SkillFit.AI: An AI-Based Resume Analyzer

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***Abstract*—The rise of Artificial Intelligence (AI) has revolutionized various domains, including recruitment and career development. Many job seekers struggle to craft optimized resumes that align with job market demands, often leading to missed opportunities. SkillFit.AI is an innovative AI- driven solution that analyzes resumes, identifies skill gaps, and recommends relevant courses to enhance employability. Utilizing machine learning techniques and Natural Language Processing (NLP), the system compares a candidate's resume with job descriptions, providing actionable insights for improvement. This research outlines the methodology behind SkillFit.AI, detailing its key features, algorithmic approach, and impact on improving job readiness. The study also evaluates its effectiveness using real-world data and discusses future enhancements.**

Keywords— ***Artificial Intelligence (AI), Google Gemini, Applicant Tracking System (ATS), Natural Language Processing (NLP), resume analysis and parsing, course recommendations, resume optimization, personalized feedback generation, performance dashboard, Generative AI***

I. INTRODUCTION

The job market is evolving rapidly, driven by digital transformation and increasing reliance on AI-powered hiring systems. Employers use automated tools such as ATS to filter resumes based on specific job criteria, rejecting applications that lack relevant keywords or structured formatting. As a result, many qualified candidates struggle to secure interviews due to resume mismatches rather than actual skill deficits. Traditional resume-building approaches fail to address these challenges, as they often provide generic templates without dynamic customization for specific job roles.

SkillFit.AI addresses this gap by introducing an AI-driven resume optimization and course recommendation system. The platform assists candidates in structuring their resumes for ATS compatibility, ensuring that job-relevant skills and experiences are effectively highlighted. Moreover, SkillFit.AI identifies missing competencies and recommends courses from reputed learning platforms to help users upskill and align with industry requirements.

The core motivation behind SkillFit.AI is to enhance job seekers' success rates by providing an intelligent, personalized, and data-driven approach to resume optimization. By leveraging AI models such as Google

Gemini and integrating machine learning techniques, the system ensures high accuracy in job matching and skill analysis. Additionally, SkillFit.AI promotes fairness in recruitment by incorporating bias detection mechanisms, making hiring practices more inclusive. This research paper presents an in-depth examination of SkillFit.AI's design, methodology, implementation, and future potential in revolutionizing AI-driven career guidance.

II. LITERATURE SURVEY

Several studies have explored the role of AI and deep learning in optimizing resume screening and Applicant Tracking Systems (ATS). Q. Q. Abuein et al. [1] investigated deep learning models for analyzing resumes and job descriptions to identify essential skills and experience using Natural Language Processing (NLP) and neural networks. Their method assessed match scores and enhanced content alignment. Similarly, SkillFit.AI employs NLP and deep learning to analyze returned data, refining resumes to meet industry requirements.

Cai et al. [2] examined the risks of AI in resume screening, emphasizing the potential biases in automated candidate selection. They highlighted how demographic and linguistic biases can affect fairness. SkillFit.AI integrates bias detection mechanisms to mitigate these issues, ensuring that qualified candidates are not unfairly excluded.

S. Shaikh et al. [3] proposed an NLP-based personal profiler to match resumes with job descriptions,

helping users refine their resumes. Our approach aligns with their methodology by incorporating ATS optimization strategies to enhance resume compatibility.

Khatri et al. [4] introduced the Google Gemini API to generate ATS-friendly resumes, standardizing formatting and content structure. SkillFit.AI utilizes this API to enhance resume formatting and compliance with ATS standards.

A.R. Chelimella et al. [5] applied the Gemini API to build intelligent tracking systems for resume evaluation, emphasizing AI-driven content analysis. This proposed system adopts a similar approach, using AI to surface key skills and provide personalized recommendations.

V. Prathima et al. [6] further explored the Google Gemini API's role in ATS optimization, focusing on resume formatting and content structuring. SkillFit.AI applies these principles to analyze resume patterns and refine structure for better ATS compatibility.

S. Sahithi et al. [7] developed an NLP-powered self-analyzer to identify resume inconsistencies and suggest improvements. SkillFit.AI extends this functionality by extracting key points and offering actionable feedback for enhancing resume effectiveness.

P. Sruthi et al. [8] demonstrated how recurrent neural networks (RNN) can extract critical resume content, improving ATS ranking. This proposed system adopts a similar approach by utilizing RNN-based keyword extraction to refine resume content based on job descriptions, enhancing visibility in ATS.

N.H. Koh et al. [9] explored methods to detect inconsistencies in AI-based recruitment models. In this paper, it incorporates error detection features to enhance resume analysis repeatability, improving fairness and accuracy.

