AI-Driven Talent Acquisition Engine And Career Fit Assessment Platform

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ABSTRACT

In the competitive landscape of recruitment, efficiently evaluating candidates is a significant challenge. Our AI-driven Applicant Tracking System (ATS) automates resume evaluation by leveraging natural language processing (NLP) and machine learning. The system utilizes the Sentence Transformer model for semantic embeddings and FAISS for fast, accurate searches, assessing resume-job description compatibility. Google Gemini AI generates detailed analysis and feedback, optimizing resumes for candidates. For recruiters, the system ranks resumes based on job fit. Featuring a user-friendly Streamlit interface, it provides distinct sections for both employees and recruiters, enhancing efficiency and delivering precise job matching and candidate selection.

1. INTRODUCTION

The recruitment process has evolved with AI and machine learning, leading to the development of advanced Applicant Tracking Systems (ATS). Traditional ATS solutions rely on keyword matching, which often fails to capture the true relevance between candidates and job descriptions. This paper presents an AI-driven ATS integrating **FAISS, Sentence Transformers, and Google's Gemini AI** to enhance resume screening. The system processes resumes using Natural Language Processing (NLP), generates embeddings, and applies **cosine similarity** for job fit analysis. Additionally, it extracts LinkedIn profile data for comprehensive candidate assessment and uses generative AI to create interview preparation questions.

Our approach improves recruitment efficiency by offering:

- **Intelligent Resume Screening:** FAISS-based embeddings for similarity search.
- **AI-Powered Job Fit Analysis:** Deep NLP-driven candidate-job alignment.
- **Automated Interview Question Generation:** AI-assisted preparation.
- **LinkedIn Profile Insights:** Enriching candidate evaluation.

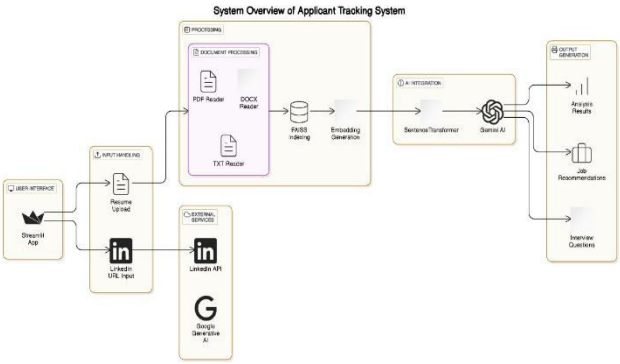
By leveraging these technologies, the proposed system enhances hiring accuracy and efficiency, ensuring better job-candidate matches and a streamlined recruitment process.

2. LITRATURE REVIEW

Several studies have explored AI-powered approaches to enhance recruitment, particularly in resume screening and candidate selection. Lalitha and Kadiyam (2024) employed Natural Language Processing (NLP) and Cosine Similarity to match resumes with job descriptions, demonstrating advantages over traditional CNN and KNN algorithms. Wailthare and Tamhane (2023) developed a web-based resume ranking system that automated filtering with 86% accuracy, suggesting the inclusion of additional factors such as context and diversity

for better results. Venkata (2022) investigated machine learning models like KNN, SVM, Logistic Regression, and Multi-Layer Perceptron (MLP) for resume classification, finding MLP to be the most effective. A web-based interface was also created for automated parsing and classification.In addition to AI and machine learning, cloud computing has been explored for optimizing recruitment workflows. McGrath and Short (2021) integrated AWS Lambda, Google Cloud Functions, and IBM Bluemix's OpenWhisk for automated resume processing, showcasing how cloud-based solutions dynamically allocate resources to handle large-scale recruitment applications. These studies collectively highlight the growing role of AI, NLP, machine learning, and cloud computing in modernizing recruitment, improving efficiency, and ensuring accurate candidate-job matching.

3. SYSTEM ARCHITECTURE



3.1 Frontend (User Interface)

The user interface, built with Streamlit, provides a simple and intuitive experience for both recruiters and job seekers. Users can upload resumes in various formats (PDF, DOCX, TXT), input job descriptions, and provide LinkedIn URLs. The system processes these inputs and presents results in an organized, accessible manner.

