ResuMate: Emendation and Analysis of Job Resumes Using DL and AI-Based Models

[1]Ms. Poonam R. Pathak, [2]Kashyap Patil, [3]Priyanshu Patil, [4]Vedant Sarvankar, [5]Kashav Sharma

2,3,4,5 UG Students, Department of Information Technology
1 Guide, Department of Information Technology
Pillai HOC College of Engineering and Technology, Rasayani, Maharashtra, India

Abstract : Resume is the first introduction of a job seeker to recruiters. Many candidates fail to prepare resumes that properly align with job requirements and professional expectations. In order to assist job seekers during the hiring process, we introduce ResuMate. ResuMate is an AI- and Deep Learning–based resume analysis and emendation platform. The system provides job-role matching, resume quality improvement, and skill recommendation using NLP and transformer-based models.

IndexTerms **- Deep Learning, Job-role Matching, NLP, Resume Analysis, Resume Emendation.**

INTRODUCTION

Resume preparation is a crucial step for every job seeker, whether a fresher or an experienced professional. A resume acts as the primary medium through which candidates present their skills, education, and experience to potential employers. However, many job seekers struggle to create resumes that effectively satisfy recruiter expectations and professional standards. As a result, qualified candidates are often overlooked due to poor formatting, missing keywords, grammatical errors, or lack of role-specific alignment. Although several resume related tools are available, most of them focus mainly on resume–job comparison and offer limited assistance in improving resume quality, structure, and overall employability.

With the rapid adoption of digital recruitment platforms and online hiring systems, there is a growing demand for intelligent, user-friendly, and adaptive resume enhancement solutions. Recent advancements in Artificial Intelligence (AI), Deep Learning (DL), and Natural Language Processing (NLP) have enabled systems to analyze unstructured resume data more accurately and understand job requirements in a meaningful way. These technologies have the potential to significantly improve resume optimization, job-role matching, and skill gap identification. However, integrating all these capabilities into a single, efficient, and scalable platform still remains a challenge in existing systems.

To overcome these challenges, this paper presents the development of *ResuMate*, an AI-driven resume analysis and emendation system designed to assist job seekers throughout the hiring process. ResuMate focuses on improving resume quality, aligning resumes with relevant job roles, and enhancing overall resume content using NLP and deep learning techniques. The key contributions of this paper can be summarized as follows:

- A unified resume enhancement system that integrates resume parsing, resume analysis, and job-role matching within a single platform.
- An intelligent resume emendation mechanism that improves grammar, formatting, and keyword alignment based on job requirements.
- A job-role matching and ranking approach using transformer-based models such as BERT and SBERT to identify suitable opportunities.
- A skill gap detection and recommendation module that supports candidates in improving employability through targeted suggestions.

RELATED WORK

Yu et al. proposed CONFIT V2, a resume–job match ing framework that utilizes hypothetical resume embeddings and contrastive learning to improve semantic alignment between resumes and job descriptions [1]. The system enhances matching accuracy through dense retrieval and hard-negative mining techniques. However, the approach primarily focuses on improving matching performance and does not provide resume optimization, resume quality evaluation, or grammar refinement features.

Jiang et al. introduced a multi-granularity, multi-modal pretraining model for efficient resume understanding [2]. The proposed method integrates textual and layout information using transformer-based architectures such as BERT and SBERT to extract structured resume data. Although the system improves parsing efficiency, it depends heavily on large-scale annotated datasets and does not include job-role recommendation or resume emendation mechanisms.

Mahalakshmi et al. developed a job recommendation system based on skill set comparison using TF-IDF vectorization and cosine similarity techniques [3]. The system recommends jobs by matching extracted skills from resumes with job requirements. While effective for skill-based filtering, the approach lacks contextual semantic understanding and does not address resume quality improvement or advanced resume enhancement techniques.

Kawtikwar et al. proposed an AI-driven resume analyzer with job recommendation and portfolio generation features [4]. The system automates resume evaluation and provides role-based suggestions to candidates. However, it does not incorporate deep semantic matching using advanced transformer models, nor does it provide comprehensive resume emendation or skill gap analysis within a unified framework.

PROPOSED METHODOLOGY

The proposed system (ResuMate) is designed to assist job seekers by providing complete resume analysis and enhancement support throughout the job application process. The system supports users from the initial resume upload stage to final resume optimization and job-role recommendation. The end-to-end workflow of the proposed system is illustrated in Fig. 1. The interaction between system actors and major functional components is further described through the use case model shown in Fig. 2.

The workflow of the system integrates automated resume analysis, job-role matching, and intelligent resume emendation using a combination of rule-based and AI-driven techniques. The system focuses on improving resume quality, aligning resume content with target job roles, and enhancing overall employability while ensuring secure handling of user data.

