

AI Career Copilot: A Personalized Career Guidance and Skill Gap Analysis System

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Abstract: *In today's competitive job market, students and fresh graduates often face difficulties in selecting a suitable career and understanding the skills required to achieve their career goals. Many students are aware of job roles such as Software Developer, Data Analyst, Business Analyst, or Cybersecurity Engineer but are uncertain about the skills they currently possess, the skills they are missing, the correct learning sequence, and how to prepare for interviews. Existing career guidance platforms generally provide separate services such as job recommendations, learning resources, resume analysis, or interview preparation.*

This requires users to depend on multiple platforms and manually identify the gap between their current abilities and their desired career. The proposed project, "AI-Powered Career Guidance and Skill Gap Analysis System," aims to provide an integrated solution to this problem through a web-based application developed using Python.

The system allows users to either upload or paste their resume or directly enter their desired career goal, such as "I want to become a Software Developer." The application uses Artificial Intelligence and Natural Language Processing (NLP) techniques to analyze the user's information and identify relevant technical skills, educational qualifications, projects, and other career-related information. The system compares the skills identified from the user's resume with the skills required for the selected career role..

Keywords: *competitive job market*

I. INTRODUCTION

Choosing the right career and understanding the skills required for a particular job role can be challenging, especially for students, fresh graduates, and job seekers. Many users are unsure about what skills they currently possess, what skills are required for their desired career, and what they should learn next. They often need to search through different websites and platforms for career guidance, skill requirements, learning roadmaps, and interview preparation. The proposed AI-Powered Career Guidance and Skill Gap Analysis System aims to solve this problem by providing personalized career guidance through a single web-based platform.

The user can either upload or paste their resume or directly enter a career goal such as "I want to become a Software Developer." The system processes the information provided by the user and analyzes it using Artificial Intelligence and Natural Language Processing techniques.

The system extracts relevant information such as educational qualifications, technical skills, programming languages, projects, certifications, and experience from the resume. It then compares the user's existing skills with the skills generally required for the selected career role.

Based on this comparison, the system identifies the skills that are already available and highlights the missing or insufficient skills. After identifying the skill gaps, the system generates a structured and personalized career roadmap.



II. PROBLEM STATEMENT AND OBJECTIVES :

Problem Statement :

Students, freshers, and job seekers often struggle to choose the right career path, understand industry requirements, assess their existing skills, and identify missing skills. They also face difficulties in finding appropriate learning resources, creating a structured learning roadmap, and preparing for interviews, which can affect their confidence and job opportunities.

Objectives:

- To develop a Python-based web application for AI-powered career guidance.
- To allow users to upload, paste, or provide resume information for analysis.
- To identify the user's existing technical skills, education, projects, and other relevant information.
- To compare the user's skills with the skills required for a selected career role.
- To identify and highlight the skill gaps that need improvement.

III. LITERATURE REVIEW

1. José-García. "A Career Guidance System for Assessing Student Skills using Machine Learning and Network Visualisation" (2022) The paper proposes an AI-based career guidance system that extracts technical skills from CVs and combines them with non-technical skills to create a user skill profile.
2. Roy, Chowdhary & Bhatia. "A Machine Learning Approach for Automation of Resume Recommendation System" (2020) The paper focuses on automatically classifying resumes and matching them with job descriptions to reduce manual resume screening.
3. Tejaswini K. "Design and Development of Machine Learning Based Resume Ranking System" (2022) This paper presents an automated system for screening and ranking resumes based on their similarity to a given job description.
4. El-Keiey, ElMenshawhy & Hassanein . "Career Recommendation Based on Feature Selection for Undergraduate Students Using Machine Learning Techniques" (2025) The paper develops a machine-learning recommendation system to help undergraduate students select career paths according to their skills and preferences.
5. Almufareh & Almaleh . "Hybrid Career Path Recommendation System for Computer Science Students: Integrating Academic Profiles and Personal Skills with a Content-Collaborative Model" (2026) The paper proposes a hybrid career recommendation system that considers academic performance, technical skills, soft skills, and personal preferences.