3.2 Resume Processing & Text Embedding

Resumes are parsed using PyPDF2 and python-docx, extracting textual data for AI analysis. The extracted text is segmented into chunks and transformed into embeddings using the Sentence-Transformer model, capturing semantic meaning for comparison.

3.3 Similarity Matching

FAISS is used to store and search resume embeddings. The job description is also converted into an embedding, and cosine similarity is calculated between job and resume embeddings to determine a match percentage.

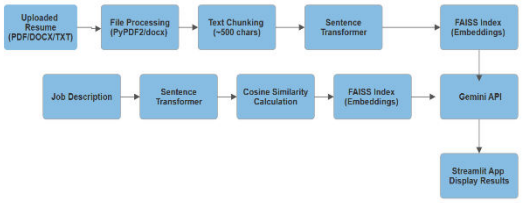
3.4 AI Analysis and Report Generation

Gemini AI generates detailed reports, including ATS score, keyword analysis, skills gap identification, grammar checks, and resume optimization suggestions. It also provides custom interview questions for preparation.

3.5 LinkedIn Integration

This module enhances job search by extracting job descriptions to generate LinkedIn job search URLs. Future enhancements will include fetching additional profile data for better candidate profiling.

4. IMPLEMENTATION



The dataset for the Applicant Tracking System (ATS) includes diverse resumes (PDF, DOCX, TXT) and job descriptions sourced from online portals, ensuring broad industry coverage. Preprocessing involved text extraction followed by tokenization, lemmatization, and stopword removal with NLTK to enhance data quality. These steps optimize the system's ability to accurately match resumes with job descriptions.

3.1 Similarity Matching And Ranking

FAISS Indexing: To compare the resume data with job descriptions, the embeddings generated for each resume chunk were indexed using

FAISS (Facebook AI Similarity Search). FAISS allows for fast and efficient similarity searches by indexing high-dimensional vectors.

Cosine Similarity Calculation: Once the resume embeddings and job description embeddings were indexed in FAISS, cosine similarity was used to calculate the degree of similarity between a resume chunk and a job description. A higher cosine similarity score indicates a better match.

Ranking: Based on the similarity scores, resumes were ranked against job descriptions. This allowed recruiters to quickly evaluate how well a candidate's resume aligned with the job requirements.

3.2 AI-Driven Report Generation

The prompt engineered for Gemini is designed to elicit specific information and analysis based on the provided resume and job description. The prompt structure varies slightly depending on whether the employee chooses ("See Results" path) or a ("Make a Match" path).

See Results path: The prompt instructs Gemini to act as an experienced Technical Human Resource Manager and perform a detailed analysis. The output is a structured report covering the following areas:

Make a Match path: This version of the prompt focuses on providing feedback to the job seeker to improve their resume by scoring from 1-100.

3.3 Recruiter Report Generation:

For recruiters, the system analyzes multiple resumes against a single job description. The output is a ranked list of candidates based on their "fit" with the job. The "fit" is determined by the cosine similarity scores, which are categorized into "Best Fit," "Moderate Fit," and "Not Fit." The report is presented as a table with the resume name and its fit category. This ranking helps recruiters quickly identify the most promising candidates.

