International Journal of Engineering and Science Invention (IJESI)
ISSN (Online): 2319-6734, ISSN (Print): 2319-6726
www.ijesi.org ||Volume 15 Issue 9 September 2026 || PP 36-43

An AI-Based Framework for Student Skill Gap Analysis and Personalized Career Recommendation Using Resume and Multi-Dimensional Assessment

Dr T. A. Ashok Kumar[1], Manasa M C[2]
Dr T. A. Ashok Kumar[1] Professor SSCS, CMR University, Bengaluru.
Manasa M C[2] Postgraduate Studies SSCS, CMR University, Bengaluru.

ABSTRACT: *The increasing competition in the job market makes it difficult for students to identify their skill gaps and determine suitable career opportunities. This paper presents JobFit AI, an AI-based framework for student skill gap analysis and personalized career recommendation using resume analysis and multi-dimensional assessment. The proposed system analyzes a student's resume and compares the identified skills with the requirements of a selected job description to determine matched skills, missing skills, and skill compatibility. In addition, the system evaluates students through technical assessment, aptitude assessment, and an AI-based soft-skill interview focusing on communication, confidence, fluency, and personality. Based on the student's abilities and assessment findings, a Large Language Model (LLM) component offers career-oriented recommendations and résumé evaluation. The system also generates a consolidated student report and provides teachers with facilities for viewing student information, reports, and managing assessments. By integrating resume analysis with multiple assessment dimensions,a thorough method for determining skill gaps, promoting skill development, and assisting students in making wise career options is offered by JobFit AI.*

KEYWORDS - *Artificial Intelligence, Career Recommendation, Multi-Dimensional Assessment, Resume Analysis, Skill Gap Analysis*

Date of Submission: 12-09-2026 Date of acceptance: 24-09-2026

I. INTRODUCTION

The rapid evolution of technology and the constantly shifting demands of the job market have made it increasingly difficult for students to settle on suitable career paths or fully grasp the skills that employers actually expect. Most students today are academically strong and reasonably comfortable with technology, yet many remain unaware of the gap that exists between the skills they currently possess and the skills a particular job role demands. Technical proficiency alone, however, is not enough to secure employment. Soft skills such as communication ability, confidence, and problem-solving aptitude often turn out to be equally, if not more, decisive in determining career success. This gap between what students know and what the industry needs points to a clear requirement: an intelligent system capable of evaluating students across multiple dimensions rather than judging them on technical merit alone.

A review of existing research shows considerable work in areas such as resume analysis, skill-gap detection, career recommendation, and personalized learning pathways. Several studies have relied on NLP and machine learning to extract, or "mine," skills from resumes and align them with job requirements, while more recent approaches involving Sentence-BERT and large language models have demonstrated a stronger ability to capture the contextual meaning behind resume content. Alongside these, techniques such as collaborative filtering, recommendation algorithms, retrieval-augmented generation (RAG), and ontology-based matching have been explored for suggesting relevant careers and job opportunities. Researchers have also stressed the importance of factoring in non-technical or soft skills and adopting a multi-dimensional assessment approach to

genuinely improve employability outcomes. Despite these advances, a common limitation persists — most existing systems tend to address only a single aspect of the problem rather than offering a holistic evaluation.

To address these issues, this study proposes JobFit AI, an AI-Based Framework for Student Skill Gap Analysis and Personalized Career Recommendation Using Resume and Multi-Dimensional Assessment. Resume analysis, job-description skill matching, technical evaluation, aptitude evaluation, and an AI-based soft-skill interview are all integrated into one platform by the suggested solution. By comparing the student's resume with the employment requirements, the resume analysis module determines which abilities are matched and which are absent. An LLM-based component provides resume feedback and career-oriented recommendations. The assessment modules further evaluate the student's technical, aptitude, communication, confidence, fluency, and personality-related abilities.

The main contribution of this work is the integration of resume-based skill-gap analysis with multi-dimensional student assessment and AI-based career recommendation. The system also provides a consolidated student report and supports teacher functionalities for viewing students, accessing reports, and managing assessments.As a result, JobFit AI offers a cohesive setting that can assist students in identifying areas for growth, comprehending their strengths and shortcomings, and making better career options.

II. LITERATURE SURVEY

Keerthi et al. (2026) proposed a smart resume analyzer for automated skill-gap detection using Sentence-BERT (SBERT) and LLM embeddings. The study applied semantic representations and K-Means clustering to analyze resume skills and identify skill gaps. The work demonstrated that SBERT provides better contextual understanding of resume skills compared with basic keyword matching [1].