IV. PROPOSED SYSTEM

1. Fragmented Career Information: Existing platforms generally provide specific services such as job searching, learning resources, resume analysis, or interview preparation. Users may need to visit multiple platforms to obtain complete career guidance.
2. Limited Personalized Skill Analysis: Many career platforms provide general information about job roles but do not compare the user's current skills with the skills required for a specific career role. As a result, users may not clearly understand their individual skill gaps.
3. Manual Resume Analysis: Users often need to manually identify their skills, educational qualifications, projects, and experience from their resume. This can be time-consuming and may not provide a clear understanding of how their profile matches their desired career.
4. Generic Learning Roadmaps: Many learning platforms provide predefined courses or roadmaps. These may not always consider the user's existing knowledge and therefore may recommend topics that the user already knows or fail to highlight important missing skills.
5. Separate Interview Preparation: Interview questions and preparation resources are generally available on separate platforms. Users must search for questions related to their selected career instead of receiving them directly as part of their career roadmap.
6. Limited Integration: Existing systems may not provide a single integrated workflow containing



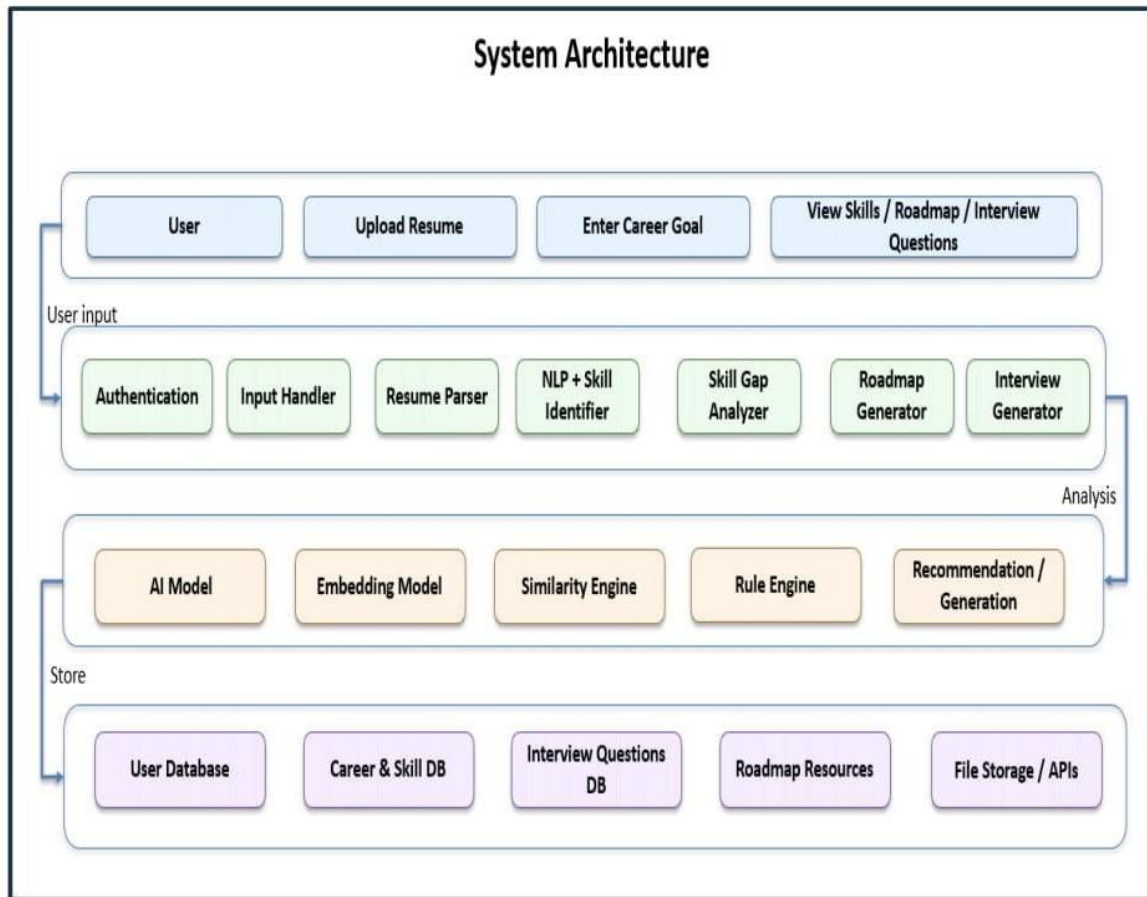
resume analysis, skill#gap identification, career roadmap generation, and interview preparation. The proposed system focuses on integrating.