5. RESULTS

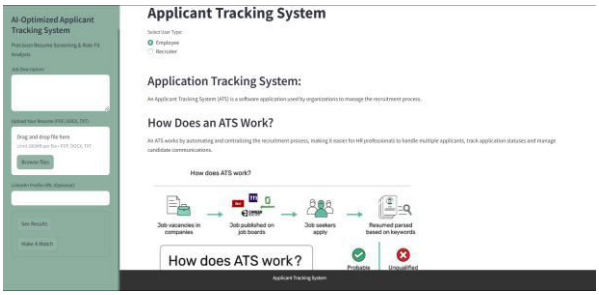


Fig 5.1 Interface

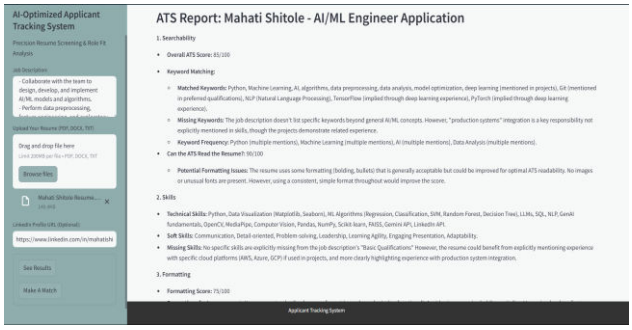


Fig 5.2 ATS Report

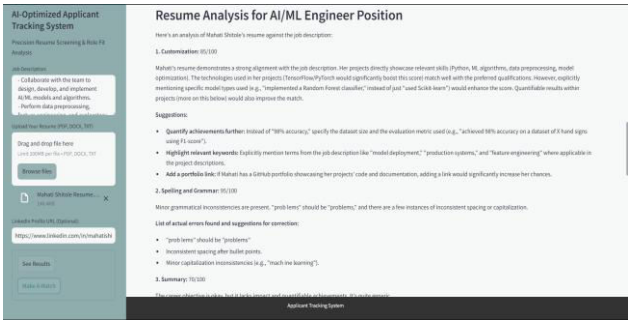


Fig 5.3 Resume Analysis

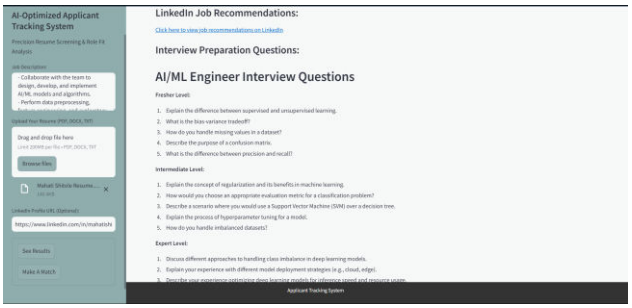


Fig 5.4 LinkedIn Job Recommendation and Interview Questions

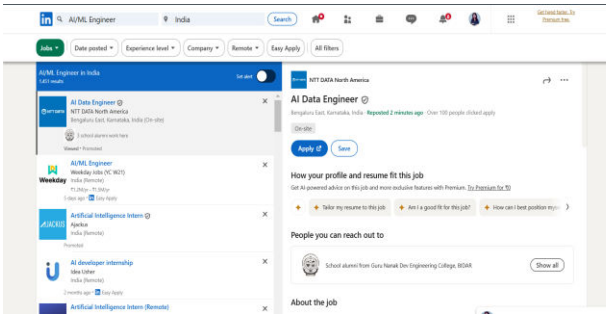


Fig 5.5 LinkedIn Job Recommendations

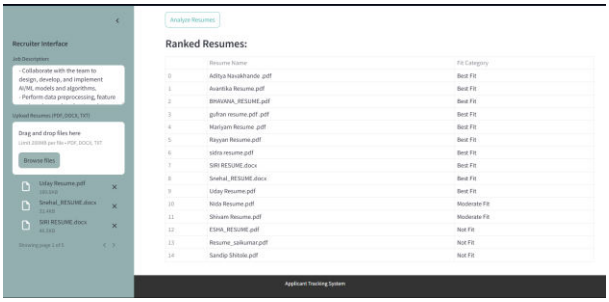


Fig 5.6 Ranking Resumes

6. CONCLUSION

The Applicant Tracking System (ATS) developed in this project automates recruitment by integrating AI-powered resume screening, job matching, and candidate evaluation. Utilizing NLP, FAISS-based similarity matching, and Google Gemini AI, the system enhances hiring efficiency with automated resume analysis, job relevance scoring, and AI-driven insights. The ATS streamlines recruiter workflows, supports multi-resume analysis, and optimizes candidate visibility. While future enhancements will further refine accuracy and benchmarking against human evaluations, the current system represents a significant step toward modernizing talent acquisition.

7. REFERENCES

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