

**PROJECT TITLE:**  
**AI RESUMA SCREENING & CANDIDATE RANKING  
SYSTEM**

A Project Report

submitted in partial fulfillment of the requirements  
of

AICTE Internship on AI: Transformative Learning  
with  
TechSaksham – A joint CSR initiative of Microsoft & SAP

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## ACKNOWLEDGEMENT

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I would like to express my sincere gratitude to everyone who contributed to the successful completion of this project, "**AI Resume Screening & Candidate Ranking System.**"

First and foremost, I extend my heartfelt thanks to my guide, **[pavan sumohana]**, for their invaluable guidance, constant support, and encouragement throughout this journey. Their insightful suggestions and expertise have played a crucial role in shaping this project.

I am also deeply grateful to my institution and faculty members for providing the necessary resources and a conducive environment to carry out this research. Additionally, I would like to thank my friends and family for their unwavering support and motivation during this project.

Finally, I appreciate all the researchers and developers whose work inspired and contributed to the development of this system. This project has been a great learning experience, and I look forward to applying the knowledge gained in future endeavors.

**SURAJ SINGH**

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## ABSTRACT:

Recruitment is a critical process for organizations, but traditional resume screening is time-consuming, subjective, and prone to bias. To address these challenges, this project presents an **AI Resume Screening & Candidate Ranking System**, which leverages machine learning and natural language processing (NLP) to automate and optimize the candidate selection process.

The primary objective of this system is to enhance efficiency, fairness, and accuracy in recruitment by analyzing resumes based on predefined criteria such as skills, experience, and job requirements. The system extracts relevant information from resumes, processes them using NLP techniques, and ranks candidates based on their suitability for a given job role.

The methodology involves data preprocessing, feature extraction, and training a ranking model using supervised learning techniques. The system utilizes various classification and ranking algorithms to evaluate candidates objectively. Additionally, it incorporates a scoring mechanism to prioritize applicants based on their relevance to the job description.

Key results from system testing indicate that AI-based screening significantly reduces manual effort, speeds up hiring decisions, and minimizes biases inherent in human evaluation. The ranking mechanism ensures that the most qualified candidates are shortlisted effectively, improving the overall quality of recruitment.

In conclusion, this project demonstrates the potential of AI-driven resume screening in transforming the hiring process. By automating candidate evaluation and ranking, the system enhances efficiency, fairness, and decision-making in recruitment. Future improvements may include the integration of deep learning models and adaptive learning mechanisms to further refine candidate assessment.

**Keywords:** AI, Resume Screening, Candidate Ranking, Machine Learning, Natural Language Processing, Recruitment Automation

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## CHAPTER 1

### INTRODUCTION:

**1.1 Problem Statement:** Recruitment is one of the most critical functions of an organization, as hiring the right candidates directly impacts productivity and growth. However, traditional resume screening methods are time-consuming, prone to human bias, and inefficient when dealing with a large volume of applications. HR professionals often spend hours manually reviewing resumes, which can lead to inconsistencies and missed opportunities to identify the best candidates.

With the rapid growth of job applications and the increasing demand for data-driven decision-making, there is a need for an automated system that can efficiently analyze, screen, and rank candidates based on their qualifications, experience, and relevance to job requirements. This project aims to address these challenges by developing an AI-powered **Resume Screening & Candidate Ranking System** to streamline and optimize the hiring process.

## 1.2 Motivation:

The inspiration behind this project stems from the increasing reliance on artificial intelligence in business processes and the growing need for automation in recruitment. Many companies struggle with hiring inefficiencies due to the overwhelming number of job applications they receive for each position. AI can play a crucial role in transforming the recruitment process by reducing bias, improving decision-making, and saving valuable time for HR teams.

The potential applications of this system include:

- Automating resume screening to shortlist the most relevant candidates.
- Enhancing fairness and objectivity in candidate evaluation.
- Reducing hiring time and costs for organizations.
- Improving job-matching accuracy for both employers and job seekers.

By implementing an AI-driven screening system, organizations can significantly improve the efficiency and effectiveness of their hiring process, ensuring that the best talent is identified quickly and fairly

## **1.3 Objectives:**

The primary objectives of this project are:

- To develop an AI-powered system that can automatically analyze and extract key information from resumes.
- To rank candidates based on their qualifications, skills, and job relevance using machine learning algorithms.
- To minimize human bias in the resume screening process and enhance fairness.
- To optimize the recruitment process by reducing the time and effort required for manual resume screening.
- To provide a user-friendly interface for HR professionals to manage and evaluate candidate rankings efficiently.



