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AI Career Navigator: A Personalized Framework for Career Guidance and Job Readiness

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ABSTRACT

Students and early-career job seekers often possess several technical skills but face difficulty in identifying a suitable career role, understanding the skills required for that role, measuring their actual readiness, and preparing systematically for interviews. This paper presents AI Career Navigator, a web-based personalized career guidance and interview readiness platform that connects these activities in a single workflow. The system accepts an uploaded resume, extracts relevant skills using natural language processing, allows the user to select a target role, and compares the detected skills with the role requirements maintained in a curated career knowledge base. A similarity-based matching approach using IDF/TF-IDF-style weighting and cosine similarity is used to identify aligned skills and skill gaps. The platform further provides adaptive five-question skill verification, a personalized learning roadmap, structured interview preparation, speech-to-text practice, semantic answer evaluation, and a final mock-interview report. Custom target roles can also be processed through internal role-based mapping and fallback handling. The contribution of the proposed work is an integrated, explainable preparation workflow rather than a separately trained predictive model. The system helps students move from resume analysis and career selection to skill improvement and interview readiness in a structured manner.

Keywords— Career Guidance, Resume Analysis, Skill Gap Analysis, Career Recommendation, Skill Verification, Personalized Learning, Interview Preparation, Recommender System

1. Introduction:

Choosing an appropriate career role has become a challenging task for students and fresh graduates because the technology sector offers numerous specialized roles with different skill requirements. Students may possess knowledge of programming languages, databases, frameworks, or machine-learning concepts but may still be uncertain about which role best matches their current skills and competencies. In addition to selecting a suitable role, students need to identify their existing strengths, recognize skill gaps, verify their claimed skills, and understand how to prepare effectively for interviews.

Existing job portals and career guidance platforms generally address individual aspects of this process. Job portals primarily focus on job vacancies and recruitment, while learning platforms provide courses and educational resources. Similarly, resume screening systems extract candidate information, and interview-practice tools evaluate responses. However, these functions are often distributed across different applications, requiring students to collect information from multiple sources and manually develop a preparation plan. An integrated approach can simplify this process by connecting career selection, skill assessment, and interview preparation within a unified workflow.

To address these challenges, this paper presents *AI Career Navigator*, an integrated career guidance and interview preparation system. The proposed system analyzes a student's resume, identifies relevant skills, and compares the extracted competencies with the requirements of a selected career role. A similarity-based matching approach using TF-IDF-style weighting and cosine similarity helps identify aligned skills and potential skill gaps. Based on these results, the system provides personalized learning recommendations and a structured roadmap to support career preparation.

The system further incorporates skill verification through adaptive questions, role-specific interview preparation, speech-to-text practice, and semantic answer evaluation. Instead of relying exclusively on exact keyword matching, semantic evaluation examines whether a student's response covers the expected concepts. A final mock-interview report summarizes performance and identifies areas that require improvement. Custom target roles can also be processed using internal role mapping and fallback handling when predefined role information is unavailable.

The main contribution of this work is an integrated and explainable career preparation workflow that connects resume analysis, role recommendation, skill-gap identification, skill verification, and interview readiness assessment. Rather than treating these activities as independent tasks, the proposed

system uses the output of each stage to support the next stage. The system aims to help students make informed career decisions, prioritize relevant skills, and prepare for interviews through a structured and personalized process.

2. Literature Survey

Research on automated career guidance has explored resume analysis, job-role recommendation, information retrieval, and skill-gap identification. These approaches help students understand the relationship between their existing competencies and the requirements of different career roles. However, connecting career recommendation with skill verification and interview preparation remains an important area for developing integrated career guidance systems.

Salton and Buckley (1988) studied term-weighting approaches for automatic text retrieval. Their research explains the importance of assigning suitable weights to terms when comparing textual documents. This concept is relevant to resume analysis, where skills and competencies extracted from a resume can be represented as weighted terms and compared with the requirements of a selected career role.

Manning, Raghavan, and Schütze (2008) presented fundamental information retrieval techniques, including document representation, ranking, and text comparison. These concepts provide a theoretical foundation for comparing resume content with role-specific skill requirements. In AI Career Navigator, similarity-based matching is used to assess the alignment between a candidate's skills and the selected career role.

Nirmala et al. (2026) proposed an AI-based career-role recommendation system that uses resume semantic analysis, natural language processing, TF-IDF vectorization, and cosine similarity. Their work also addresses skill-gap identification and personalized learning recommendations. These features are closely related to the resume analysis and career-matching components of AI Career Navigator. The proposed system additionally connects these activities with skill verification and interview preparation.

Chandrakumara and Silva (2026) presented a hybrid career-readiness framework that combines job-role prediction, skill-gap analysis, and personalized learning-path recommendations. Their study highlights the importance of integrating multiple career-readiness functions into a unified platform. AI Career Navigator follows a related integrated approach and further includes role-specific interview practice and semantic evaluation of candidate responses.

