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NLP-Based resume screening and resume generation system

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Abstract

Resume screening is an important part of recruitment, but in many organizations, it is still done manually. This makes the process slow, repetitive, and sometimes unfair because suitable candidates may be missed if their resumes do not contain the exact expected keywords. At the same time, many job seekers find it difficult to create a professional resume in a proper format.

To address these issues, this project proposes an NLP-based Resume Screening System with an integrated Resume Generation module. The system uses Natural Language Processing techniques to extract useful information such as skills, qualifications, and experience from resumes and job descriptions. TF-IDF and semantic similarity methods are then used to calculate a matching score that shows how closely a resume fits a particular job role. The system also identifies missing skills and common resume issues, and it provides feedback for improvement. In addition, the resume generation feature allows users to create a professional resume from keywords and basic details. The proposed system reduces manual effort, improves accuracy, and makes the recruitment process more efficient for both recruiters and job seekers.

Keywords: Natural Language Processing; Resume Screening; TF-IDF; Semantic Similarity; Resume Generation; Recruitment Automation

1. Introduction

Recruitment has become more challenging as organizations receive a large number of applications for every job opening. Reviewing every resume manually takes a lot of time and often leads to inconsistent decisions. In many cases, qualified candidates are rejected simply because their resumes do not use the exact keywords expected by the recruiter. This creates the need for a smarter and more reliable way to screen resumes.

Natural Language Processing offers a practical solution by allowing a system to understand and analyse resume content in a meaningful way. Instead of relying only on keyword matching, the system can identify important information such as skills, qualifications, education, and experience. It can then compare this information with a job description and calculate how well a candidate fits a specific role. This makes screening faster, more accurate, and less dependent on manual review.

This project combines resume screening and resume generation in a single web-based platform. Users can either upload an existing resume or generate one using keywords, and the system processes the input using NLP techniques. The results are shown in a recruiter dashboard, where candidates can be ranked based on matching scores. In this way, the system supports both recruiters and job seekers by simplifying the hiring process and improving resume quality.

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1.1. Background and Motivation

Recruiters often need to go through many resumes for a single position. Manual screening is tiring, time-consuming, and prone to bias. Keyword-based filtering is also limited because it does not understand the meaning of the text and may overlook good candidates whose resumes are written differently. This becomes even more difficult when applications arrive in large numbers within a short period.

The motivation behind this project is to create an intelligent system that makes resume screening faster, fairer, and more practical. At the same time, it also aims to help job seekers who may not know how to create a proper resume. By adding a resume generation feature, the system allows users to build a structured and professional resume quickly using their skills, experience, and role preferences.

1.2. Need for the Study

There is a clear need for a system that can reduce manual workload in recruitment and support automatic resume creation. Traditional methods are not able to understand context properly, which lowers the quality of candidate shortlisting. A system based on NLP can analyse resumes more intelligently and compare them with job descriptions in a better way. Such a system can help recruiters save time and improve accuracy, while also helping candidates present themselves more effectively.

1.3. Objectives of the Study

The main objective effort and project are to automate resume screening using NLP techniques, generate professional resumes from user-provided keywords, extract skills and qualifications from resumes, calculate resume job matching scores using TF-IDF and semantic similarity, reduce manual effort, and provide a recruiter dashboard for viewing ranked candidates and results.

1.4. Problem Statement

Traditional resume screening and resume creation depend heavily on manual evaluation and basic keyword-based filtering. These methods are slow, error-prone, and often fail to identify suitable candidates because they do not understand the actual meaning of the text. Manual resume creation also lacks standardization and requires considerable effort. As the number of applications increases, handling resumes efficiently becomes even more difficult. This creates a strong need for an automated, intelligent, and scalable recruitment solution.

1.5. Research gap paragraph

Although many existing resume screening systems can extract text or calculate similarity, most of them still depend heavily on exact keyword matching or focus only on screening alone. Very few systems combine resume screening and resume generation in a single platform. This creates a practical gap in recruitment support systems, which the proposed work addresses by combining NLP-based resume analysis, semantic matching, and resume generation in one web-based solution.

