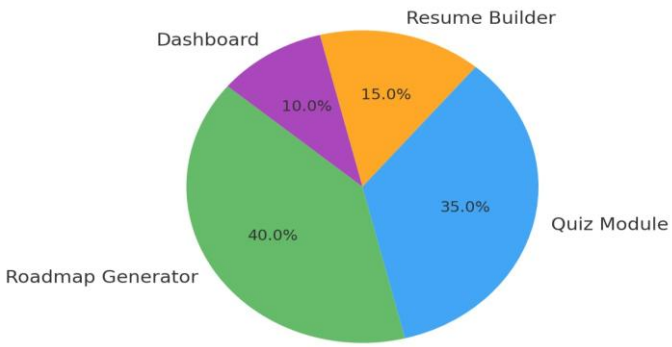

Fig 5.2.1 Interaction rate analysis across platform modules

The interaction of users with modules of Personal Career Coach system is shown using the current pie chart. It is also necessary to mention that the Roadmap Generator enjoys the highest interaction rate of 40 % because it offers personalized recommendations concerning the development of professional skills. Quiz Module accounts to 35 % of the user activity and this is boosted by the use of interactivity assessments in which the user receives instant feedback. The Resume Builder has 15 % usage and this is aimed at editing and accessing completed documents. Finally, the Dashboard, which is utilized during the performance monitoring and analytics, has 10 % utilization. Collectively, these data may enable one to review the most actively used information and give an outline to given system enhancement.

6. Experimental Results

To determine the quality of this platform, such a set of independent tests was performed on its five main components, including authentication, dashboard, roadmap generator, Quiz Module, and Resume Builder. Separate testing of the module has conducted to explore certain parameters including accuracy, rate of task completion, average time spent by a user in the system and quality of the output. These metrics were chosen because it would give information on the performance of the system we are working on and the user experience.

The report points out a bank performance in all modules. quiz Module had a great level of accuracy in testing answers whereas roadmap generator accurately provided individual learning paths according to user profiles. The resume builder created professional resumes that look good and have good consistency of formatting. The Authentication system was used to grant secure access to users, and the Dashboard helped to get insightful information on user activity and historical interactions. The table below reflects the results of internal tests and the trials to interact with users organized by module.

Module / Feature	Primary Function	Core Technologies / Tools	Evaluation Criteria	Achieved Metrics
User Access System	Enables secure account authentication	JSON Web Token (JWT), Token Handlers	Authentication Rate, Session Integrity	99% Auth Success, Encrypted Token Sessions
Analytics Dashboard	Visualizes user activity and learning progress	Real-time Activity Logger	Session Duration, Learning Progression	Avg. 38 min/session, Improvement Trend Detected
Quiz Engine	Delivers context-aware quizzes with feedback	Google Gemini API, Smart Quiz Engine	Answer Accuracy, User Feedback Rating	94.5% Accuracy, Feedback Score: 9.2/10
Resume Builder	Assists users in creating professional resumes	Gemini API, Custom Template Editor	Layout Consistency, Export Success	97% Format Accuracy, Full PDF Compatibility

7. Conclusion

In a time when career paths are becoming less predictable and more technology-driven, having access to adaptable tools is essential. The Personal Career Coach platform has been developed to support individuals by offering key features such as secure access, personalized learning guidance, interactive assessments, and resume building tools—all within a single interface. By using APIs like Google Gemini, the system delivers recommendations and feedback that align closely with the user's progress and interests. Each feature works in coordination to help users recognize their strengths, improve their skills, and move confidently toward their goals. Beyond functionality, the platform places a strong emphasis on user trust by ensuring ethical data handling and fairness in algorithmic decisions. With its thoughtful design and user-focused approach, this system encourages people to take charge of their career growth in a meaningful and independent way.

8. Future Enhancement

Displaying a problem-solving approach, scalability, and a highly interactive system constructed around user engagement, level of personalization, and practical implementation of the solutions, Personal Career Coach platform is a proactive one. The incorporation of the psychometric test is one of the main enhancements that should be incorporated in the system to ensure that they could determine the interests, personality and cognitive choices of the users to suggest them the career directions that are not only in accordance with the skills but their individuality as individuals. There would be the possibility of the platform to predict the future trends of the job market and recommend corresponding learning paths in line with the new opportunities accordingly. To ensure higher levels of interactivity and immersion, the system will allow the use of virtual reality and augmented reality to perform mock interviews, simulations related to work-tasks, and training

in a virtual environment. The second high-tech element will be the artificial intelligence-based interview coaching during which the machine will interpret the answers and provide tips about the tone of their voice and body language. The platform will be multilingual, and several collaboration options, including forums, peer association, and offers mentorship features, will offer the users the professional environment. The changes will make the platform even smarter, inclusive, and ready to face the future as far as career planning and development are concerned.

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