The architecture follows a structured processing pipeline in which resume information is extracted, analyzed, matched with relevant job roles, and refined to generate an optimized resume output. The system operates through two primary modes, namely user mode and admin mode.

A. User Login and System Initialization

The methodology begins when a job seeker logs into the ResuMate web platform. The system authenticates the user and creates a secure session to initiate resume-related services. After successful login, the user is redirected to the main workflow where the user can provide job role preferences and upload their resume for further processing.

This initialization stage ensures that each session is associated with a specific user profile and enables secure handling of user data throughout the analysis process.

B. Resume Upload and Analysis Phase

In this phase, users upload their resumes in supported formats such as PDF or DOCX. The uploaded resume is processed through a resume analysis pipeline consisting of resume parsing, feature extraction, and resume content analysis.

The resume parser converts the document into structured text data. After parsing, the system extracts important attributes such as skills, educational qualifications, work experience, certifications, and other relevant information. These extracted features are analyzed using Natural Language Processing (NLP) techniques to evaluate resume quality and identify keywords relevant to the selected job roles.

This stage prepares structured resume data that will be used for job-role matching in the next phase.

C. Job Matching Phase

Once resume parsing and feature extraction are completed, users select preferred job domains or roles. The system retrieves relevant job descriptions corresponding to the selected job role and performs semantic comparison between resume content and job requirements.

Transformer-based deep learning models such as BERT and SBERT are used to capture contextual relationships between resume features and job descriptions. These models allow the system to perform semantic matching rather than relying only on simple keyword comparisons. Based on the computed similarity scores, suitable job opportunities are ranked and presented to the user. The ranking mechanism prioritizes job roles that most closely match the candidate's skills and experience.

If the resume does not sufficiently align with the job requirements, the system forwards the resume to the enhancement module for further optimization.

D. AI-Based Resume Emendation and Skill Recommendation

During this phase, the AI-assisted resume emendation module improves the overall structure and content of the resume. The system refines grammar, enhances keyword placement, improves sentence structure, and aligns resume content with role-specific expectations.

Additionally, the system performs skill gap identification by comparing the extracted resume skills with the requirements of the target job roles. If missing skills are identified, the system generates skill recommendations that help users improve their profiles and increase their chances of obtaining relevant job opportunities.

These recommendations guide users in enhancing their resumes for better alignment with industry requirements.

E. Result Review and Resume Generation Phase

After the resume enhancement process is completed, the system presents the analysis results and suggested improvements to the user. Users can review the recommended changes and the ranked job opportunities generated by the system.

An optimized version of the resume is generated based on the suggested modifications. The user is then provided with the option to download the optimized resume for further use in job applications.

This phase allows the user to validate the suggested changes before finalizing the improved resume.

F. Completion and Data Management

Once the optimized resume has been downloaded, the session is marked as complete. Temporary processing data generated during resume analysis is handled securely to maintain user privacy and system integrity.

The system resets the workflow to allow users to repeat the process if they wish to target a new job role or upload an updated resume. This design ensures efficient reuse of the system without affecting performance or security.

G. Use Case Interaction and System Workflow

The functional behavior of the proposed ResuMate system is represented through the use case model shown in Fig. 2. The diagram illustrates the interaction between the primary actors of the system, namely the user, the admin, and the AI interface.

The user represents job seekers who interact with the system to provide job role information, upload resumes, and obtain optimized outputs. The process begins with user authentication followed by submission of job role preferences and resume documents.

Once the resume is uploaded, the system performs resume processing which includes resume parsing, extraction of key information, and resume analysis using Natural Language Processing techniques.

The processed information is forwarded to the job-role matching module where semantic similarity and ranking mechanisms identify suitable job opportunities. The AI interface supports this process by generating skill recommendations and assisting in resume optimization.

After the analysis is completed, the system produces an optimized resume and ranked job recommendations. The user can download the improved resume or repeat the process by selecting a new job role if required.

