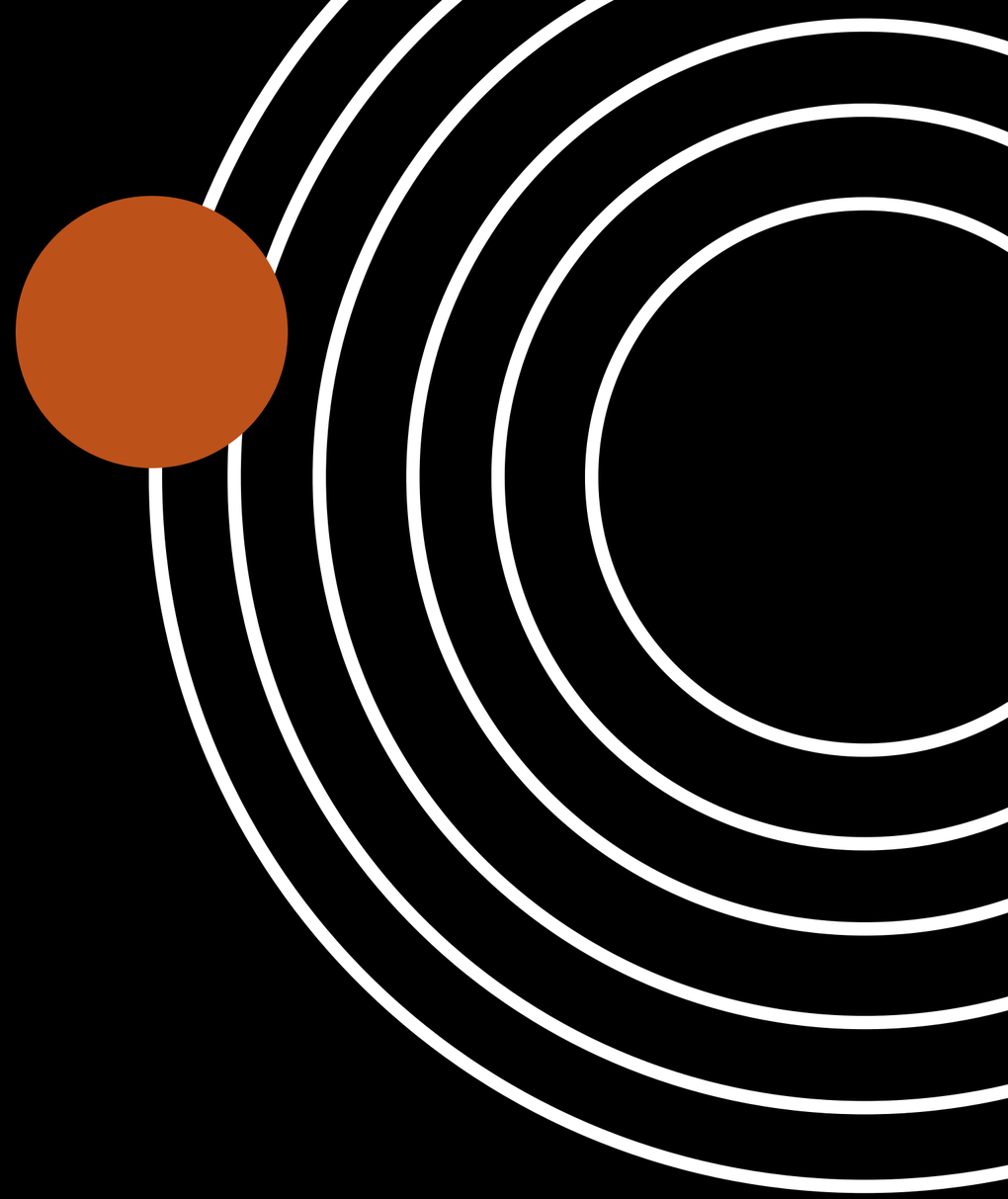
AI-Powered Resume Screening and Ranking System

Name: J Rithick Joel
e-mail : jrithickjoel@gmail.com

Agenda

Abstract
Problem Statement & Objectives
Literature Review
Hardware & Software Requirements
Implementation Steps
output Screenshots
Conclusion
Future Work
Refrences



Abstract

The AI Resume Screening & Candidate Ranking System addresses the inefficiencies in traditional recruitment methods. By leveraging NLP techniques like TF-IDF and cosine similarity, the system automates resume evaluation, ranking candidates based on their relevance to job descriptions. This project reduces manual effort, minimizes bias, and enhances recruiter productivity.