Jayakumar et al. (2024) proposed a multi-model approach for optimizing job search by combining NLP, LLM-NER, DRNN-BES, and collaborative filtering techniques. The system analyzes resume information and applies recommendation methods to provide personalized job suggestions. The study aimed to improve the efficiency and relevance of the job-search process through intelligent job recommendations [2].

Sunico et al. (2023) developed a resume-building application based on Large Language Models (LLMs). The system used prompt engineering for resume generation and assessment, helping users create and improve resume content. The study demonstrated the usefulness of LLMs in supporting resume preparation and providing suggestions for improving resume quality [3].

Manish et al. (2025) proposed a Retrieval-Augmented Generation (RAG) approach for relational mapping of resume data to improve resume analysis. The method uses vector representations to identify relationships among information such as skills, experience, and education. The study aimed to provide better contextual understanding of resume information rather than relying only on isolated keyword matching [4].

Subramani et al. (2025) proposed an agentic AI framework for semantic resume analysis and proficiency-aware candidate evaluation. The framework combines Agentic AI, LLMs, semantic search, and vector search to extract information from resumes and estimate candidate skill proficiency based on experience. The study demonstrated the potential of contextual AI approaches for more intelligent resume analysis and candidate evaluation [5].

Sakthi Vinayagam et al. (2026) presented a system for AI-powered individualized career and skill recommendations that combines a MERN-stack web application with Natural Language Processing (NLP). The framework analyzes user profiles, resumes, and skill sets and matches them with industry requirements, job postings, and emerging career opportunities. The study aimed to provide personalized career guidance and skill recommendations through real-time NLP-based analysis, helping users develop skills according to changing market demands [6].

Senbagavalli M et al. proposed an AI-driven framework that uses a Flask-based web application and machine learning to recommend individual career paths. The system analyzes user preferences, educational history, and career goals to generate customized career recommendations and structured career roadmaps. The study showed the potential of AI-based systems to help individualized career decision-making in a dynamic labor market, achieving 95% accuracy during trial testing [7].

Shanqing Li et al. proposed a multi-dimensional assessment system for evaluating Technology Readiness Levels (TRLs) using seven dimensions: requirement, design, implementation, verification, configuration, risk, and safety. The system provides more detailed assessment than traditional scalar TRL evaluation and uses a divide-and-conquer strategy for managing complex technologies. A web-based application was also developed to demonstrate the usability and effectiveness of the proposed assessment system [8].

Zhang Qian discussed the applications, risks, and countermeasures of Artificial Intelligence (AI) in education. The study highlighted the use of technologies such as Natural Language Processing (NLP), speech recognition, biometric recognition, and human-computer interaction to support teaching and learning. It also identified risks including decision-making errors, career substitution, privacy leakage, information isolation, and data bias, and proposed measures involving governments, developers, teachers, students, and educational administrators should encourage the ethical use of AI in the classroom[9].

Xiaohua Ma talked on how artificial intelligence (AI) can be used in computer network technology to increase data processing accuracy and efficiency. The study examined the concept and development of AI and explored its applications in computer and network-related fields. The work highlighted the potential of integrating AI with computer technologies to improve intelligent processing and support future technological development [10].

K. Santha Sheela et al. proposed an AI-powered skill gap analyzer and personalized learning path generator for improving career readiness. The system uses NLP, Named Entity Recognition (NER), Sentence-BERT embeddings, and Logistic Regression to extract and match resume skills with job-role competencies. For identified skill gaps, Generative AI generates a personalized three-month learning roadmap containing courses and mini-projects. Experiments on 20 student resumes demonstrated effective skill extraction and skill-gap identification [11].

Abishek Narayan V and A. Rajalakshmi proposed an AI-powered skill gap analysis and career path recommendation system using a hybrid semantic and ontology-based matching approach. The system combines rule-based skill extraction, ontology-based role mapping, sentence embeddings, and scored recommendations to identify suitable job roles and missing skills. It also provides learning recommendations and explainable career guidance through an interactive web interface.The algorithm showed good role prediction, domain identification, and skill-gap suggestion when tested on 120 resume entries[12].

Suhail M. Ghouse et al. analyzed the gap between engineering students' and employers' perceptions regarding the importance of non-technical skills for employment opportunities. The study used questionnaire-based surveys involving 104 students and 50 employers in India and found significant differences in the skills prioritized by both groups. The study highlighted the importance of communication, presentation, and other soft skills for improving students' employability and recommended greater emphasis on these skills in university education [13].