Narayan and Rajalakshmi (2026) proposed a career-path recommendation system using rule-based skill extraction, ontology-based role mapping, semantic similarity, and scored job-role recommendations. Their work addresses the limitations of basic keyword-based matching in identifying suitable roles and missing skills. Building on the broader objective of personalized career guidance, AI Career Navigator connects resume analysis and role matching with skill verification, interview practice, and a final preparation report.

The reviewed studies provide useful foundations for resume processing, text similarity, career-role recommendation, and skill-gap analysis. The proposed AI Career Navigator brings these functions together in a structured workflow that also supports skill verification and interview readiness assessment. Its objective is to help students identify relevant competencies, understand areas requiring improvement, and prepare systematically for their chosen career roles.

3. Problem Statement

Career planning is an important stage in a student's academic and professional development. However, making appropriate career decisions has become increasingly challenging due to the changing nature of job roles, evolving industry expectations, and the wide availability of online career-related information. Students often receive information from multiple sources, such as job portals, online courses, career websites, and educational platforms. Although these sources provide useful information, they do not always offer a coordinated approach that helps students make informed career decisions and plan their professional development.

A major concern is that career selection and job preparation are frequently treated as separate activities. Career guidance generally focuses on identifying suitable occupations, while job preparation focuses on acquiring skills and preparing for recruitment processes. The lack of a clear connection between these activities can make it difficult for students to understand how their career choices relate to their current abilities and future learning requirements. Consequently, students may have difficulty converting their career interests into realistic and achievable preparation goals.

Furthermore, individual students differ in their educational backgrounds, interests, strengths, learning progress, and professional aspirations. A common career planning approach may not adequately address these differences. Students require guidance that considers their individual circumstances and helps them prioritize relevant competencies, learning activities, and preparation tasks. Without such personalization, career development can become an unstructured process in which students find it difficult to determine what to learn first and how to measure their progress towards employment.

Another challenge is the lack of continuity in career development. Selecting a career is not a one-time decision; it requires regular evaluation of personal capabilities, changing job requirements, and preparation progress. A useful career guidance approach should therefore support a continuous process of career exploration, competency development, self-assessment, and job readiness improvement rather than providing isolated recommendations.

The problem addressed in this study is the absence of a sufficiently connected and personalized framework for guiding students from career exploration to employment preparation. This research proposes a conceptual framework that links career goals, individual competencies, skill development priorities,

and job readiness activities within a structured career planning process. The purpose is to establish a more organized and adaptable approach to career development that can help students make informed decisions and prepare for their chosen professional paths.

4. System Architecture

The proposed AI Career Navigator follows a modular architecture that integrates resume analysis, career-role recommendation, skill-gap identification, skill verification, and interview preparation into a unified platform. The architecture is designed to process user information through connected modules, where the output of one module supports the operation of the next. This approach provides a structured workflow for personalized career guidance and interview readiness assessment.

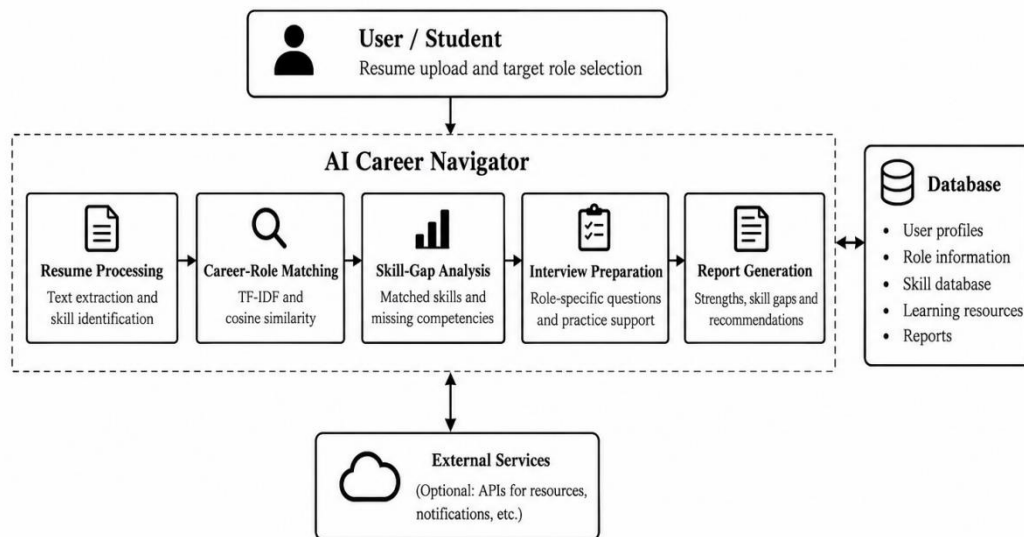


Fig. 1. System Architecture of AI Career Navigator.