1.6. Proposed System

The proposed system is an NLP-based web application that automates both resume screening and resume generation. A user can either upload an existing resume or enter keywords to generate a resume. After that, the system preprocesses the text, extracts relevant skills, and compares the resume with a job description using TF-IDF and semantic similarity techniques. Based on this comparison, a matching score is calculated and displayed in the recruiter dashboard. The system also identifies missing skills and gives improvement suggestions to help users improve their resumes.

2. Materials and Methods

The proposed system is designed as a web-based recruitment support platform that combines resume upload, resume generation, and automated screening. It follows a structured workflow in which user input is first collected, then processed using NLP methods, and finally evaluated against job requirements. The system is built to support both job seekers and recruiters by providing a smooth and practical way to create, analyse, and rank resumes.

2.1. System Overview

The system works in two main ways. In the first flow, a user uploads an existing resume, and the system extracts the text, processes it, and compares it with the job description. In the second flow, the user enters keywords such as skills,

education, experience, and job role, and the system generates a structured resume. Both flows pass through the same NLP and matching pipeline so that the results remain consistent.

2.2. Data Input

The system accepts resumes in PDF, DOCX, and text format. It also takes job descriptions as input. These job descriptions may be added by the recruiter or stored in the database for matching purposes. In the resume generation flow, the user provides keywords and basic personal information, which are used to create a professional resume.

2.3. Text Preprocessing

Before analysis, the text is cleaned using standard NLP preprocessing steps. The system performs tokenization, stop-word removal, and lemmatization to remove unnecessary noise and keep only the important words. This helps improve the quality of further analysis and matching.

2.4. Feature Extraction

After preprocessing, the resume and job description are converted into a numerical representation using TF-IDF. This helps the system identify the most important terms in each document. TF-IDF is useful because it gives higher weight to terms that are more meaningful in a specific resume or job description.

2.5. Semantic Matching

In addition to TF-IDF, the system uses semantic similarity methods to understand the meaning behind the text. This helps the system match resumes and job descriptions even when the wording is different. Semantic comparison improves accuracy because it does not depend only on exact keyword overlap.

2.6. Matching Score Calculation

The processed resume and job description are compared using cosine similarity or a similar scoring method. Based on this, the system generates a match score that shows how closely the candidate fits the job role. The score can then be used to rank candidates in the recruiter dashboard.

2.7. Hybrid scoring paragraph:

To improve the reliability of resume evaluation, the system uses a hybrid scoring strategy that combines weighted skill matching with semantic similarity. Core skills are treated with higher importance than supporting tools or libraries, and related terms are normalized using synonym mapping and fuzzy matching. This approach ensures that the final score reflects both the presence of relevant skills and the contextual meaning of the resume content. As a result, the system produces a more realistic and balanced assessment than exact keyword matching alone.

2.8. Resume Generation Module

The resume generation module allows users to create a professional resume by entering details such as skills, education, work experience, and target job role. The system converts these inputs into a structured format that looks neat and professional. This is especially useful for users who do not already have a proper resume or who want to improve their existing one.

2.9. System Workflow

The workflow begins when the user uploads a resume or enters keywords. The system preprocesses the text, extracts relevant information, and performs feature extraction. After that, the resume is compared with the job description, and a matching score is generated. The final results are shown in the recruiter dashboard, which helps in selecting the most suitable candidates.

2.10. System Modules

The proposed system is divided into the following modules: Resume Upload Module, Resume Generation Module, NLP Processing Module, Matching Engine, and Recruiter Dashboard. Each module plays a specific role, but all of them work together to provide a complete recruitment support solution.

