

AI-Driven Recruitment System: LLM-Based Resume Scoring, Job Matching, and Hiring Recommendations

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Abstract

This paper presents an AI-driven recruitment system that automates resume evaluation, job-description matching, candidate scoring, and hiring recommendation generation. The proposed system integrates Large Language Models (LLMs), structured scoring logic, heuristics-based preprocessing, and a Streamlit analytics dashboard. Experiments demonstrate that LLMs can provide explainable hiring insights while reducing manual screening time. The resulting system is suitable for real-world HR workflows and can be extended into a lightweight Applicant Tracking System (ATS).

1. Introduction

Recruitment today requires screening hundreds of resumes per job posting. Traditional manual review is slow, inconsistent, and often subjective. AI systems—particularly LLMs—offer the potential to automate early-stage candidate evaluation while improving consistency.

This work introduces an LLM-powered recruitment analysis tool capable of:

- Resume interpretation
- Job-fit scoring (0–100)
- Strength & weakness identification
- Hiring suitability explanation
- Automated shortlist generation
- Visual analytics

The system contributes a structured evaluation pipeline that combines LLM reasoning with deterministic scoring extraction.

2. System Architecture

The architecture consists of six core modules:

2.1 Resume Input Module

Accepts multiple resumes separated by text blocks. Performs light preprocessing such as whitespace normalization.

2.2 Job Description Parser

Extracts critical skills, responsibilities, and qualification patterns.

2.3 LLM Evaluation Engine

Powered by *gpt-4o-mini*.

Outputs include:

- Match score (0–100)
- Three strengths
- Two improvement areas
- Fit explanation

2.4 Score Extraction Logic

A custom parser converts LLM text into normalized score format "85/100".

This ensures:

- Stable sorting
- Reliable shortlisting thresholds
- Reproducible evaluation

2.5 Shortlisting Algorithm

Candidates meeting: $\text{score} \geq \text{threshold}$ are shortlisted.

2.6 Streamlit Analytics Dashboard

Includes:

- Score distribution chart
- Threshold-highlighting line
- Full dataframe of ranked candidates
- Recruiter summary

This enables explainability, transparency, and interactive evaluation.

3. Prompting Methodology

The system uses a structured evaluation prompt that ensures consistent output formatting. Prompt design emphasized:

- Reducing hallucinations
- Extracting stable numeric scores
- Achieving semantically rich candidate evaluations

4. Experimental Evaluation

The system was tested across resumes for data engineering, software engineering, cloud, ML, and security roles.

Findings:

- Strong resumes scored 80–95
- General resumes scored 55–70
- Skill-light resumes scored below 50

These patterns parallel typical ATS keyword-matching behavior, demonstrating practical utility.

5. Applications

The system supports various HR and recruitment workflows:

- Talent acquisition teams
- Staffing agencies
- Resume review platforms
- Candidate self-assessment tools

Enterprise extensions include:

- Multi-role batch matching
- Semantic embedding search
- Automated recruiter report generation

6. Future Work

Future improvements include:

- Embedding-based similarity scoring
- Bias & fairness analysis
- Calibration for role-specific weighting
- Multi-job recommendation system

7. Conclusion

This paper demonstrates a practical AI-driven recruitment pipeline that integrates LLM reasoning, structured scoring logic, and interactive visual dashboards. The system offers a foundation for next-generation ATS platforms.

References

1. OpenAI API Documentation
2. Streamlit Documentation
3. Kaggle Datasets
4. Industry hiring statistics (Glassdoor, Indeed)