CareerPilot: A Web-Based Intelligent Career Advisory Platform for Skill-Oriented Career Guidance

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Abstract – Navigating your career has gotten a lot trickier these days. The job market keeps shifting, new skills pop up overnight, and employers care less about what degree you have and more about what you can actually do. With all this change, students and job seekers need smarter, more practical guidance. That's exactly where CareerPilot comes in-a web-based platform built to give you personalized, skill-focused advice.

Here's how it works: CareerPilot looks at your profile, checks your skills, and matches you with career paths that fit your background and interests. It uses a mix of data-driven analysis and rule-based logic to make recommendations-not just about jobs, but also about the skills you'll need and the best ways to learn them. The platform runs on up-to-date web tech, so it's easy to use whether you're on a laptop, tablet, or phone. By focusing on what you can do, not just what degree you have, CareerPilot helps you make smarter choices in a fast-changing job market. Testing and feedback so far show that users walk away with a better sense of what's out there and a real plan for their next steps.

Keywords*-career guidance, decision support systems, educational technology, skill-based recommendation, web based applications*

1. Introduction

The job market isn't what it used to be. Digital tools, automation, and new tech have completely changed the landscape. For students and folks just starting out, figuring out the right path can feel overwhelming. There's so much information, but not a lot of clear, personal guidance. Most career counseling still happens face-to-face and leans heavily on one-size-fits-all advice, which just doesn't cut it for everyone.

That's why we need smarter, tech-powered solutions that actually connect what people learn with what employers want. Thanks to advances in web technology and smart decision systems, we can now build platforms that use real data and knowledge models to guide people. These systems look at your background, your interests, and your skills, then suggest concrete career options that match what's actually happening in the job world right now. This paper introduces CareerPilot a web-based, intelligent career advisory platform that zeros in on skill-based guidance. We

designed it to be personal, easy to access, and scalable, so lots of people can use it at once. By pulling together user profiles, skill assessments, and smart career mapping, CareerPilot supports people in making confident, future-ready choices about their careers.

That's the heart of this research: showing how an intelligent web platform can genuinely help people build skill-focused paths that stand up to whatever the job market throws at them making and support users in planning future-ready, skill-focused career pathways.

2. Materials and Methods

This section presents a comprehensive description of the materials, system components, and methodological framework used for the development and evaluation of the CareerPilot web-based intelligent career advisory platform. The proposed methodology is designed to ensure transparency, reproducibility, and scalability of the system while aligning with industry-oriented career guidance

requirements.The development process follows a structured approach that includes system design, data preparation, user profiling, skill assessment, recommendation generation, and performance evaluation. Each phase is described in detail to enable replication and further enhancement of the proposed system.

2.1 System Development Environment

We built CareerPilot with modern web tools so people can use it anywhere-on any device, any operating system. On the frontend, we use HTML for structure, CSS to make things look good and adapt to different screens, and JavaScript to handle all the interactive stuff. This combo makes the platform feel smooth and easy to use. On the backend, things get a little more technical: that's where we handle user requests, crunch the data, run the career- matching logic, and make sure everything's secure. We use server-side frameworks for things like authentication and checking data, while a relational database keeps track of user profiles, skill assessments, career info, and the recommendation rules. By keeping the frontend and backend separate, it's easier to update and scale the system later on.

2.2 Data Collection and Career Knowledge Base

CareerPilot's advice is only as good as the information it's built on, so the career knowledge base is pretty robust. It covers a ton of ground, from different industries and job roles to the exact skills and qualifications you need- including both technical and soft skillstand up-to-date info on what employers want right now. We pull this data from trustworthy sources: academic research, industry reports, official skill frameworks, government job sites, and professional guidelines. These sources help us stay on top of new job trends and shifting skill demands. Once we gather everything, we double-check and sort the data, organizing it into categories like career domains, skill sets, job profiles, and learning paths. This structure makes it easy to match up users with the right career options. So when someone uses CareerPilot, the recommendations actually connect their skills and goals to what's really happening in the job market. recommendations by aligning individual competencies with real-world industry requirements.

2.3 User Profiling Methodology

To really get to know each user, CareerPilot uses detailed forms and assessment questions. We ask about your education, interests, what you're good at, and where you want your career to go-both short-term and long-term. We mix hard data, like your qualifications and skill ratings, with softer info, like your personal interests and preferences. The

end result is a profile that's not just about what you can do right now, but also what you care about and where you're headed. This profile feeds right into our recommendation engine, making sure the guidance you get actually fits you.

2.4 Skill Assessment Technique

CareerPilot's skill assessment digs into both technical and soft skills in a way that actually makes sense. Instead of random quizzes, users get a questionnaire where they rate how good they are at things like programming, communication, teamwork, problem-solving, and a bunch of domain-specific abilities. The system doesn't just collect these answers and call it a day - it runs them through logic checks to keep things fair and consistent. Then it normalizes the results to cut down on bias and sorts skills into clear categories. This way, users can easily spot what they're good at and where they need to improve. It's not just about labeling skills, either. The assessment helps match users to careers that fit and points them toward learning paths that actually help them grow.

2.5 Recommendation and Mapping Approach

When it comes to career guidance, CareerPilot doesn'tjust throw out generic suggestions. The platform uses a mix of smart rules and real data to give personalized, skill-focused advice. Here's how it works: The system looks at each user's skills, interests, and education, then matches those to different career paths using a set of defined rules built from industry standards and its own knowledge base. It calculates compatibility scores by comparing what a user brings to the table with what each career actually requires. Based on these scores, it ranks and shows the most relevant career options first. But it doesn't stop there. The platform also spots any skill gaps and recommends learning resources or development paths, so users know exactly what to work on if they want to move closer to their ideal job.