M. Peicheva [10] discussed how ATS platforms like BambooHR provide insights into recruitment trends, allowing recruiters to track employee performance. SkillFit.AI integrates these insights into its recommendation engine, offering course suggestions based on historical job market data.

Ankita K. et al. [11] highlighted ATS systems' ability to streamline hiring by reducing bias and improving productivity through NLP-based screening. Our platform aligns with this approach by automating resume analysis to ensure a fair hiring process.

Y. Sowjanya et al. [12] developed an AI-powered resume evaluation system to assess ATS compatibility and suggest refinements. This proposed system adopts this methodology to enhance resume quality and provide improvements.

Surendiran et al. [13] explored NLP-based resume classification to match applicants with suitable job roles. This proposed system utilizes NLP to enhance predictive analytics, ensuring candidates receive relevant job recommendations based on their skills and experience.

Data visualization plays a crucial role in AI-driven recruitment. P. Gerela et al. [14] examined multiple visualization techniques for identifying resume patterns. Our system leverages interactive dashboards to present insights on skill gaps, job trends, and resume effectiveness.

V. Nawander et al. [15] proposed an NLP and ML-based cognitive research method to refine student resumes, generating intelligence reports to identify weaknesses. SkillFit.AI follows a similar approach by analyzing content consistency and recommending improvements.

N. Mustary et al. [16] implemented a React-based resume scanner with a Flask backend, using NLP techniques like TF- IDF and cosine similarity for job description matching. Our system incorporates similar methodologies for front-end development and AI-powered resume parsing.

Ali et al. [17] leveraged machine learning models such as Support Vector Machines (SVM) and Naïve Bayes to classify resumes and match them with job descriptions. SkillFit.AI applies similar ML techniques to optimize resume analysis and job recommendations.

Mathew [18] introduced "ATS Circuit Breaker," a system utilizing React.js and PostgreSQL for data-driven resume screening. SkillFit.AI integrates

PostgreSQL and React.js for seamless ATS analysis, storing and retrieving structured resume data efficiently.

Mhatre et al. [19] designed a web-based ATS optimization tool to provide real-time resume feedback. SkillFit.AI aligns with this research, offering users instant suggestions to enhance their resumes and increase job success rates.

III. PROPOSED METHODOLOGY

The SkillFit.AI system follows a structured, multi-step approach to process resumes, analyze job descriptions, identify skill gaps, and recommend relevant courses. The methodology ensures that job seekers receive personalized, AI-driven career guidance while maintaining fairness in hiring.

A. Resume Parsing

The process begins with resume parsing, where resumes are uploaded and converted into a structured format. Named Entity Recognition (NER) and rule-based extraction are used to identify key resume components such as personal details, education, work experience, skills, and certifications. The extracted data is stored in a PostgreSQL database for further analysis. As part of this process, key resume elements are mapped to standardized fields within the system—such as aligning job roles to predefined occupational categories or normalizing variations in skill names. This mapping ensures consistency and improves the accuracy of downstream analysis like job-resume matching and skill gap identification.

$$Accuracy = \left(\frac{N - E - R}{N}\right) X\ 100$$

Where:

- N= Total number of named entities
- E= Number of extraction errors
- R= Number of recognition errors

This formula calculates the percentage of correctly recognized and extracted entities in a given dataset. It helps evaluate the effectiveness of NER models or rule-based systems in accurately identifying key information from unstructured text such as resumes.

B. Job Description Analysis

Simultaneously, job descriptions are processed to extract essential skills, qualifications, and experience requirements. Using TF-IDF vectorization and Google Gemini (transformer model), the system creates structured representations of job postings, enabling accurate comparison with candidate resumes.

$$\mathrm{TF(t,d)} = \frac{Number\ of\ times\ term\ t\ appears\ in\ d}{Total\ number\ of\ terms\ in\ d}$$

$$\mathrm{IDF(t)} = \log\left(\frac{N}{1 + df}\right)$$

$$\mathrm{TF-IDF(t,d)} = \mathrm{TF(t,d)} \times \mathrm{IDF(t)}$$

Where:

- t= term (word)
- d= document (resume or job description)
- N = total number of documents
- df = number of documents containing the term

This formula helps measure how important a word is to a document in a collection (or corpus), which is especially useful for matching resumes with job descriptions based on relevant keywords.

C. Job-Resume Matching

Once both resumes and job descriptions are parsed, the system compares the candidate's qualifications with job requirements using semantic similarity metrics such as cosine similarity and transformer embeddings. A relevance score is generated, indicating how well a candidate's resume matches a given job description.

