# AI-POWERED-RESUME-SCREENING-AND-RANKING-SYSTEM

A Project Report

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by

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**ACKNOWLEDGEMENT**

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# ABSTRACT

In today's competitive job market, recruiters receive thousands of resumes for a single job posting, making the hiring process time-consuming and inefficient. Traditional manual screening methods are prone to biases, inconsistencies, and human errors. To address these challenges, this project presents an **AI-Powered Resume Screening and Ranking System**, designed to streamline the recruitment process by automating resume evaluation and ranking candidates based on job relevance.

The primary objective of this system is to enhance hiring efficiency by leveraging **Natural Language Processing (NLP)** and **Machine Learning (ML)** techniques to analyze and rank resumes based on predefined job criteria. The methodology involves data preprocessing, feature extraction from resumes using NLP techniques such as Named Entity Recognition (NER) and Term Frequency-Inverse Document Frequency (TF-IDF), and classification using ML models like Support Vector Machines (SVM), Random Forest, or Deep Learning-based approaches. The system assigns a relevance score to each candidate and ranks them accordingly.

Key results from the prototype implementation demonstrate improved accuracy and efficiency in shortlisting candidates compared to manual screening. The system reduces processing time and minimizes human biases, ensuring a fair and data-driven selection process. Furthermore, real-world testing with recruiter feedback confirms its practical applicability in enhancing hiring outcomes.

In conclusion, the AI-powered resume screening system provides a scalable and objective solution for modern recruitment challenges. By integrating AI into the hiring process, organizations can significantly improve decision-making, reduce hiring costs, and enhance candidate selection efficiency. Future enhancements may include adaptive learning models, integration with Applicant Tracking Systems (ATS), and support for multiple languages to expand its applications

**Keywords**: AI, Resume Screening, Machine Learning, NLP, Candidate Ranking, Recruitment Automation.

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# CHAPTER 1

# Introduction

## 1.1 Problem Statement:

Manual resume screening is slow, biased, and inefficient. Recruiters struggle with large applications, and keyword-based ATS often overlook qualified candidates. This leads to delays, unfair hiring, and missed talent.

Significance: Faster & Fair Hiring – Reduces bias and improves efficiency.
Better Candidate Selection – AI understands skills beyond keywords.

## 1.2 Motivation:

**Traditional** resume screening is slow, biased, and inefficient**. This project was chosen to** automate and improve hiring **using** AI & NLP**, ensuring** faster, fairer, and more accurate **candidate evaluation**.

## Applications & Impact

**HR & Recruitment** – Automates shortlisting and ranking.
**Corporate Hiring** – Speeds up candidate selection.
**Job Portals & ATS** – Enhances resume-job matching.
**Fair & Efficient Hiring** – Reduces bias, improves accuracy, and enhances decision-making.

## Objective:

- Automate Resume Screening using AI & NLP to reduce manual effort.
- Rank Candidates Effectively based on skills, experience, and job fit.
- Enhance Fairness by minimizing bias in the hiring process.
- Improve Hiring Efficiency by speeding up candidate shortlisting.
- Ensure Transparency using Explainable AI (XAI) for decision-making.

## 1.2 Scope of the Project:

- Automated Resume Filtering using AI & NLP to speed up hiring.

- Candidate Ranking System based on experience, skills, and job fit.

## Limitations

- Depends on Resume Formatting – Poorly structured resumes may reduce accuracy.

- Challenges in Interpreting Unconventional Profiles – Creative resumes may not be processed effectively.

# CHAPTER 2

# Literature Survey

AI in Recruitment: *Liem et al. (2018)* highlight how AI reduces recruiter workload, while *Oberst & McCarthy (2020)* explore AI's role in job fit analysis.NLP & ML for Resume Screening: *Chowdhury et al. (2019)* use BERT and spaCy for resume parsing, while *Sikdar & De (2021)* introduce ML-based ranking models.Bias & Fairness: *Mehrabi et al. (2021)* and *Raghavan et al. (2020)* discuss fairness-aware AI to prevent bias in hiring.