2.11. Methodology Diagram

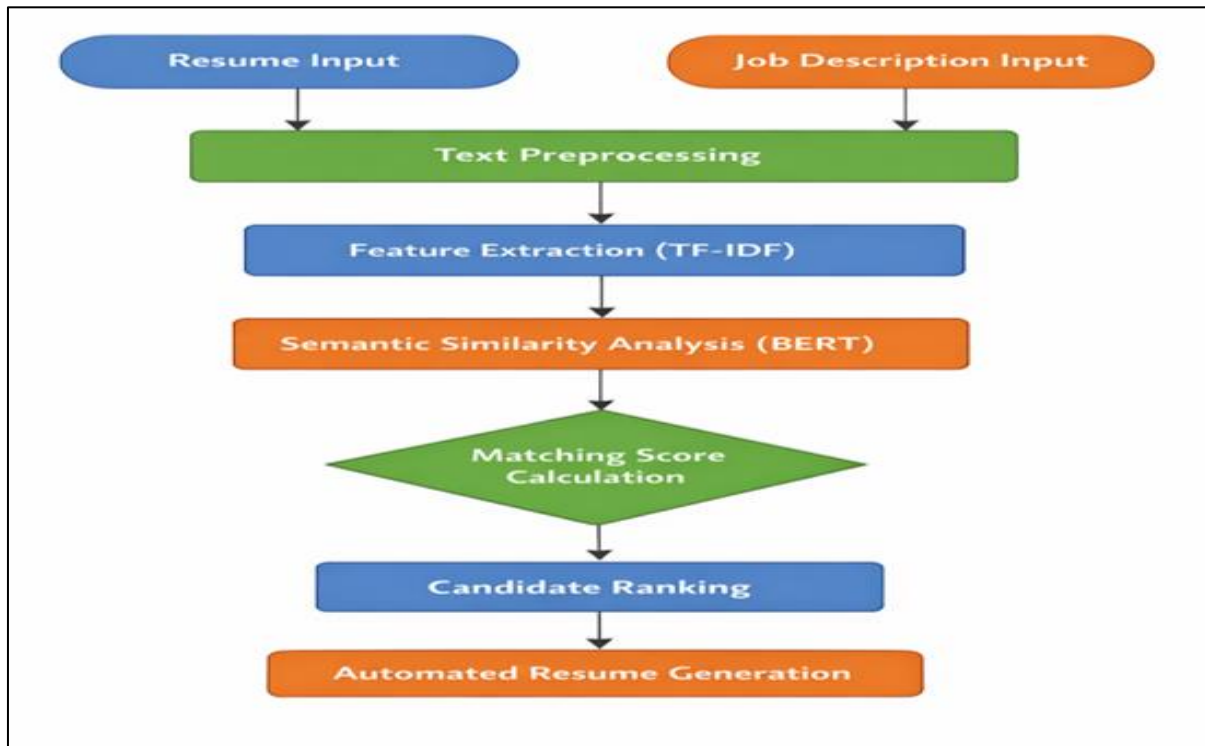


Figure 1 METHODOLOGY Diagram

2.12. Usecase Diagram

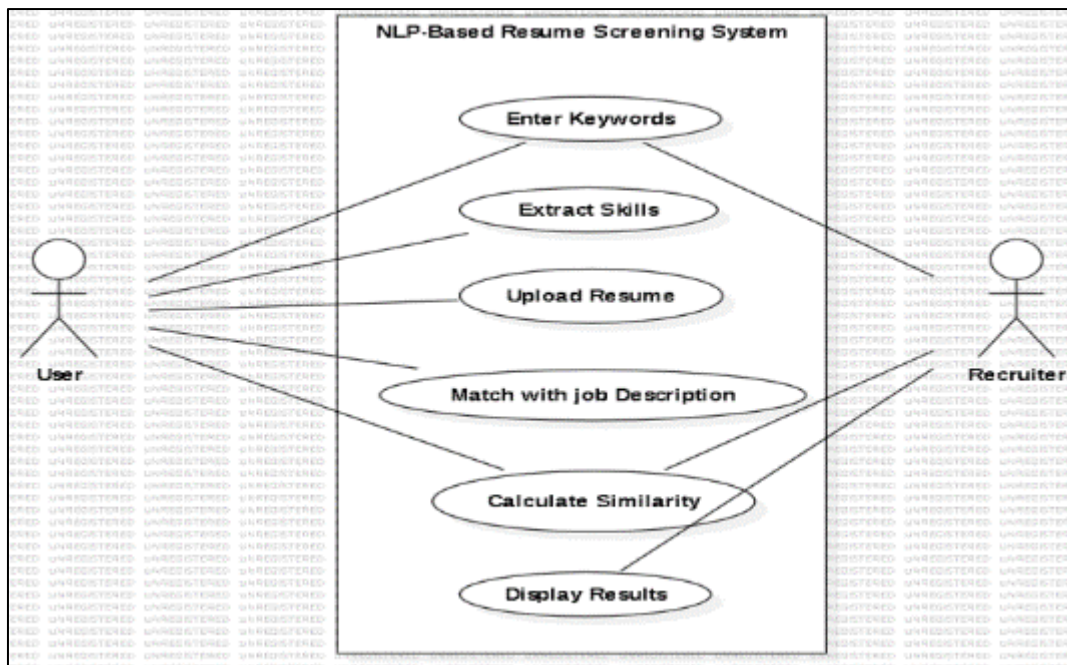


Figure 2 USECASE Diagram

3. Results and Discussion

The proposed system successfully performs resume upload, resume generation, skill extraction, and job matching. After processing the resume and job description, the system calculates a similarity score and shows the result in a recruiter dashboard. This makes it easier to compare candidates and shortlist the most relevant ones.

The proposed system was evaluated on sample resume and job description pairs and produced clear outputs showing extracted skills, direct matches, skill overlap, and a final similarity score. In one representative case, the dashboard identified 15 matched