A. User Module

The user module allows students to upload their resumes and select a target career role. It provides the necessary input for further analysis and personalized career guidance.

B. Resume Processing Module

This module extracts text and identifies relevant skills from the uploaded resume. The extracted information is organized for comparison with the requirements of the selected career role.

C. Career-Role Matching Module

This module compares the candidate's skills with the selected role requirements using TF-IDF-based weighting and cosine similarity. It identifies relevant skills and estimates the alignment between the candidate's profile and the target role.

D. Skill-Gap Analysis Module

The skill-gap analysis module identifies matched skills and missing competencies by comparing the candidate's profile with the selected role requirements. The results help students understand which skills require further improvement.

E. Interview Preparation Module

This module provides role-specific interview questions and practice support based on the selected career role and identified skill gaps. It helps students strengthen their technical knowledge and prepare for interviews.

F. Report Generation Module

The report generation module summarizes the results of resume analysis, role matching, and skill-gap identification. It presents the candidate's strengths, areas for improvement, and personalized preparation recommendations in a structured report.

5. System Design and Methodology

A. System Design

The system consists of five major processing modules: resume processing, career-role matching, skill-gap analysis, interview preparation, and report generation. The user first uploads a resume and selects a target career role. The system extracts relevant skills from the resume and compares them with the requirements associated with the selected role. The identified skill gaps are then used to guide interview practice and generate personalized preparation recommendations.

The modular design separates individual functions, making the system easier to maintain and extend. Each module processes specific information and passes its results to the subsequent module. The final output presents the candidate's matched skills, missing competencies, and recommended preparation activities.

B. Resume Processing

In the first stage, the system accepts a resume in a supported document format and extracts its textual content. The extracted text is processed to identify relevant technical skills, programming languages, tools, and competencies. These skills are organized into a structured representation that can be compared with the requirements of the selected career role.

C. Career-Role Matching

In this stage, the extracted resume skills are compared with the skills required for the target role. TF-IDF-based weighting can be used to represent the importance of terms, while cosine similarity measures the similarity between the resume representation and the role description.

The cosine similarity is calculated as:

$$\text{sim}(A,B) = \frac{A \cdot B}{\|A\| \|B\|}$$

where (A) represents the resume vector and (B) represents the target-role vector. The resulting similarity score indicates the degree of textual alignment between the two representations.

D. Skill-Gap Analysis

The system compares the extracted skills with the required skills for the selected role. Skills found in both sets are classified as matched skills, while required skills not identified in the resume are treated as potential skill gaps. These results help determine which competencies the candidate should prioritize during further learning and preparation.

E. Interview Preparation

Based on the selected role and identified skill gaps, the system provides relevant interview questions and practice support. This stage helps students revise important concepts and practice explaining their knowledge. The questions should be aligned with the requirements of the selected role and the skills identified during the previous stages.

F. Report Generation

In the final stage, the system consolidates the results from resume processing, role matching, and skill-gap analysis. The generated report summarizes the candidate's profile alignment, matched skills, missing competencies, and preparation recommendations. This output provides a structured overview that students can use to plan their career development and interview preparation.

G. Methodology Workflow

The overall methodology follows these steps:

1. *Input collection:* The user uploads a resume and selects a target career role.
2. *Skill extraction:* The system extracts and organizes relevant skills from the resume.
3. *Role matching:* The extracted skills are compared with the requirements of the selected role.
4. *Gap identification:* Matched skills and potential skill gaps are identified.
5. *Interview preparation:* Role-related questions and practice support are provided.
6. *Report generation:* The system produces a summary of the analysis and personalized preparation recommendations.

6. Conclusion

AI Career Navigator presents an integrated approach to personalized career preparation for students and early-career job seekers. By connecting resume analysis, target-role selection, skill matching, skill verification, learning-roadmap generation, interview preparation, semantic answer evaluation, and mock-interview reporting, the system converts a student's existing profile into a structured preparation path. The use of a curated role-skill knowledge base, NLP-based skill extraction, similarity-based matching, and semantic evaluation provides a practical and relatively explainable implementation without claiming a separately trained predictive model.

The current implementation has clear limitations that also define future scope. Custom roles are processed using internal role-title mapping and fallback skill profiles rather than live external job-market data, so requirements for completely new occupations may not always reflect the latest industry expectations. Resume skill extraction is also dependent on the maintained skill vocabulary, while lightweight semantic evaluation cannot fully judge communication quality, confidence, or complex reasoning like a human interviewer. Future work can therefore include verified job-market APIs, broader skill ontologies, improved entity and skill normalization, larger question banks, privacy-aware evaluation datasets, and formal benchmarking of recommendation and interview-readiness outcomes.

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