

# Enhancing HR Efficiency with AI Powered Resume Ranking for Smart Talent Acquisition

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## ABSTRACT

The rapid growth in job applications has made manual resume screening a time-consuming and inefficient task for Human Resource (HR) professionals. To address this challenge, this paper proposes an AI-powered resume ranking system designed to enhance HR efficiency and support smart talent acquisition. The proposed system analyzes multiple candidate resumes for specific job roles and evaluates them based on skills, keywords, and experience. Using the Gemini API, resumes are processed through natural language understanding techniques to identify relevance and match scores. The system then ranks resumes and assigns a score, enabling recruiters to quickly identify the most suitable candidates.

In addition, the proposed approach ensures consistency and scalability in recruitment by handling large volumes of resumes with minimal human intervention. The system supports data-driven decision-making and improves the overall quality of candidate short listing. By reducing screening time and effort, the solution contributes to faster hiring cycles and more effective talent acquisition strategies. The proposed system is flexible and can be adapted to different job roles and industry domains. It also promotes fair and unbiased screening by relying on objective evaluation criteria rather than manual judgment. Overall, this AI-driven resume ranking framework serves as a practical and efficient tool for modern recruitment processes.

**Key words:** Resume Ranking, Artificial Intelligence, Talent Acquisition, HR Automation, Gemini API.

## I. INTRODUCTION

The recruitment process plays a critical role in identifying and hiring suitable candidates for organizations. With the rapid growth of online job portals and digital recruitment platforms, organizations receive hundreds or even thousands of resumes for a single job opening. Managing and screening such a large volume of resumes manually has become a

challenging task for Human Resource (HR) professionals. Traditional recruitment methods rely heavily on manual resume evaluation, which is time-consuming, labor-intensive, and prone to inconsistencies. Recruiters often spend a significant amount of time filtering resumes that may not meet the required job criteria. Moreover, manual screening can introduce unconscious bias and subjective decision-making, which may affect the fairness of the hiring process.

Artificial Intelligence (AI) and Natural Language Processing (NLP) technologies have emerged as powerful tools to automate and improve recruitment processes. AI-driven systems can analyze large volumes of textual data efficiently and extract meaningful insights from resumes and job descriptions.

By leveraging these technologies, organizations can improve recruitment efficiency, reduce hiring time, and enhance the quality of candidate selection.

This paper presents an AI-powered resume ranking system that assists HR professionals by automatically analyzing and ranking candidate resumes according to job-specific requirements. The proposed system focuses on skill matching, keyword analysis, and experience evaluation to provide an objective and data-driven approach to talent acquisition.

The ranked output helps HR professionals quickly identify the most suitable candidates, significantly reducing screening time and manual effort. The proposed approach ensures scalability, consistency, and fairness in the recruitment process, making it a practical solution for modern, data-driven hiring environments.

## II. LITERATURE SURVEY

Recent studies have explored the use of automation and Artificial Intelligence to improve efficiency in recruitment and resume screening. Researchers have identified the limitations of manual screening methods and have proposed various intelligent systems to automate different phases of the hiring process.

Early research typically utilized keyword-based matching techniques, where keywords extracted from job descriptions were matched with resumes to shortlist candidates. While this approach reduces basic manual effort, it often lacks semantic understanding and fails to capture contextual relevance, resulting in inaccurate or incomplete candidate rankings.

To address these shortcomings, Natural Language Processing (NLP)-based approaches have been widely investigated. NLP techniques such as tokenization, named entity recognition, and similarity scoring have enabled more precise extraction of structured information — including skills, qualification details, work experience, and certifications — from unstructured resume text. These approaches demonstrate improved matching accuracy compared to simple keyword methods.

More recently, deep learning and transformer-based language models have shown promising results in semantic resume analysis. Techniques leveraging embeddings and contextual text representation offer a deeper understanding of resume content and job requirements. However, these advanced models often come with higher computational complexity and greater implementation requirements.

In contrast to the existing literature, the proposed system in this paper integrates the Gemini API to perform intelligent resume evaluation without requiring extensive model training. The proposed approach combines advanced language understanding, relevance scoring, and experience evaluation to achieve a scalable, practical, and efficient resume ranking solution for smart talent acquisition.

additional processing complexity that could slow down real-time verification.

### III. PROPOSED SYSTEM DESIGN

The proposed system automates the resume screening and ranking process using Artificial Intelligence. It is designed to handle large volumes of resumes efficiently and provide accurate candidate-job matching. The system takes resumes and job descriptions as input and produces a ranked list of candidates based on relevance.