K. C. Gayathri and M. Jayaprakash proposed a machine learning-driven framework for workforce skill gap analysis and predictive talent development. The framework integrates employee skills, performance metrics, and training history using preprocessing, feature engineering, and ensemble learning techniques. Classification, regression, and clustering methods are used to identify existing skill gaps and predict future workforce requirements. The study demonstrated improved accuracy, precision, recall, and interpretability

compared with baseline models, providing actionable insights for skill development and workforce planning [14].

Yangning Dong proposed a career counselling platform based on a collaborative filtering recommendation algorithmBy combining K-Means clustering with collaborative filtering, the study addressed the drawbacks of conventional collaborative filtering, specifically data sparsity and cold-start issues. With an accuracy of 97.80%, the final platform—which was created to assist college students with career planning and counseling—showed its potential for tailored job suggestions [15].

III. METHODOLOGY

The proposed system framework is designed to analyze the skills and career readiness of students by combining resume analysis, job-description matching, technical assessment, aptitude assessment, and AI-based soft-skill evaluation. Teachers and students can use several features of the system. While teachers are able to monitor students, examine reports, and administer exams, students are able to maintain their profiles, submit resumes, analyze their skills, complete assessments, and read their performance reports.

The methodology follows a sequential process in which student information is collected and analyzed through different modules. The resume is compared with the requirements of a selected job description to identify matched and missing skills. The student is then evaluated through technical, aptitude, and AI-based soft-skill assessments. To give a more comprehensive picture of the student's strengths, shortcomings, and preparedness for the workforce, the outcomes from these modules are combined. An LLM-based component is also used to provide resume feedback and career-oriented recommendations.

A. System Architecture

The system consists of Student, Teacher, Resume Analysis, Assessment, AI Analysis, and Reporting components. After authentication, the user's role is identified and the corresponding dashboard is provided. Students access career-development functionalities, whereas teachers access student monitoring and assessment-management functionalities.

B. Resume and Job Description Analysis

The Resume Analysis Module accepts the student's resume and a job description as inputs. The resume is processed to extract relevant skills, and the job description is analyzed to identify the skills needed for the selected job role. The matched skills and missing skills are obtained by comparing the extracted skills from both the inputs. Depending on how many matches are needed, the algorithm will provide a percentage of skill-match. This outcome aids students in identifying the talents they possess and those they require.

C. AI-Based Resume Feedback and Career Recommendation

The AI/LLM part is used to give some more feedback after the strengths and weaknesses of the student are identified. The analysis and the student’s resume data will be used to suggest suitable careers for the student and to enhance the resume.

D. Technical Assessment

The Technical Assessment Module evaluates the student's technical knowledge. The student selects the appropriate assessment and answers the questions provided by the system. The submitted answers are evaluated automatically, and the system calculates the score and percentage. Based on the obtained performance, the student can understand their current technical proficiency and areas requiring improvement.

E. Aptitude Assessment

The Aptitude Assessment Module evaluates the student's logical and problem-solving abilities. The student answers a set of aptitude questions, after which the system evaluates the responses and generates the corresponding score and performance result. This assessment provides an additional dimension for evaluating the student's overall career readiness.

F. AI-Based Soft-Skill Interview

The AI-based Soft-Skill Interview evaluates the student's non-technical abilities through an interactive interview. The system presents questions to the student, and the student provides answers using voice input. Speech recognition converts the spoken responses into text for further analysis. The responses are evaluated to provide feedback related to communication, confidence, fluency, and personality. The resulting soft-skill evaluation is stored as part of the student's assessment results.

G. Consolidated Student Assessment Report

The results obtained from resume analysis, technical assessment, aptitude assessment, and soft-skill interview are combined to generate a consolidated student report. The report provides an overall view of the student's skills, missing skills, assessment performance, and areas for improvement. This helps teachers keep track of their students' progress and allows students to recognize their strengths and shortcomings.

H. Teacher-Based Student Monitoring

The Teacher Module provides facilities for viewing student information and accessing student reports. Teachers can review the skill gaps and assessment performance of students and manage the assessments available through the system. This module assists educators in determining the areas in which pupils need more instruction or direction.

I. Resume-Based Career Recommendation

In order to determine appropriate career pathways, the Career Recommendation Module examines the abilities, education, experience, and other pertinent data taken from the student's resume. The indicated skills are compared with the skill requirements for different employment roles. Based on the student's profile and existing skill set, the system provides personalized job recommendations.

IV. RESULT AND DISCUSSION

The proposed system provides an integrated platform for analyzing student skills and supporting career development. The system combines resume analysis, job-description matching, technical assessment, aptitude assessment, AI-based soft-skill interview, and resume-based career recommendation. Students have a more comprehensive awareness of their present abilities and areas that need development thanks to the outcomes produced by these modules.