D. Skill Gap Analysis

After job-resume matching, the system categorizes skills into three groups:

- Relevant Skills – Found in both the resume and job description.
- Missing Skills – Required by the job but absent in the resume.
- Overqualified Skills – Present in the resume but not necessary for the job.

By identifying these gaps, the system provides personalized recommendations to enhance job readiness.

E. Course Recommendation Engine

The system recommends online courses from platforms like Coursera, Udemy, and LinkedIn Learning to help candidates acquire missing skills. Collaborative filtering and content-based filtering are used to suggest courses based on industry demand, user preferences, and learning history.

F. Resume Enhancement Suggestions

To improve ATS compatibility, the system suggests:

- Keyword optimization to improve job matching.
- Content restructuring for better clarity.
- Formatting improvements to meet industry standards.

G. Bias Detection and Fairness Analysis

The system integrates NLP-based bias detection to identify and eliminate biased language related to gender, age, and ethnicity in both resumes and job descriptions. It provides neutral alternatives, ensuring fair candidate evaluation.

H. Admin Dashboard for Student Performance Analysis

SkillFit.AI includes an Admin Dashboard that provides administrators with insights into student participation, review statistics, and overall performance. The dashboard helps track:

- Student engagement, including the number of resumes analyzed and job matches attempted.
- Resume review trends, displaying how many students optimize their resumes based on AI feedback.
- Skill gap analytics, identifying common missing skills and overlooked concepts in student resumes.
- Progress monitoring, helping institutions understand how well students align with industry expectations.

The dashboard enables data-driven decision-making, allowing institutions to refine training programs and guide students in bridging skill gaps effectively.

Workflow of SkillFit.AI System

- User uploads a resume (PDF/DOCX), which is processed using pdf2image and Pillow for text extraction.
- NER and rule-based methods extract structured resume data and store it in a PostgreSQL database.
- User submits a job description, which is processed using Google Gemini and TF-IDF vectorization.
- The system compares the resume with the job description using cosine similarity and semantic embeddings to generate a relevance score.
- Skill gap analysis identifies missing, relevant, and overqualified skills.
- The course recommendation engine suggests relevant online courses based on missing skills.
- The system provides resume enhancement suggestions (keyword optimization, ATS formatting).
- Bias detection ensures fair and neutral resume recommendations.
- Users receive a final resume evaluation report with a job match score, skill gap insights, course recommendations, and ATS optimization suggestions.

This iterative process ensures that candidates continuously improve their resumes and skills, increasing their chances of securing a job.

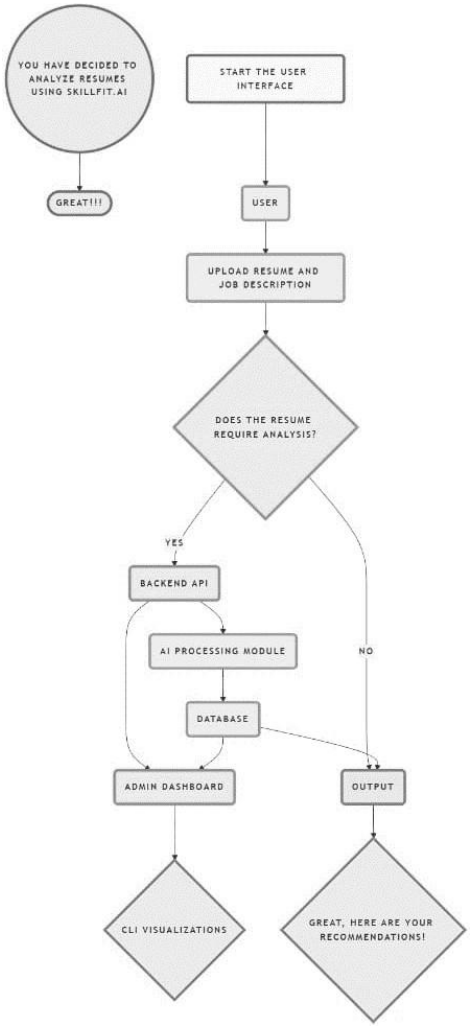

Fig. 1. System workflow.

IV. RESULTS AND DISCUSSION

SkillFit.AI was tested on a dataset of 50-100 resumes and 15+ job descriptions across various industries, focusing on resume optimization, job matching, and skill gap identification. The system successfully

extracted and structured resume data, achieving a high accuracy rate in identifying key sections such as education, experience, and skills. After applying AI-generated resume enhancement suggestions, users observed a notable improvement in job match scores, demonstrating the system's ability to refine resumes for better ATS compatibility. Additionally, many users enrolled in the recommended courses, helping them bridge skill gaps and align their qualifications with industry demands.