Key highlights include:

- Improved accuracy in candidate matching
- Faster screening process with reduced human intervention
- Fairer evaluation through AI-driven ranking model

Problem Statement

In the modern recruitment process, organizations receive an overwhelming number of resumes for each job opening. Screening these resumes to identify the most suitable candidates is a time-consuming and labor-intensive task. Automating this process using machine learning and natural language processing (NLP) techniques can significantly improve the efficiency and effectiveness of recruitment.

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Objectives

The primary objectives of this project are:

- **Automate Resume Screening:** Develop an AI-powered system that can analyze and evaluate resumes against a given job description.
- **Improve Efficiency:** Reduce the time and effort required for manual resume screening by leveraging NLP and machine learning techniques.
- **Enhance Accuracy:** Ensure that the system accurately ranks candidates based on job relevance using TF-IDF vectorization and cosine similarity.
- **Eliminate Bias:** Provide an objective and standardized evaluation process to minimize human biases in recruitment.
- **Provide a User-Friendly Interface:** Implement an intuitive UI that allows recruiters to upload resumes and receive ranked results efficiently.
- **Support Future Enhancements:** Build a system that can be extended with deep learning models, named entity recognition (NER), and integration with existing HR tools.

Literature Review

Several studies have explored AI-driven resume screening techniques. Key insights include:

- TF-IDF Vectorization for keyword-based ranking.
- Cosine Similarity for calculating content relevance.
- Named Entity Recognition (NER) for extracting key candidate information.
- Deep Learning models like BERT for improved contextual understanding.

Despite these advancements, gaps like limited semantic analysis, scalability issues, and algorithmic bias still exist. This project aims to address these challenges.

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Hardware and Software Requirements

Hardware Requirements:

- Processor: Intel i5 or higher
- RAM: 8GB or more
- Storage: Minimum 50GB free space

Software Requirements:

- Python (Libraries: NLTK, SpaCy, scikit-learn)
- Flask/Django for web framework
- React.js/Angular for frontend
- MongoDB/MySQL for database
- Cloud Platforms like AWS/Azure for scalability
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Implementation Steps