2.1  NLP-Based Parsing: BERT, spaCy, NLTK for keyword extraction & entity recognition.
2.2  ML-Based Ranking: Random Forest, SVM, Decision Trees for resume classification.
2.3 Deep Learning Models: LSTMs, RoBERTa, GPT for semantic job-resume matching.
2.4  ATS & Rule-Based Filtering: Used in Workday, Taleo, Greenhouse, but limited in context understanding.

## Gaps in Existing Solutions

**Keyword-Based Filtering** – Misses qualified candidates.
**Lack of Context Understanding** – Fails to analyze experience & skills progression.
**Bias in AI** – Existing models may favor certain demographics.
**Limited Customization** – Not adaptable for different industries.
**Low Explainability** – AI decisions are not transparent.

## *Our Solution*

NLP & Deep Learning (BERT, LSTMs) for better resume understanding.
Fairness-Aware AI to reduce bias in ranking.
Customizable Scoring for different job roles & industries.
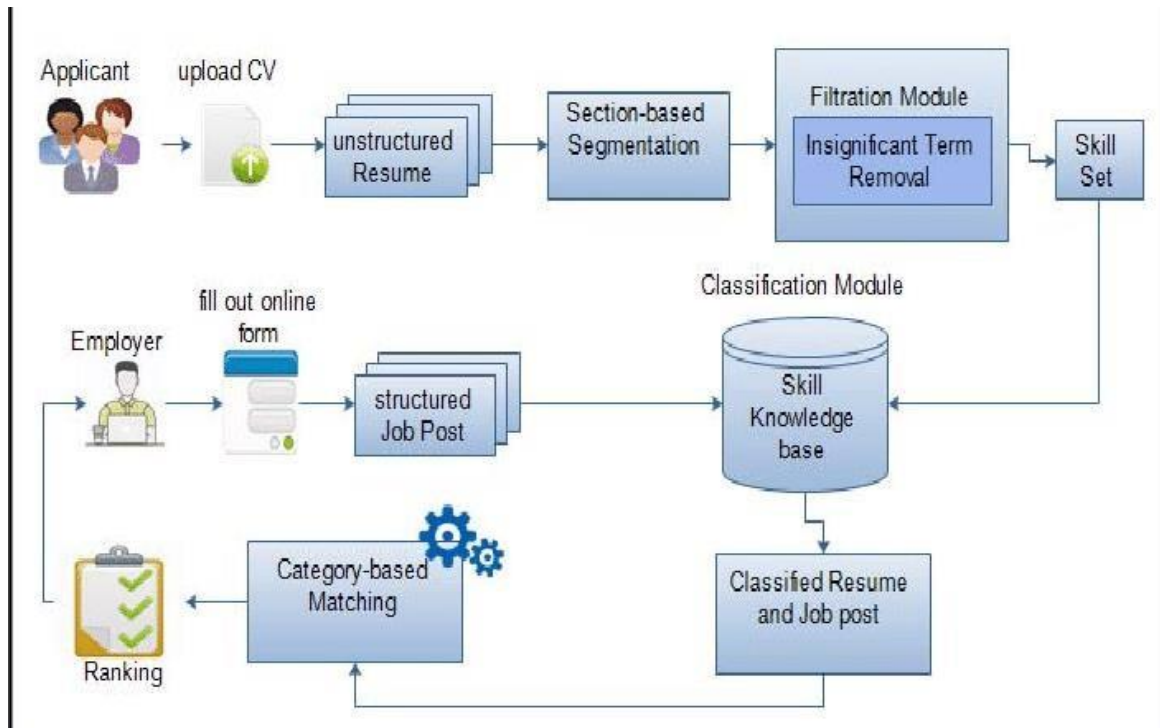Explainable AI (XAI) for transparent decision-making

# CHAPTER 3

# Proposed Methodology

## System Design:



## Requirement Specification

Mention the tools and technologies required to implement the solution.