2.6 Evaluation Methodology

To make sure CareerPilot actually works and stays helpful, the team takes a close look at how users interact with the platform. They analyze how people use the career recommendations, skill assessments, and learning suggestions. They also collect detailed feedback to find out how satisfied users are and whether they find the platform useful. The team tracks key metrics like how relevant the recommendations are, how accurate the career matches feel, and whether users grow more confident in their decisions. These insights help them see where the platform aligns with users' goals - and where it falls short. CareerPilot uses this feedback loop to keep tweaking its rules, scoring, and

overall accuracy, so it keeps getting better at pointing people toward the careers they want.

2.7 Block Diagram

Figure 1: System Architecture of the Web-Based Intelligent Career Advisory Platform

3.1.1 User Interface Module (React.js)

The user interface is where everything starts on CareerPilot. Here, people can sign up, log in, fill in their info, or upload a resume. When we put this piece together, it worked well- no hiccups, and it looked good on phones and desktops. Users had no trouble entering their details, which means the design really does make things easy and accurate. That's key

for collecting solid data and making career advice that actually fits.

3.1.2 Backend APIs (Node.js + Express.js)

The backend handles all the behind-the-scenes stuff: logging in, checking requests, and keeping the different parts talking to each other. Secure authentication kept out anyone who didn't belong, and smart validation made sure we only processed good, complete information. This layer connected the frontend, database, and AI engine without any real drama, so the whole system ran smoothly.

3.1.3 MongoDB Database

MongoDB takes care of storing everything-user profiles, quiz answers, past jobs, and subscription details. When we tested it, data saved and loaded without any problems or mix-ups. Its flexible setup made it easy to handle all sorts of skill data, even the unpredictable stuff. That kind of flexibility is perfect for a career platform that needs to scale and adapt.

3.1.4 AI Recommendation Engine

This is really the heart of the whole thing. The AI analyzes skills, interests, and assessment scores, then spits out career paths, job matches, college ideas, and points out missing skills. Most users said the recommendations matched what they wanted out of their careers. The skill-gap analysis zeroed in on what people needed to work on, offering up the right learning routes. Basically, the AI guidance actually worked.

3.1.5 Subscription Management Module

This module sorts out who gets what-free users get basic recommendations, while premium folks unlock full features like detailed roadmaps, job alerts, and extra resources. It did its job, no surprises, which shows the platform's set up for real-world use and can handle more users as it grows.

3.1.6 Interactive Dashboard

The interactive dashboard acts as the central hub of the CareerPilot platform, seamlessly integrating all user-facing features, including detailed career roadmaps, quiz outcomes, tailored recommendations, and comprehensive progress tracking. Rather than forcing users to navigate through multiple menus or sift through dense layers of information, the dashboard brings everything into a single, intuitive interface. At a glance, users can assess their current standing--seeing which milestones they've achieved, which skills they're developing, and what actionable steps lie

ahead. Vibrant data visualizations, such as progress bars, competency charts, and personalized notifications, make next steps obvious and attainable.

This approach not only streamlines navigation but also reinforces motivation: users receive immediate feedback on their journey, helping them stay engaged and aware of their growth. Interactive elements such as clickable modules, drag-and-drop roadmap customization, and direct links to suggested resources empower users to take ownership of their development.

2.8 Flowchart

Figure 2: CareerPilot System Workflow

Figure 2 lays out how the CareerPilot platform works from start to finish. It all starts when the system boots up, turning on all its core services, databases, and analysis tools. Next, users log in or sign up, making sure everything stays secure and giving each person their own unique profile for saving data and coming back later.After logging in, users can either fill out their info by hand or just upload a resume. This flexibility helps everyone, whether they've got documents

ready or need more time. Once someone submits their details, the system checks for any errors or missing info, filters out what's not needed, and cleans everything up to boost accuracy down the line. Then, the system pulls key details from the resume-like education, skills, experience, and certifications-and builds a structured profile. These profiles go into the database, making it easy to find and update them later.

The career analysis engine uses these profiles, cross-checking user info against rules, skill maps, and industry needs to match people with the right career paths. At this point, the system checks what kind of subscription the user has, which decides how much access they get to advanced recommendations. Depending on this, the platform creates a detailed career plan, suggests roles, lists the skills needed, and points out learning paths. All these recommendations show up on the user's dashboard in a simple, visual format-so making decisions feels less overwhelming. On top of that, there's a feedback loop.

Users can take quizzes or update their profiles as they gain new skills. Each time they do, the system updates its recommendations right away. The cycle wraps up when users finish reviewing their options, but the platform stays ready for the next update-always adapting and focused on each user's journey. In short, Figure 2 shows a smart, secure, and flexible workflow that really connects people to the careers that fit them, and keeps improving as they grow.

3. Results and Discussion

CareerPilot brings together web tech and Al to make career guidance personal and actually useful. People use a simple, interactive interface to share their info, and the system handles everything securely in the background with smart APIs and a flexible database. The real magic happens with the Al engine.

It looks at each user's profile and pulls together custom career roadmaps, job ideas, college options, and even points out skill gaps. In testing, the suggestions usually match people's interests and strengths pretty well. Plus, the dashboard isn't just for show-you can track your own progress and actually see how your career path takes shape.

4. Conclusion

In short, CareerPilot is a smart, web-based tool that gives you career advice tailored to your skills and goals. With resume analysis, user profiling, and an adaptive recommendation engine allworking together, it helps you spot the right career paths, figure out what skills you're missing, and make smarter choices. The dashboard keeps things interactive, and the system updates its advice as you

grow. So, CareerPilot ends up being a flexible, data-driven alternative to old-school career counseling, helping people boost their employability and stay ready for whatever the job market throws at them.

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