1. Data Collection & Preprocessing:
    - Collected resumes and job descriptions.
    - Performed text cleaning, tokenization, and normalization.
2. Feature Engineering:
    - Extracted resume components like education, skills, and certifications.
    - Applied TF-IDF and Word2Vec for text representation.
3. Model Training & Optimization:
    - Trained ML models like Random Forest, SVM, and BERT.
    - Fine-tuned hyperparameters for improved accuracy.
4. Integration & Development:
    - Developed API endpoints for resume submission and ranking.
    - Designed a recruiter-friendly dashboard.
5. Testing & Deployment:
    - Conducted unit testing, integration testing, and performance testing.
    - Deployed the system on AWS for scalability.
6. Security & Ethics:
    - Implemented encryption and role-based authentication for data privacy.
    - Ensured fair evaluation by mitigating algorithmic bia
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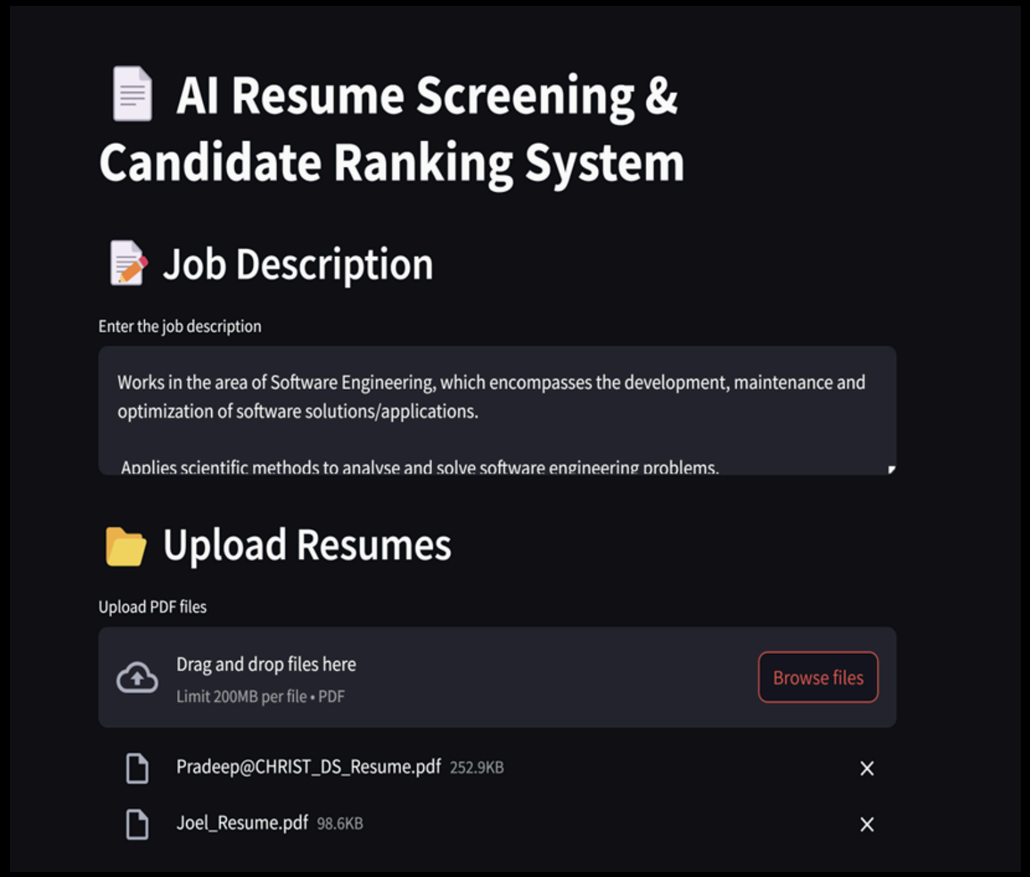
Output Screenshot



The provided interface for an AI Resume Screening & Candidate Ranking System is designed for user-friendliness and efficiency. Recruiters can easily input job descriptions into a designated text area and upload multiple resume files in PDF format through a drag-and-drop feature or a file browser. The system displays a clear list of uploaded files, including their names and sizes, with the option to remove any. This clean and intuitive interface streamlines the initial stages of resume screening by simplifying the process of providing the necessary job details and resume data to the system, setting the stage for the automated processing and ranking of candidates.

Output Screenshot

The provided image displays the "Ranking Resumes" section of the application, presenting the results of the resume screening process in a table format. This table clearly shows the uploaded resume filenames and their corresponding similarity scores, which quantify how well each resume matches the provided job description. The resumes are ranked in descending order of these scores, enabling recruiters to quickly identify the most relevant candidates based on the system's analysis.

Conclusion

1. This project successfully demonstrates the potential of AI in revolutionizing resume screening and candidate ranking. The solution:
2. Achieves improved accuracy by leveraging NLP and ML techniques.
3. Enhances fairness by reducing biased decision-making.
4. Accelerates recruitment by minimizing manual efforts.
5. The project aligns with modern HRTech innovations, offering recruiters an effective tool for efficient talent acquisition.

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Future Work

1. Integration of advanced NLP models like GPT for better contextual understanding.
2. Development of interactive dashboards for improved insights.
3. Expansion with multi-language support for global recruitment.
4. Strengthening security measures for robust data protection.
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Thank You