#### 1 System Modules Overview

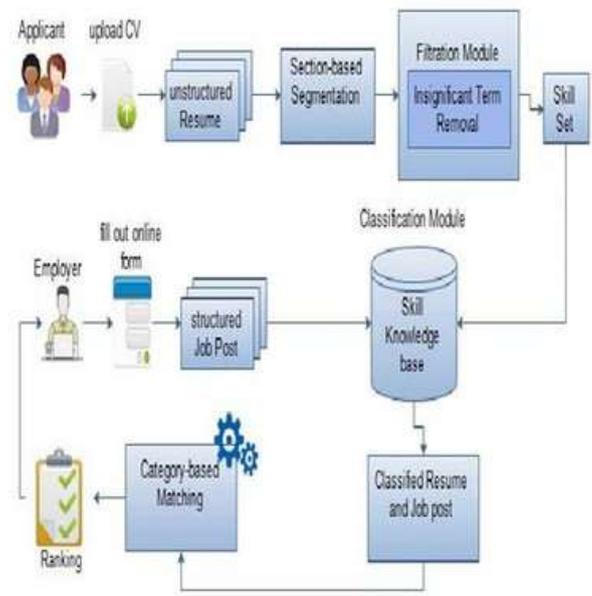
The system is divided into five major modules:

1. Resume Collection Module
2. Job Description Processing Module
3. Resume Analysis Module
4. AI-Based Matching and Scoring Module
5. Resume Ranking and Report Generation Module

These modules work together to ensure effective and unbiased resume evaluation.

The Gemini API processes the resume content and job description to generate similarity scores. Based on these scores, resumes are ranked from best match to least match.

### ARCHITECTURE DESIGN



### IV. METHODOLOGY

#### 1. Resume Collection Module

This module is responsible for collecting resumes from candidates. Resumes can be uploaded in multiple formats such as PDF or DOCX. The system stores each resume securely and converts it into machine-readable text. This module ensures proper organization of candidate data for further processing.

#### 2. Job Description Processing Module

In this module, HR professionals provide the job description for a specific role. The system extracts required skills, keywords, qualifications, and experience details from the job description. This processed information acts as a benchmark for evaluating candidate resumes.

#### 3. Resume Analysis Module

The resume analysis module processes each candidate resume to extract important information such as technical skills, soft skills, work experience, education, and certifications. Natural Language Processing techniques are used to understand the context of resume content and eliminate irrelevant data.

#### 4. AI-Based Matching and Scoring Module

This module uses the Gemini API to compare resume content with the job description. The system calculates matching scores based on skill relevance, keyword similarity, and experience alignment. Each resume is assigned a numerical score that reflects how well it matches the job requirements.

#### 5. Resume Ranking and Report Generation Module

Based on the scores generated, this module ranks resumes from best match to least match. A detailed report is generated for HR professionals, showing candidate scores and ranking order. This helps recruiters quickly shortlist the most suitable candidates.

### V. ALGORITHM

**Input:**

$JD = \{JD_1, JD_2, \dots, JD_m\}$  – Set of Job Descriptions  
 $R = \{R_1, R_2, \dots, R_n\}$  – Set of Candidate Resumes

**Output:**

$RL_j$  – Ranked Resume List for each Job  $JD_j$   
 $Score(R_i, JD_j)$  – Relevance Score

#### 1. Initialization Phase

1. Initialize Gemini API connection
2. Load resumes R and job descriptions JD
3. Set weighting factors  $w_1$  (Skills),  $w_2$  (Experience),  $w_3$  (Keywords) where  $w_1 + w_2 + w_3 = 1$

#### 2. Resume & Job Description Preprocessing Phase

4. For each  $JD_j \in JD$   $JD_j \leftarrow \text{Clean}(JD_j)$
5. For each Resume  $R_i \in R$   $R_i \leftarrow \text{Clean}(R_i)$

where  $\text{Clean}(\cdot)$  includes:

- o Lowercase conversion
- o Stop-word removal
- o Tokenization
- o Special character elimination.