V. SYSTEM ARCHITECTURE AND WORKFLOW

The proposed system is developed using a modular methodology in which different functions of the application are divided into separate modules. Each module performs a specific task and works together with other modules to provide an integrated AI-based career guidance platform. List of Modules and Explanation:

1. **User Input Module:** This module allows users to provide their career-related information. Users can upload or paste their resume or directly enter their desired career goal, such as Software Developer or Data Analyst.
2. **Resume Processing Module:** This module processes the uploaded or pasted resume and extracts useful textual information. It identifies information such as education, technical skills, programming languages, projects, certifications, and experience.
3. **NLP Analysis Module:** This module uses Natural Language Processing techniques to understand and analyze the text provided by the user. It identifies important keywords and career-related information from the resume or user input.
4. **Career Selection Module:** This module allows the user to specify their desired career role. The selected career is used as the basis for determining required skills and generating personalized recommendations.
5. **Skill Identification Module:** This module identifies the skills currently possessed by the user from the analyzed resume or user-provided information.
6. **Required Skills Module:** This module contains or retrieves the skills generally required for different career roles. These skills are used as a reference for comparing the user's current abilities with career requirements.
7. **Skill Gap Analysis Module:** This is one of the main modules of the proposed system. It compares the user's existing skills with the required skills for the selected career and identifies the missing or insufficient skills.
8. **Career Roadmap Module:** This module generates a personalized roadmap based on the identified skill gaps. It recommends topics, programming languages, technologies, tools, and concepts that the user should learn.
9. **Interview Preparation Module:** This module provides relevant interview questions according to the selected career role. It helps users prepare for technical interviews and identify areas requiring additional preparation.
5. **AI Career Guidance & Analysis.**
10. **AI Recommendation Module:** This module uses Artificial Intelligence to generate personalized career guidance, skill recommendations, learning roadmaps, and interview questions according to the user's input and selected career.
11. **Database Management Module:** This module manages the storage and retrieval of application data. It can store information related to career roles, required skills, users, and other relevant system data.





VI. LIMITATIONS AND FUTURE SCOPE

LIMITATIONS:

The current paper describes the project concept and intended workflow rather than a completed controlled evaluation. The final implementation may differ in its supported resume formats, extraction method, recommendation logic, and data storage. These details must be checked against the source code before submission. The system is not a substitute for professional career counselling and should not be used to make high-stakes hiring decisions.

FUTURE SCOPE:

Future work may include a larger and more representative test dataset, semantic matching between candidate profiles and role descriptions, a maintained occupation-skill catalogue, user-adjustable learning schedules, curated course links, multilingual support, accessibility improvements, and a formal usability study. Future evaluation should also examine whether recommendations work comparably across different educational backgrounds and avoid unfairly limiting opportunities based on incomplete profile information.

VII. CONCLUSION

This paper presents AI Career Copilot, a proposed student-focused career guidance application that brings together profile or resume review, career exploration, skill-gap identification, learning-roadmap guidance, and interview



preparation. The design uses a Streamlit interface and SQLite for a lightweight prototype, with user authentication and a modular workflow. Its intended contribution is an integrated and understandable process for helping students plan career preparation, rather than an unsupported claim of predictive accuracy.

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