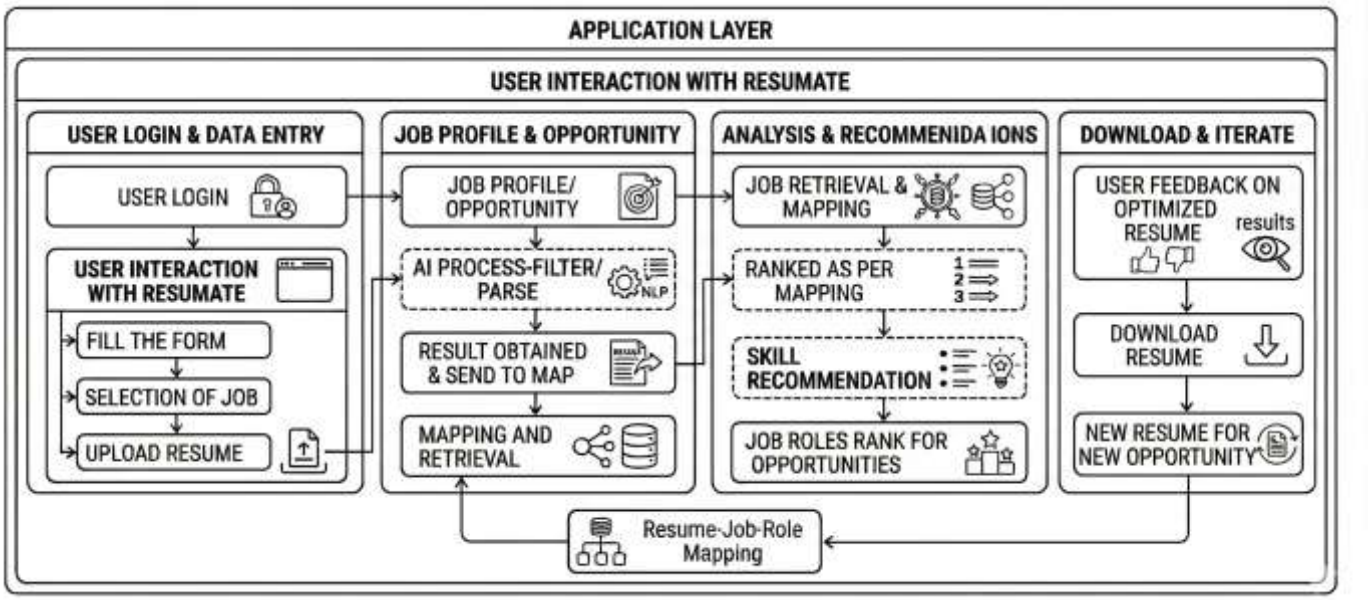

Fig. 1. System architecture of the proposed ResuMate framework illustrating resume analysis, resume enhancement, and job recommendation modules.

RESULT ANALYSIS

The ResuMate system was analyzed based on its ability to assist job seekers at different stages of the resume enhancement and job application process. These stages include resume analysis, job-role matching, resume emendation, and postanalysis user interaction. The system evaluation focused on how effectively it supports users in improving resume quality and identifying suitable job opportunities.

A. Resume Analysis Performance

During the resume analysis phase, the system successfully parsed uploaded resumes and extracted key information such as skills, education, and work experience. Resume quality evaluation and keyword relevance analysis were performed accurately. Users were able to view structured resume insights with minimal response time, which helped them understand weaknesses in their resumes before applying for jobs.

B. Job Matching and Ranking Analysis

In the job matching phase, the system effectively matched resumes with relevant job roles using NLP and deep learning models such as BERT and SBERT. The ranking mechanism provided a prioritized list of suitable job opportunities based on similarity scores. This helped users identify roles that best aligned with their profiles and reduced the chances of applying to unsuitable positions.

The AI-based matching module responded efficiently and generated job recommendations in real time, demonstrating the system's capability to handle resume–job alignment accurately.

C. Resume Emendation and Skill Recommendation Analysis

The resume emendation features performed reliably by improving grammar, formatting, and keyword integration. The system also identified skill gaps based on job requirements and provided relevant recommendations. These features helped enhance resume clarity, professionalism, and overall resume quality, thereby increasing the effectiveness of job applications.

D. User Interaction and Feedback Analysis

During the post-analysis stage, users were able to review resume improvements, download optimized resumes, and submit feedback without difficulty. The interaction process was simple and user-friendly, resulting in higher user participation. The feedback collected can be used to further improve system accuracy and recommendation quality in future updates.

E. System Reliability and Data Handling Analysis

The system demonstrated stable performance throughout all stages of operation. User data was handled securely, and temporary data generated during resume analysis was properly managed after completion. The system was able to reset efficiently for new users, enabling repeated usage without affecting overall performance or data integrity.