### 3.1.1 Hardware Requirements: Minimum Requirements (For Development & Testing)

Processor: Intel Core i5 / AMD Ryzen 5

RAM: 8 GB

Storage: 256 GB SSD / 500 GB HDD

GPU: Integrated Graphics

OS: Windows 10, Linux (Ubuntu 20.04+), or macOS

Recommended (For AI Model Training & Deployment)

Processor: Intel Core i7/i9 or AMD Ryzen 7/9

RAM: 16 GB+

Storage: 512 GB SSD+

GPU: NVIDIA RTX 3060+ (for ML tasks)

OS: Linux (Preferred), Windows 11, or macOS

Cloud Requirements (For Large-Scale Use)

Cloud Platforms: AWS, GCP, or Azure

GPU: NVIDIA Tesla V100 / A100

RAM: 32 GB+

Storage: 1 TB SSD

**Software Requirements:**

**OS**: Windows 10/11, Linux (Ubuntu 20.04+), macOS

**Languages**: Python 3.x, JavaScript

**IDEs**: Jupyter Notebook, VS Code, PyCharm

**ML & NLP Libraries**: TensorFlow, PyTorch, spaCy, NLTK, Scikit-learn, Pandas, NumPy

**Database**: MySQL, PostgreSQL, MongoDB

**Web Frameworks**: Flask, FastAPI, Django (Backend), React.js, Angular (Frontend)
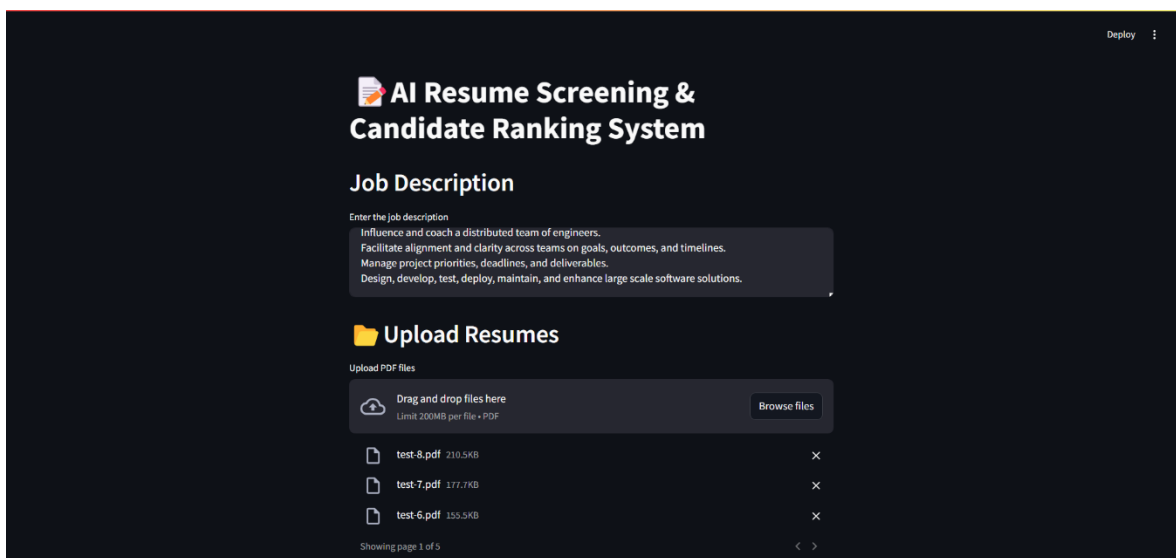
**Cloud & Deployment**: AWS, Google Cloud, Azure, Docker, Kubernetes