#### 3. Feature Extraction Phase (Using Gemini API)

4. Extract job features using Gemini API  
 $F(JD_j) \leftarrow \{\text{Skills}_j, \text{Exp}_j, \text{Keywords}_j\}$
5. Extract resume features using Gemini API  
 $F(R_i) \leftarrow \{\text{Skills}_i, \text{Exp}_i, \text{Keywords}_i\}$

#### 4. Matching Phase

8. For each  $JD_j$  and Resume  $R_i$  Perform feature comparison:

- o  $\text{SkillMatch}_{ij} \leftarrow \text{Match}(\text{Skills}_i, \text{Skills}_j)$
- o  $\text{ExpMatch}_{ij} \leftarrow \text{Match}(\text{Exp}_i, \text{Exp}_j)$
- o  $\text{KeywordMatch}_{ij} \leftarrow \text{Match}(\text{Keywords}_i, \text{Keywords}_j)$

#### 5. Scoring Phase

9. Compute relevance score for each resume:

$$\text{Score}(R_i, JD_j) = w_1 \cdot \text{SkillMatch}_{ij} + w_2 \cdot \text{ExpMatch}_{ij} + w_3 \cdot \text{KeywordMatch}_{ij}$$

10. Normalize scores:

$$\text{Score}(R_i, JD_j) \in [0, 1]$$

#### 6. Ranking Phase

11. For each Job  $JD_j$  Sort all resumes R based on  $\text{Score}(R_i, JD_j)$  in descending order
12. Generate ranked list  $RL_j \leftarrow \{R_1, R_2, \dots, R_n\}$

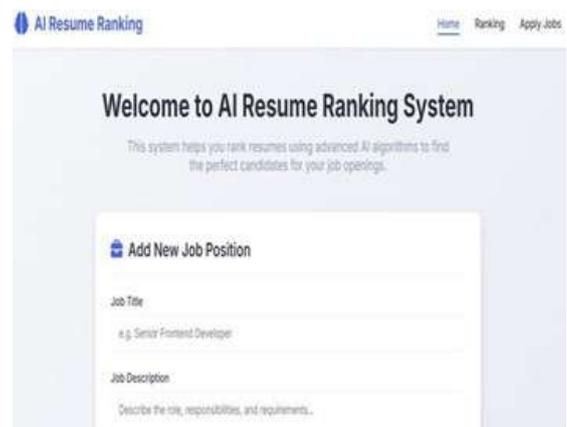
#### 7. Output Phase

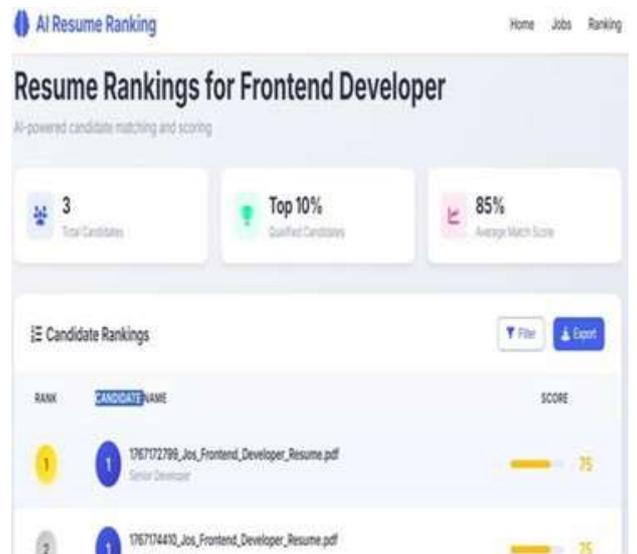
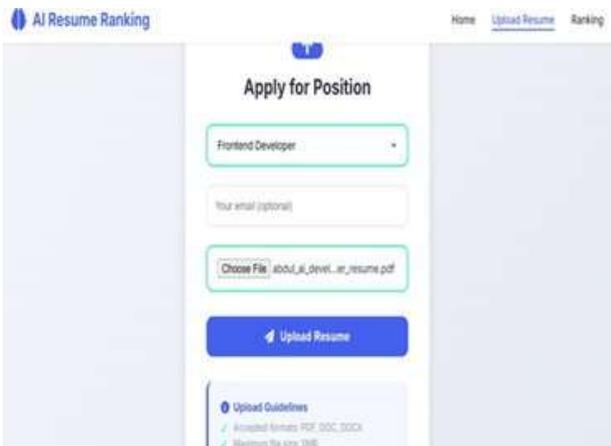
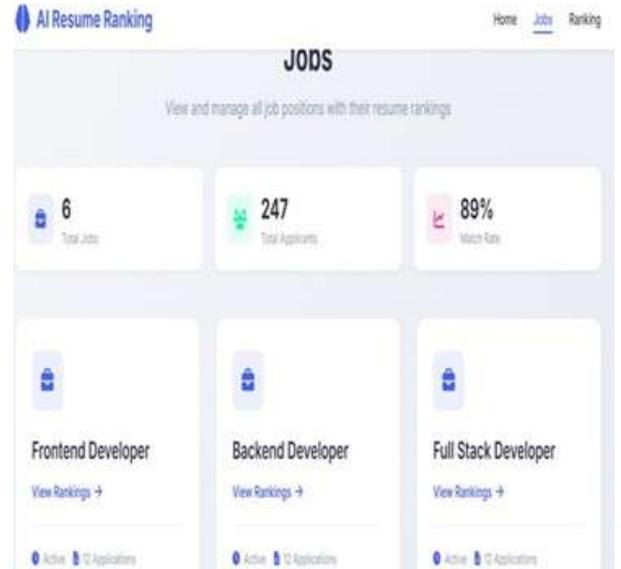
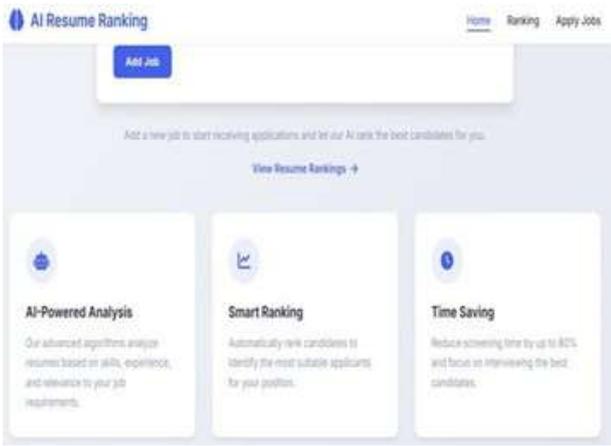
13. Display ranked resumes with relevance score
14. Highlight top-K resumes for HR decision-making