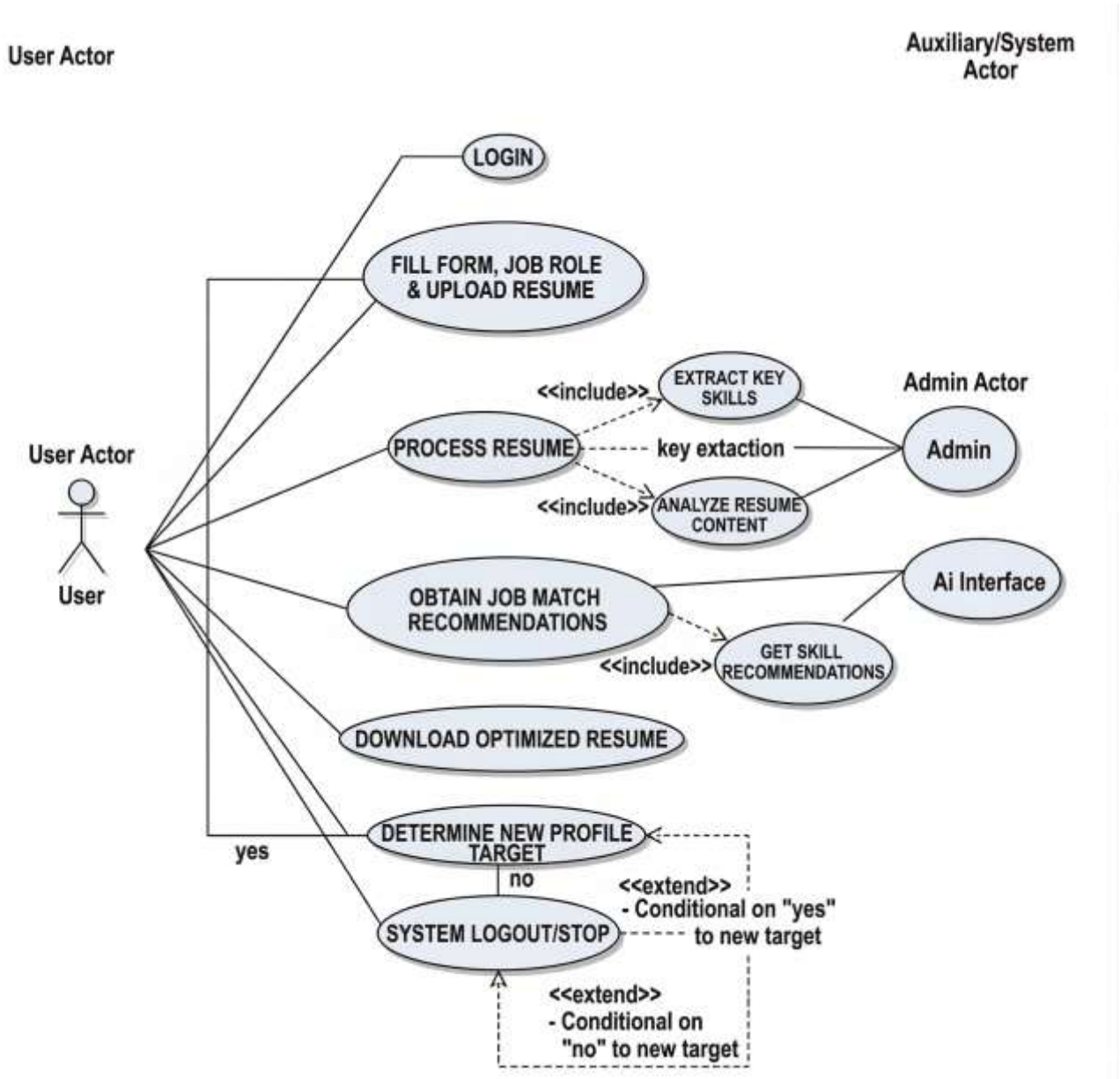

Fig. 2. Use case diagram of the proposed ResuMate system illustrating interactions between the user, admin, and AI interface during resume processing, job-role matching, and resume optimization.

CONCLUSION

This system, ResuMate, presents an AI and Deep Learning–based resume analysis and emendation solution aimed at improving resume quality and job-role alignment. The system combines resume parsing, job matching, and resume improvement into a single

platform. By using NLP and transformer based models, ResuMate assists job seekers in enhancing resume effectiveness and identifying suitable job opportunities.

Future Work: The system can be enhanced with improved personalization, multilingual resume support, and integration with recruitment platforms. Further advancements using machine learning models can help provide predictive career guidance and more accurate recommendations.

REFERENCES

[1] X. Yu, R. Xu, C. Xue, J. Zhang, and Z. Yu, "CONFIT V2: Improving Resume-Job Matching using Hypothetical Resume Embedding and Runner-Up Hard-Negative Mining," *arXiv preprint arXiv:2502.12361*, Feb. 2025.

[2] F. Jiang, C. Qin, J. Zhang, K. Yao, X. Chen, D. Shen, C. Zhu, H. Zhu, and H. Xiong, "Towards Efficient Resume Understanding: A Multi-Granularity Multi-Modal Pre-Training Approach," *arXiv preprint arXiv:2404.13067*, Apr. 2024.

[3] G. Mahalakshmi, A. Arun Kumar, B. Senthilnayaki, and J. Duraimurugan, "Job Recommendation System Based on Skill Sets," *International Journal of Creative Research Thoughts (IJCRT)*, vol. 10, no. 8, pp. a770– a785, Aug. 2022.

[4] V. Kawtikwar, S. Narse, L. Patil, S. Bari, and P. Mistry, "An AIDriven Resume Analyser with Job Recommender and Portfolio Code Generator," *Proc. IEEE Int. Conf.*, 2024.