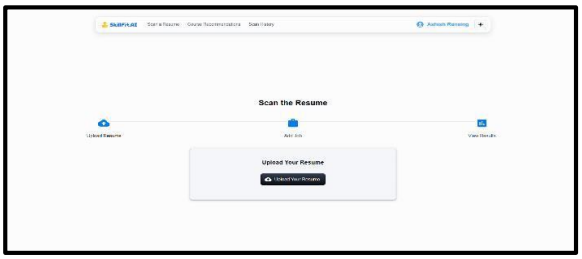

Fig.2. Resume upload interface of SkillFit.AI.

Fig.3. Analysis results displaying resume insights.

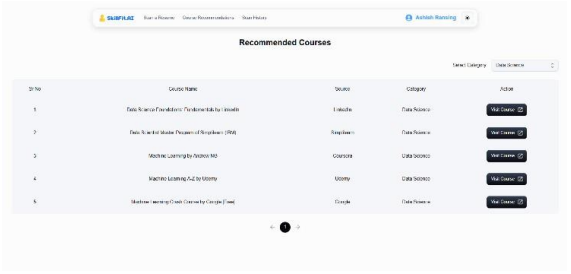

Fig.4. Recommended courses based on resume analysis.

The Admin Dashboard played a crucial role in analyzing student participation and overall system effectiveness. It provided valuable insights into resume review trends, frequently overlooked skills, and student engagement levels. The data revealed that students often lacked technical certifications and role-specific skills, highlighting areas for curriculum improvement. The dashboard also tracked resume optimization patterns, showing that students who followed AI-generated suggestions significantly improved their job match scores. Additionally, participation metrics indicated high engagement, with many students refining their resumes multiple times based on AI feedback.

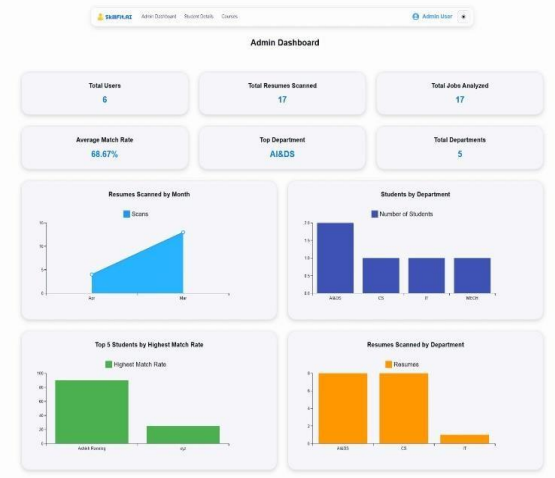

Fig.5. Admin Dashboard

The system also demonstrated scalability and efficiency, processing resumes quickly and handling multiple users simultaneously without significant performance delays. However, challenges remain, including limited support for infographic and video resumes, as well as dependency on third-party course providers for skill development recommendations. Some job descriptions also lacked clear skill requirements, affecting the accuracy of job matching. Future enhancements will focus on multilingual support, AI- driven video resume analysis, and tailored industry-specific resume templates to improve user experience and precision.

By continuously refining AI models and leveraging admin-driven insights, SkillFit.AI aims to bridge the gap between students, educators, and recruiters, ensuring a data- driven, AI-powered approach to career development.

V. CONCLUSION AND FUTURE SCOPE

SkillFit.AI provides an AI-driven solution to help job seekers optimize their resumes, identify skill gaps, and receive personalized course recommendations. By leveraging Google Gemini (transformer model), NLP, and Machine Learning, the system enhances job-resume alignment, ATS compatibility, and skill development. As per the latest version, Google Gemini 2.0, the system benefits from improved natural language understanding and generation, further boosting the accuracy of skill extraction and recommendation quality. The implementation and evaluation results

demonstrate that SkillFit.AI can significantly improve resume structure, job match accuracy, and candidate visibility to recruiters. Additionally, the bias detection module promotes fair hiring practices, ensuring inclusivity in career development.

Despite its effectiveness, the system faces limitations, including lack of support for infographic/video resumes and reliance on third-party course platforms. Future enhancements will focus on multilingual support, AI-based video resume analysis, industry-specific resume templates, and real-time career path recommendations. By continuously improving its capabilities, SkillFit.AI aims to become a comprehensive career development platform, bridging the gap between job seekers and recruiters through data-driven insights and AI-powered guidance.

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