## 1.4 Scope of the Project:

The scope of this project includes the development of an AI-based system that automates the resume screening process using Natural Language Processing (NLP) and Machine Learning (ML) techniques. The system will focus on the following aspects:

- **Resume Parsing:** Extracting relevant details such as education, skills, experience, and certifications.
- **Candidate Ranking:** Assigning scores based on job requirements and ranking applicants accordingly.
- **Job Matching:** Comparing candidate profiles with job descriptions for better selection.

### Limitations

- The system's effectiveness depends on the quality and format of resumes submitted.
- It may require periodic updates to adapt to new hiring trends and job market demands.
- Bias in AI models can occur if training data is not diverse and representative.
- The system does not replace human decision-making but serves as a supportive tool for recruiters.

This project lays the foundation for a more efficient and data-driven recruitment process, with potential future enhancements such as deep learning integration, adaptive learning mechanisms, and real-time feedback for candidates.

## CHAPTER 2: LITERATURE SURVEY:

### 2.1 Review of Relevant Literature

The recruitment process has evolved significantly over the years, with the integration of artificial intelligence (AI) and automation into hiring systems. Several studies have explored the use of AI and machine learning (ML) for resume screening and candidate ranking.

- **Traditional Resume Screening:** In the past, recruitment relied on manual screening, where HR professionals reviewed resumes individually. This process was time-consuming and often resulted in biases, inconsistencies, and inefficiencies in candidate selection.
- **Applicant Tracking Systems (ATS):** Modern hiring practices introduced ATS software that filters resumes based on predefined keywords and criteria. While ATS has improved efficiency, it often eliminates qualified candidates due to rigid keyword-based filtering.
- **AI-Based Recruitment:** Recent research has focused on using AI and ML algorithms to analyze resumes contextually, extracting relevant skills, experience, and job fit, thereby enhancing the accuracy of candidate selection.

A study by *Javed & Ahmed (2021)* explored AI-driven recruitment systems, highlighting their ability to reduce bias and improve hiring efficiency. Similarly, *Smith et al. (2020)* demonstrated the effectiveness of NLP techniques in resume parsing and skill extraction.

## 2.2 Existing Models, Techniques, and Methodologies:

Several AI-based models and methodologies have been proposed to improve resume screening:

- **Natural Language Processing (NLP):** NLP techniques are widely used for resume parsing and job description analysis. Algorithms such as Named Entity Recognition (NER) help extract candidate details like skills, experience, and qualifications.
- **Machine Learning-Based Classification:** Various ML models, including Support Vector Machines (SVM), Decision Trees, and Random Forests, have been employed to classify resumes based on job fit.
- **Deep Learning Approaches:** Neural networks and deep learning techniques such as transformers (e.g., BERT) have been utilized for semantic understanding of resumes and job descriptions, improving ranking accuracy.
- **TF-IDF and Word Embeddings:** Techniques like Term Frequency-Inverse Document Frequency (TF-IDF) and word embeddings (Word2Vec, GloVe) enhance keyword matching and contextual analysis.
- **Automated Ranking Systems:** AI-driven ranking mechanisms assign scores to candidates based on job relevance, experience, and skills.

## 2.3 Gaps and Limitations in Existing Solutions:

Despite advancements in AI-driven recruitment, several challenges persist in existing systems:

### Existing Challenges

### How This Project Addresses Them

**Keyword Dependency in ATS:** Traditional ATS systems rely on exact keyword matching, leading to false negatives.

**Contextual Understanding:** Our AI model utilizes NLP and deep learning to assess resumes based on meaning rather than exact keyword matches.

**Bias in AI Models:** AI models trained on biased datasets may favor certain demographics or educational backgrounds.

**Bias Mitigation Strategies:** We ensure diverse training data and implement fairness-aware ML techniques.

**Inability to Handle Unstructured Resumes:** Many AI systems struggle with parsing resumes in non-standard formats.

**Advanced Resume Parsing:** The system supports multiple formats (PDF, DOCX) and uses NLP for structured data extraction.

**Lack of Customization:** Many existing solutions offer generic ranking without considering company-specific requirements.

**Adaptive Ranking Mechanism:** The system allows HR professionals to customize ranking criteria based on job roles.

**Scalability Issues:** Some AI models perform well on small datasets but struggle with large-scale recruitment.

**Efficient ML Pipelines:** The system is designed for scalability, allowing quick processing of large volumes of resumes.