skills and produced a similarity score of 73.4%, along with an improvement panel that highlights what the candidate already matches and what is still missing. This makes the output easier to understand for both recruiters and job seekers, while also giving useful feedback for improving resume quality.

To further evaluate the effectiveness of the proposed system, a comparison with traditional resume screening methods is presented in Figure 3.

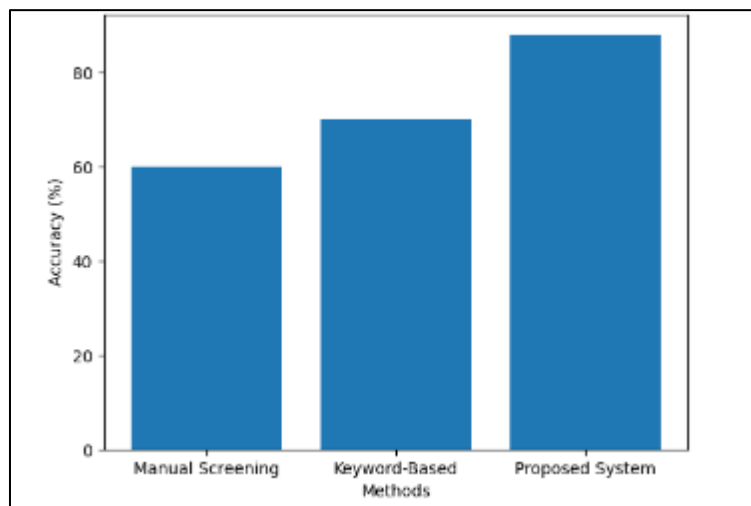


Figure 3 Performance Comparison of Resume Screening Methods

Figure 3 shows that the proposed system achieves higher accuracy compared to manual and keyword-based approaches. The integration of semantic similarity and weighted skill matching improves the overall effectiveness and reliability of candidate evaluation.