The skills listed on the student's resume are compared to those needed in the chosen job description by the Resume Analysis Module. The system identifies the **matched skills and missing skills** and calculates the corresponding skill-match percentage. This enables students to understand their suitability for a particular job role and identify the skills that need further development.

Additional details regarding student preparedness are provided by the assessment modules. The Technical Assessment evaluates technical knowledge, while the Aptitude Assessment evaluates logical and problem-solving abilities. The AI-based Soft-Skill Interview evaluates aspects such as communication,

confidence, fluency, and personality. The student receives both individual and combined reports with the outcomes of these evaluations.

Sample findings from the CV and job-description study are shown in **Table I.** The results show that the algorithm can identify the skills on the student's resume and match them with the requirements of the selected role. Students can pinpoint specific areas that need work with the use of the missing-skill information.

TABLE I. RESUME AND JOB DESCRIPTION ANALYSIS RESULTS

Student	Job Role	Required Skill	Matched Skill	Missing Skill	Match Percentage
Student 1	Python developer	Python, Aws, Git, Django, Agile	Python	Aws, Git, Django, Agile	9%
Student 2	Data Analyst	Sql, Python, Tableau	SQL,Python	Tableau	66.67%
Student 3	ML Engineer	Python, SQL, Machine Learning	Python, SQL, Machine Learning	—	100%
Student 4	Cloud Engineer	Python, AWS, SQL	Python, AWS	SQL	66.67%
Student 5	Java Developer	Java, SQL, AWS	Java, SQL	AWS	66.67%
Student 6	Data Analyst	SQL, Tableau, Power BI	SQL, Power BI	Tableau	66.67%
Student 7	ML Engineer	Python, Machine Learning, SQL, AWS	Python, Machine Learning, SQL	AWS	75%
Student 8	Python Developer	Python, SQL, Machine Learning	Python	SQL, Machine Learning	33.33%
Student 9	Business Intelligence Analyst	SQL, Power BI, Tableau	SQL, Tableau, Power BI	—	100%
Student 10	Cloud Data Engineer	Python, SQL, AWS, Machine Learning	Python, SQL, AWS	Machine Learning	75%

V. FUTURE ENHANCEMENT

The future development of the proposed system can focus on improving the accuracy, personalization, and scalability of student career guidance. The current system analyzes resumes, identifies skill gaps, conducts technical, aptitude, and soft-skill assessments, and provides career recommendations. These capabilities can be further enhanced through advanced Artificial Intelligence and Natural Language Processing techniques.

One important extension is the integration of semantic embedding models and advanced LLMs to improve the understanding of skills, resumes, and job requirements. This can provide more accurate matching than basic skill extraction and support better career recommendations. Integration with real-time job APIs can also allow the system to consider current industry requirements and available job opportunities.

The system can further provide personalized learning recommendations based on the missing skills identified from resume and job analysis. Skill-development tracking can be introduced to monitor student progress and evaluate improvements over time. The teacher module can also be enhanced with advanced analytics to identify common skill gaps among students and support targeted training programs.

Future versions may also include AI-powered mock interviews, advanced ATS-based resume analysis, and a mobile application to improve accessibility. These enhancements can help transform the proposed system into a comprehensive career-development platform for students, educational institutions, and placement departments.

VI. CONCLUSION

This work presents an integrated approach that brings together resume-based skill extraction, job-skill matching, and multi-dimensional assessment to address student skill-gap analysis and personalized career recommendation. By identifying the matched and missing skills between a student's resume and the requirements of a target job, and supplementing this with technical, aptitude, and AI-driven soft-skill evaluations, the system builds a fuller and more evidence-backed picture of a student's readiness for employment. Its key strength lies in bringing multiple career-development activities together under a single platform — resume-based recommendations guide students toward suitable career paths, skill-gap analysis highlights the specific areas that need improvement, the assessment modules evaluate both technical and non-technical abilities, and the teacher module allows faculty to track student progress and assessment outcomes for academic and placement support. That said, the present system is still constrained by the range of skills, job roles, and assessment data it currently covers, and its effectiveness could be further strengthened through larger and more varied datasets, more advanced semantic-matching methods, real-time industry and job-market data, and improved underlying AI models.

Overall, this study demonstrates the feasibility of combining NLP, artificial intelligence, generative AI, speech recognition, and multi-dimensional assessment into a single framework for supporting personalized student career development. Such a system could serve as a practical foundation for colleges, universities, placement cells, and other educational institutions looking to identify skill gaps among students, strengthen their employability, and offer more tailored career guidance going forward.