### VI. IMPLEMENTATION RESULT

The system is implemented using Python for backend processing and integrates the Gemini API for intelligent text analysis. NLP techniques are used for text preprocessing and information extraction. The scoring logic assigns weightage to skills, keywords, and experience to ensure accurate resume evaluation.

The final output is a ranked list of candidates along with their matching scores. This output enables HR professionals to make faster and more accurate recruitment decisions while significantly reducing manual screening effort.

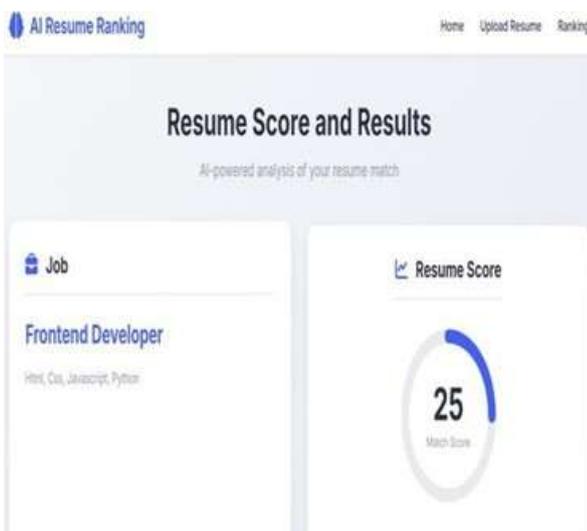




## VII. FUTURE WORK

The proposed AI-powered resume ranking system can be extended in several ways to further improve recruitment efficiency and accuracy. In the future, advanced machine learning techniques can be integrated to enhance resume-job matching by learning from past hiring data and recruiter feedback. This would allow the system to adapt to changing job requirements and recruitment trends.

The system can also be enhanced to support multiple languages, enabling organizations to analyze resumes from diverse geographical regions. Additionally, improving support for various resume formats and layouts will increase the robustness of the system.



Furthermore, the system can be expanded to include additional stages of the hiring process such as online assessments, interview performance analysis, and behavioral evaluation, thereby creating a comprehensive end-to-end smart talent acquisition platform.

## CONCLUSION

This project presented an AI-powered resume ranking system designed to enhance HR efficiency and support smart talent acquisition. The proposed system automates the resume screening process by analyzing candidate resumes based on skills, keywords, and experience, thereby reducing the dependency on manual evaluation.

By integrating the Gemini API, the system achieves intelligent and context-aware resume-job matching. The ranking mechanism enables HR professionals to quickly identify the most suitable candidates, significantly reducing screening time while improving accuracy and consistency in recruitment decisions.

The proposed approach minimizes human bias and supports data-driven hiring practices. Its scalable and modular design makes it suitable for handling large volumes of resumes across different job roles. Overall, the system provides an effective and practical solution for modern recruitment challenges and demonstrates the potential of AI in transforming traditional HR processes.

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