Resume Matching Output Showing Skill Overlap, Direct Skill Matches, and Similarity Score:

The resume generation module also works effectively by producing a clean and structured resume from user-provided keywords. This helps candidates prepare professional resumes without much effort. The dashboard presents the information in a simple and readable format, which improves usability and makes the system suitable for real-time demonstration.

Compared to manual screening, the system reduces time and effort significantly. It also improves consistency because the same matching method is applied to every resume. The use of semantic similarity makes the system more reliable than keyword-based methods alone, especially when the resume wording does not exactly match the job description. Overall, the results show that the system is capable of handling the main tasks involved in recruitment automation. It supports both recruiters and job seekers, making it a useful and practical solution for modern hiring environments.

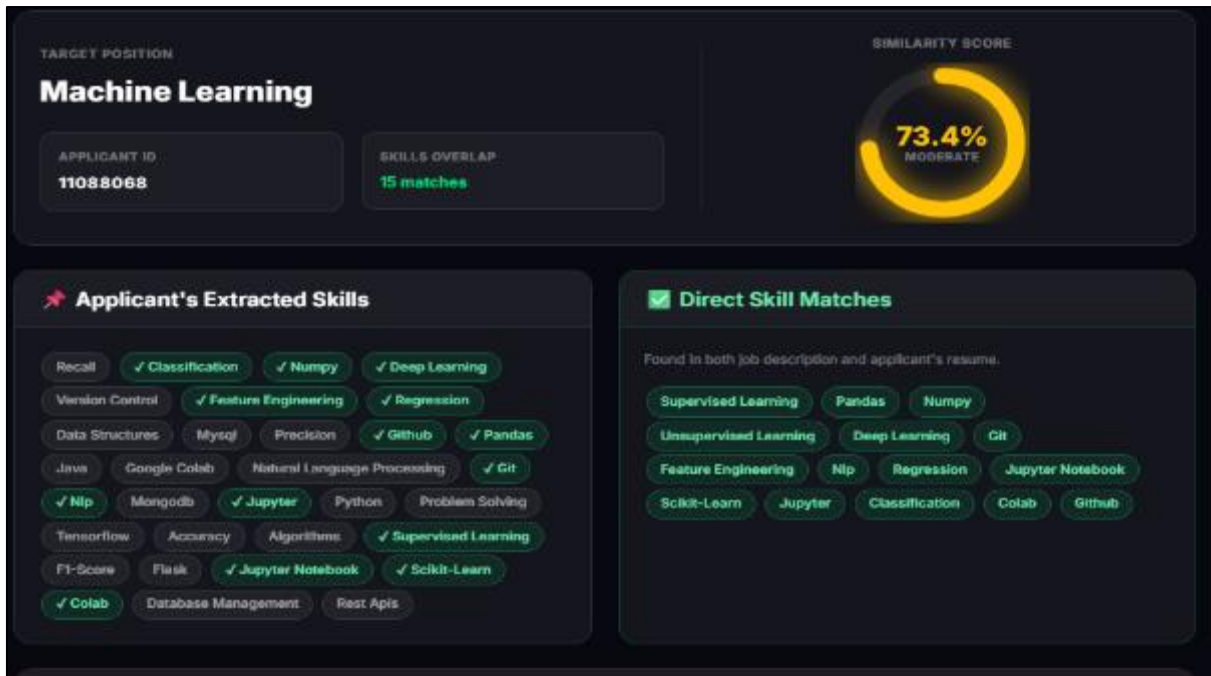


Figure 4 Resume Matching Output

3.1. AI Resume Generated:

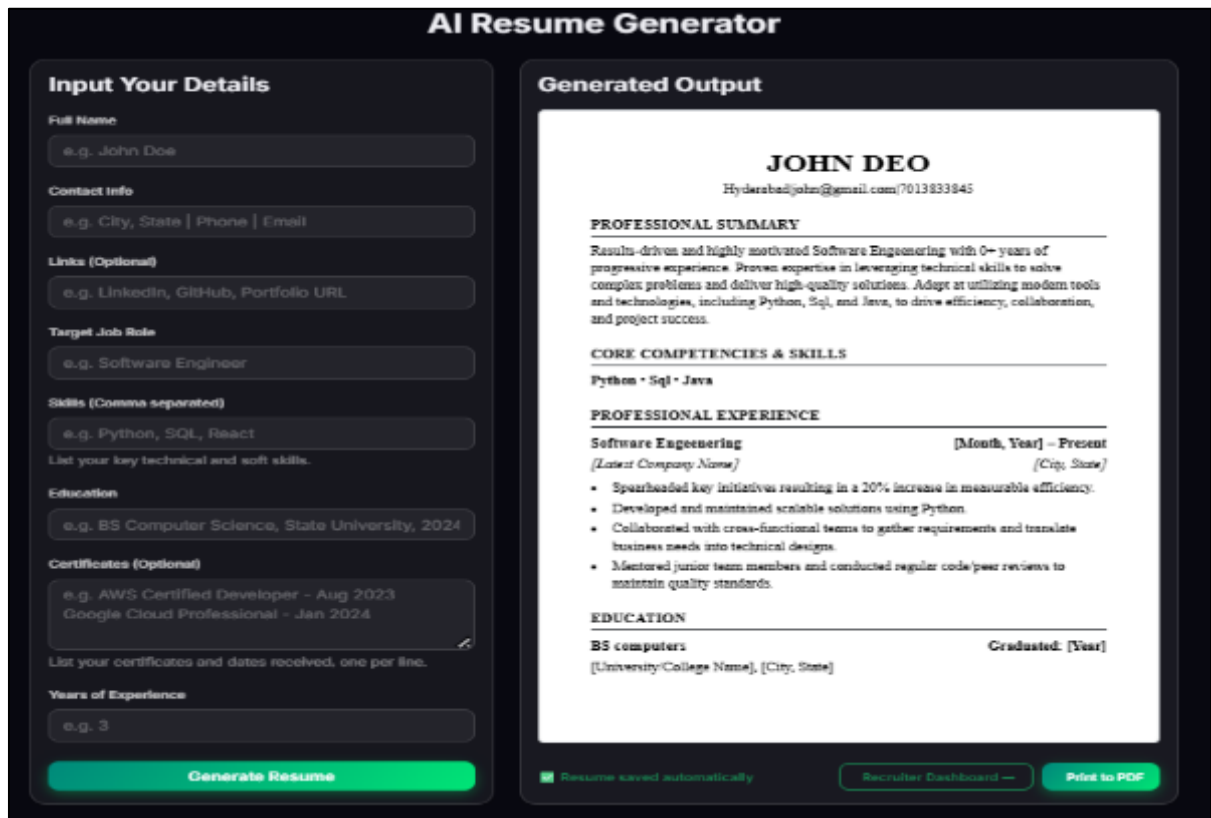


Figure 5 AI Resume Generated

3.2. Resume upload:

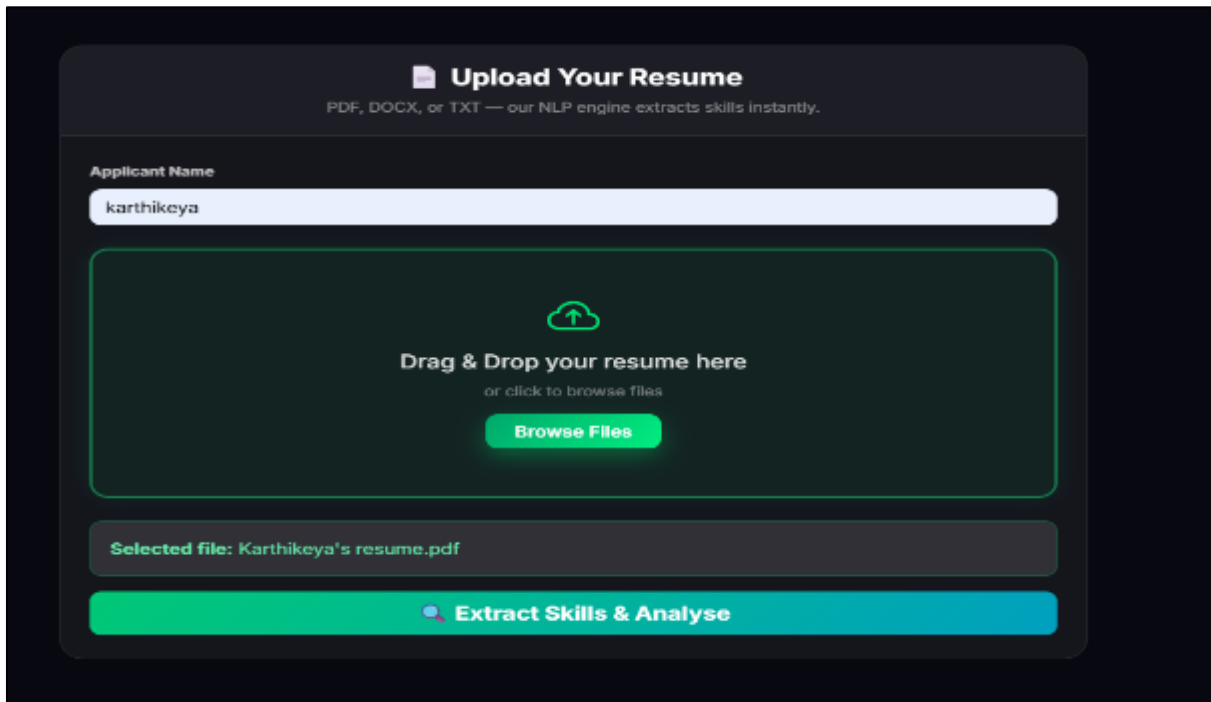


Figure 6 Resume Upload

3.3. Recruiter Dashboard:

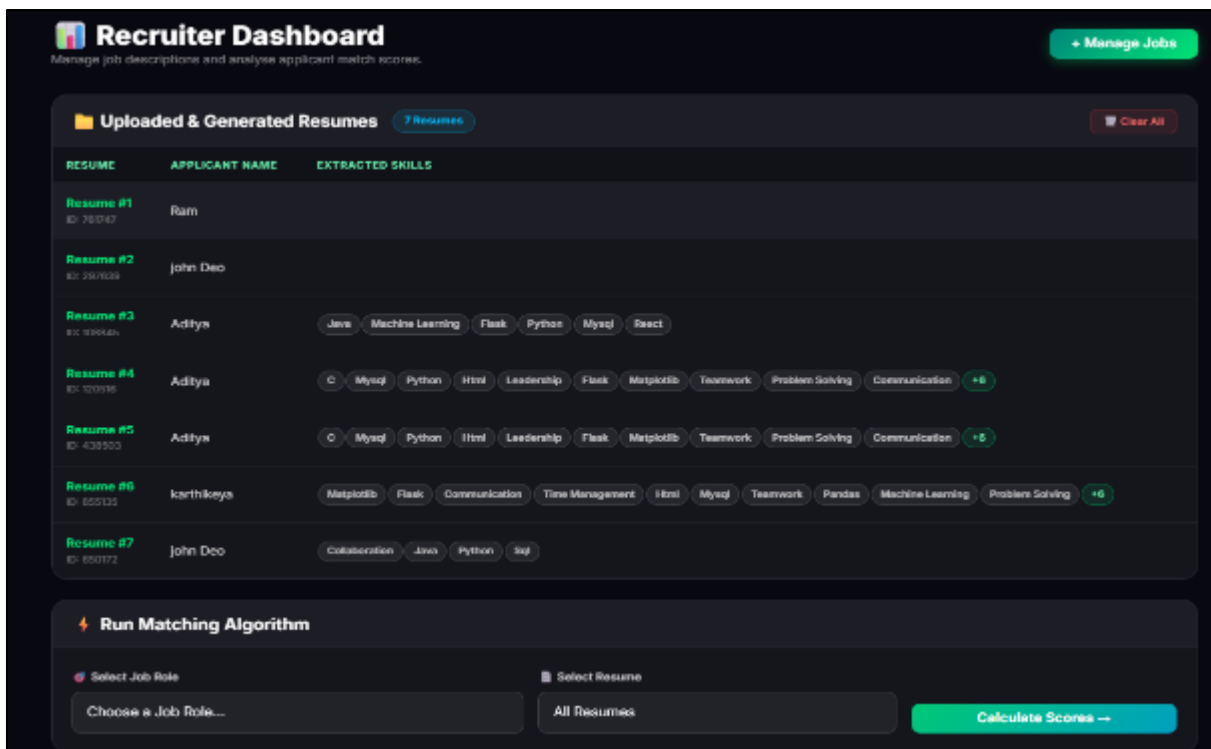


Figure 7 Recruiter Dashboard

To better understand existing approaches, a comparative analysis of recent research works is presented in Table 1.

Table 1 Comparative Analysis of Related Work

Year	Authors	Technique Used	Key Contribution	Limitations
2026	Wu et al.	LLMs, Adversarial Learning	Proposed a bias-aware resume screening system that improves fairness and semantic understanding in candidate selection.	High computational complexity and requires advanced resources.
2026	Gupta et al.	TF-IDF, Cosine Similarity	Developed a combined resume builder and job matching system using text similarity techniques.	Relies heavily on keyword matching with limited contextual understanding.
2026	Mohd et al.	NLP Ranking Models	Introduced an intelligent platform for ranking resumes and optimizing job applications.	Limited transparency in how ranking decisions are generated.
2025	B. K. P & Chellamani	RAG, Sentence Transformers	Improved resume screening accuracy using contextual and semantic understanding techniques.	High computational cost and increased system complexity.