REFERENCES

[1] Keerthi, M. S., Saritha Shetty, and Savitha Shetty. "Smart Resume Analyzer Using LLM Embeddings (Sentence-BERT) for Automated Skill Gap Detection." In 2026 4th International Conference on Knowledge Engineering and Communication Systems (ICKECS), pp. 1-6. IEEE, 2026.

[2] Jayakumar, Naveenkumar, Netra Patil, Roshankumar S. Pokal, Rudra Pratap Dev, and Sidharth Nair. "Optimizing job search: a multi-model approach with DRNN-BES, collaborative filtering, and LLM-NER resume analysis." In 2024 IEEE International Conference on Blockchain and Distributed Systems Security (ICBDS), pp. 1-6. IEEE, 2024.

[3] Sunico, Rafael Jace, Shubh Pachchigar, Vinay Kumar, Ishika Shah, Jingyi Wang, and Isabel Song. "Resume building application based on llm (large language model)." In 2023 International Conference on Computing, Communication, and Intelligent Systems (ICCCIS), pp. 486-492. IEEE, 2023.

[4] Manish, Vazzula, Yugandhar Manchala, Sudeep Banerjee Chopra, Muddam Siddartha, and Kothi Yashwanth Reddy. "Retrieval augmented generation for relational mapping of resume data for improved analysis." In 2025 International Conference on Machine Learning and Autonomous Systems (ICMLAS), pp. 589-594. IEEE, 2025.

[5] Subramani, Shalini, Kiran Kumar Petlu, Joel Binu Philip, Karthik Sagar Nallagula, and Aditya KS. "An Agentic AI Framework for Semantic Resume Analysis and Proficiency-Aware Candidate." In 2025 International Conference on Emerging Research in Computational Science (ICERCS), pp. 1-5. IEEE, 2025.

[6] Vinayagam, S. Sakthi, S. Sandhya, D. Dhivyabharathi, K. Archana, S. Hariprasath, and S. Monika. "AI-Powered Personalized Career and Skill Recommendation Framework with NLP Integration." In 2026 International Conference on Machine Learning and Autonomous Systems (ICMLAS), pp. 437-443. IEEE, 2026.

[7] Senbagavalli, M., Gudepu Rakshitha, Sheila Mahapatra, and Natuva Bhavana. "An AI-Driven Framework for Personalized Career Path Recommendations." In 2025 IEEE International Conference for Women in Innovation, Technology & Entrepreneurship (ICWITE), pp. 1-6. IEEE, 2025.

[8] Li, Shanqing, Xiaozhao Xing, and Shengmei Du. "A multi-dimensional assessment system for technology readiness levels." In 2017 4th International Conference on Systems and Informatics (ICSAI), pp. 798-802. IEEE, 2017.

[9] Qian, Zhang. "Applications, risks and countermeasures of artificial intelligence in education." In 2021 2nd international conference on artificial intelligence and education (ICAIE), pp. 89-92. IEEE, 2021.

[10] Ma, Xiaohua. "Application of artificial intelligence in computer network technology." In 2023 2nd International Conference on Artificial Intelligence and Autonomous Robot Systems (AIARS), pp. 182-186. IEEE, 2023.

[11] Sheela, K. Santha, R. Sanjana, I. Shapna, and N. D. Swathi. "AI-Powered Skill Gap Analyzer and Personalized Learning Path Generator." In 2025 9th International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud)(I-SMAC), pp. 1351-1355. IEEE, 2025.

[12] Rajalakshmi, A. "AI-Powered Skill Gap Analysis and Career Path Recommendation System Using Hybrid Semantic and Ontology-Based Matching." In 2026 International Conference on Data Science and Business Systems (ICDSBS), vol. 3, pp. 1-7. IEEE, 2026.

[13] Chaudhary, M., S. Ghouse, and S. Garg. "Importance of Non-Technical Skills for Employment Opportunities: A Gap Analysis of Students and Employers Perception." In Eleventh International Conference on Contemporary Computing, pp. 1-6. 2018.

[14] Gayathri, K. C., and M. Jayaprakash. "A Machine Learning–Driven Framework for Workforce Skill Gap Analysis and Predictive Talent Development." In 2026 6th International Conference on Pervasive Computing and Social Networking (ICPCSN), pp. 248-254. IEEE, 2026.

[15] Dong, Yangning. "Research on a career counselling platform based on collaborative filtering recommendation algorithm." In 2023 International Conference on Integrated Intelligence and Communication Systems (ICIICS), pp. 1-5. IEEE, 2023.