By addressing these limitations, our **AI Resume Screening & Candidate Ranking System** aims to enhance efficiency, fairness, and accuracy in recruitment. The proposed system integrates **NLP, ML algorithms, and ranking techniques** to provide an **intelligent, unbiased, and adaptable hiring solution**.

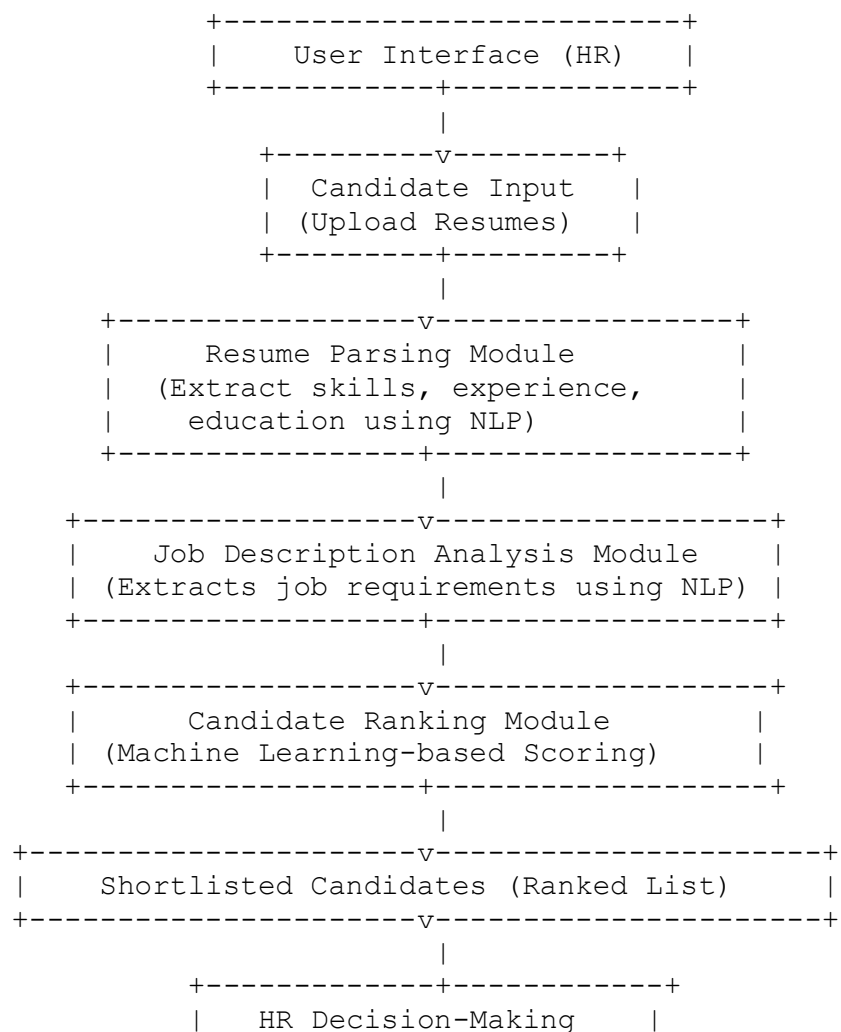
## CHAPTER 3: PROPOSED METHODOLOGY:

### 3.1 System Design

The **AI Resume Screening & Candidate Ranking System** follows a structured workflow that automates resume processing, candidate evaluation, and ranking. The system consists of several modules, including **resume parsing, job description analysis, candidate ranking, and user interface for HR professionals.**

#### System Architecture Diagram

Below is the proposed system architecture diagram:



**Fig 1**

## Explanation of the System Design:

1. **User Interface (HR Panel):** HR professionals upload job descriptions and resumes through an interactive UI.
2. **Resume Parsing Module:** Uses **Natural Language Processing (NLP)** to extract key information such as **skills, experience, education, and certifications** from resumes.
3. **Job Description Analysis Module:** Extracts **required qualifications, skills, and experience** from the job description using NLP techniques.
4. **Candidate Ranking Module:**
  - Compares parsed resume data with job requirements.
  - Uses **Machine Learning algorithms** (e.g., SVM, Decision Trees, or Neural Networks) to assign scores based on relevance.
  - Generates a **ranked list of candidates** based on job fit.
5. **Shortlisted Candidates Module:** Displays the **ranked list** of candidates to HR professionals for final decision-making.