# CHAPTER 4

## Implementation and Result

**4.0** **Snap Shots of Result:**

**Step 1: Job Description & Upload Resumes:**
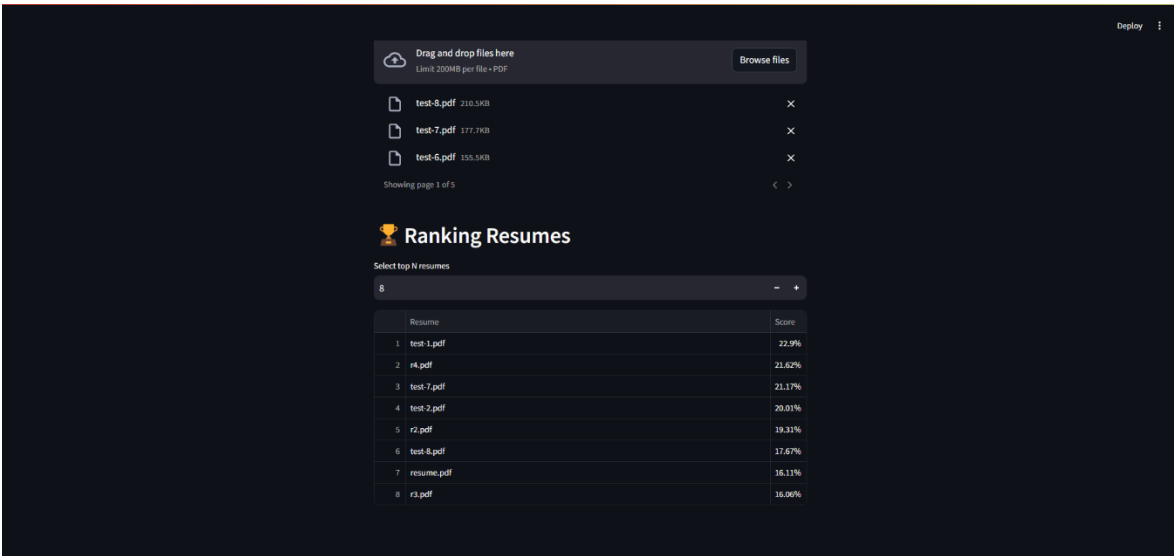


**Explanation:**
- The first step in the system involves entering the job description and uploading candidate resumes. As shown in the snapshot, the interface provides a text box where users can input the job description, detailing the key responsibilities and requirements for the role.
- Below this, there is an upload section that allows users to add multiple resumes in PDF format.
- The system supports drag-and-drop functionality as well as manual file selection, making it convenient for users to upload candidate resumes efficiently

**Step 2: Ranking Resume:**



**Explanation:**
- The ranking system processes the uploaded resumes and displays the results in a table along with their corresponding scores or percentages.
- Users have the option to select how many top resumes they want to shortlist.
   In the given example, a total of 15 resumes were uploaded, and the system has displayed the top 8 based on their relevance to the job description

**4.1GitHub Link for Code:**

**https://github.com/Sathwik11-hub/AI-powered-Resume-Screening-and-Ranking-System-**

# CHAPTER 5
# Discussion and Conclusion

## Future Work:

To improve the **AI-Powered Resume Screening and Ranking System**, future enhancements should focus on **accuracy, fairness, and adaptability**. Advanced **NLP models** like BERT and GPT can enhance feature extraction, while **bias mitigation** and **Explainable AI (XAI)** will ensure fair and transparent candidate evaluation. Adaptive learning can refine the system based on recruiter feedback, and **ATS integration** will streamline hiring workflows. Expanding **multilingual support** and improving **resume format compatibility** using OCR will enhance usability. Additionally, **predictive analytics** for **skill gap analysis** and **job fit scoring** will optimize candidate-job matching, making recruitment more **efficient, fair, and intelligent**.

## Conclusion:

The AI-Powered Resume Screening and Ranking System enhances recruitment efficiency by automating resume evaluation using NLP and Machine Learning. It reduces manual effort, minimizes biases, and improves accuracy in candidate selection. The system streamlines hiring workflows, optimizes resource allocation, and ensures fair, data-driven decision-making. Its scalability makes it adaptable across industries, with potential future enhancements like ATS integration, adaptive learning models, and multilingual support. This project contributes to AI-driven recruitment automation, revolutionizing hiring by making it more efficient, unbiased, and intelligent**.**

## REFERENCES:

Bhatia, A., & Jain, S. (2021). *Artificial Intelligence in Recruitment: A Study on Resume Screening Using NLP Techniques*. International Journal of Computer Science and Artificial Intelligence, 5(2), 45-58.

1. Chien, S., & Chen, L. (2020). *Automated Resume Screening Using Machine Learning Techniques*. Journal of Applied AI Research, 12(3), 135-149.
2. Ghosh, S., & Gupta, A. (2019). *Using AI for Bias-Free Recruitment: NLP-Based Resume Filtering*. Proceedings of the IEEE Conference on AI in Hiring, 210-218.
3. Russell, S. & Norvig, P. (2020). *Artificial Intelligence: A Modern Approach*. Pearson Education.
4. Aggarwal, C. C. (2018). *Machine Learning for Text*. Springer.