2025	Xie & Zhao	Fuzzy NLP	Addressed ambiguity in resumes by applying fuzzy logic-based semantic matching.	Requires manual rule tuning and configuration.
2025	Dhanalakshmi et al.	Semantic NLP, ML	Developed a real-time resume ranking system using semantic analysis.	Not suitable for experienced candidates and complex profiles.
2025	Shahade et al.	TF-IDF, NER	Built a resume ranking system focused on freshers using NLP techniques.	Performance depends on dataset quality and diversity.

The above comparison shows that earlier systems mainly relied on keyword-based and statistical techniques such as TF-IDF and cosine similarity, which are simple but limited in understanding context. Recent approaches have introduced semantic NLP, transformer-based models, and advanced techniques to improve accuracy and fairness in resume screening. However, many of these systems are either computationally expensive or focus only on screening without supporting resume generation. The proposed system addresses these limitations by combining NLP-based resume screening with resume generation in a single platform, providing a more practical and efficient solution for modern recruitment.

4. Conclusion

The NLP-based Resume Screening and Resume Generation System provides a practical solution to the problems found in traditional recruitment workflows. It automates resume analysis, improves candidate matching, and helps users generate professional resumes in a simple way. By using NLP, TF-IDF, and semantic similarity, the system reduces manual effort and improves the quality of screening results.

The system is useful because it combines screening and resume generation in one platform. This makes it helpful for recruiters who need faster shortlisting and for job seekers who want to prepare better resumes. Overall, the proposed system offers an efficient, user-friendly, and scalable approach to modern recruitment.

Future Scope

The system can be further enhanced by integrating deeper transformer-based models for improved semantic understanding, supporting multilingual resume analysis, and connecting the platform to live job portals. Future versions can also include interview recommendations, skill-gap analysis, and role-based resume suggestions, making the system more useful in real-world recruitment environments.

Compliance with ethical standards

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Disclosure of conflict of interest

No conflict of interest to be disclosed

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