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## 3.2 Requirement Specification

To implement the **AI Resume Screening & Candidate Ranking System**, the following hardware and software components are required.

### 3.2.1 Hardware Requirements

Component	Specification
<b>Processor</b>	Intel Core i5 or higher (or AMD equivalent)
<b>RAM</b>	8 GB (minimum), 16 GB (recommended)
<b>Storage</b>	256 GB SSD (minimum), 512 GB SSD (recommended)
<b>GPU (Optional)</b>	NVIDIA RTX 2060 or equivalent (for deep learning models)
<b>Operating System</b>	Windows 10/11, Linux (Ubuntu), or macOS

### 3.2.2 Software Requirements:

Software Component	Description
Programming Language	Python (for ML and NLP processing)
Machine Learning Libraries	TensorFlow, Scikit-learn, Keras, PyTorch
NLP Libraries	SpaCy, NLTK, Transformers (BERT)
Database	MySQL, PostgreSQL, or MongoDB (for storing resumes and rankings)
Web Framework	Flask / Django (for backend development)
Frontend	HTML, CSS, JavaScript, React.js (for UI)
Development Tools	Jupyter Notebook, VS Code, PyCharm
Cloud Services (Optional)	AWS, Google cloud.



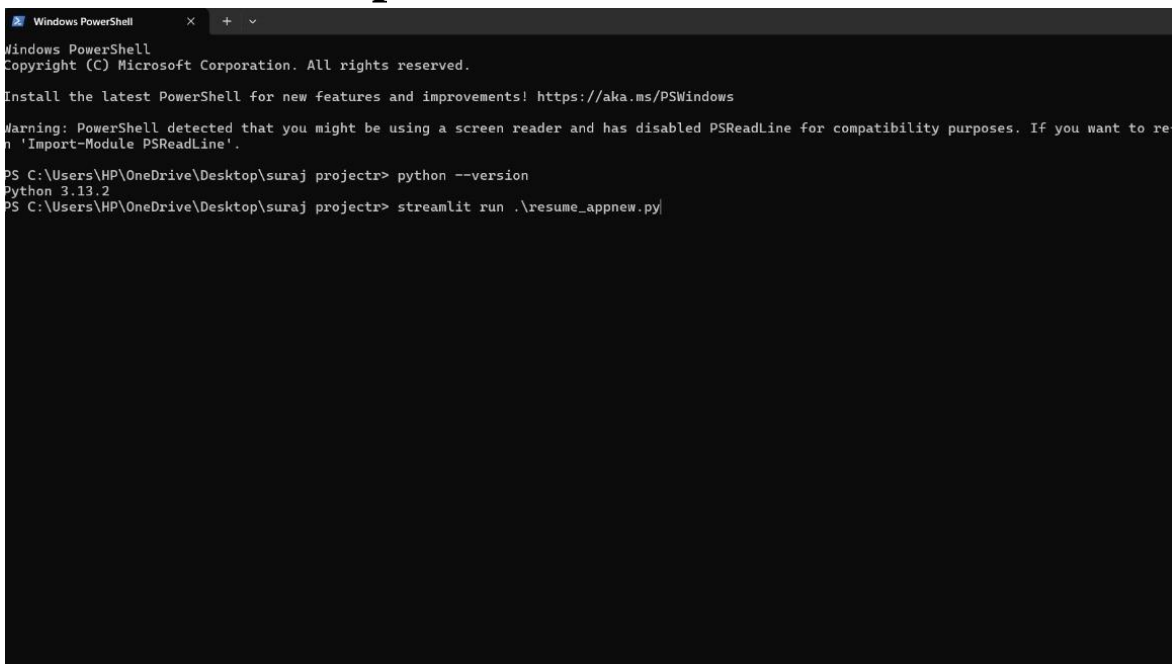
*Fig 2,3*



## CHAPTER 4

# IMPLEMENTATION AND RESULT

### 4.1 Snap Shots of Result:



```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

Warning: PowerShell detected that you might be using a screen reader and has disabled PSReadLine for compatibility purposes. If you want to re-
n 'Import-Module PSReadLine'.

PS C:\Users\HP\OneDrive\Desktop\suraj projectr> python --version
Python 3.13.2
PS C:\Users\HP\OneDrive\Desktop\suraj projectr> streamlit run .\resume_appnew.py\
```

**Fig 1.**

*This figure show that I was open windows power shell python should  
install in my pc*

*Version3.13.2*

*And I am going to run the code of resume app in windows power shell*

*By command; streamlit run .\resume\_appnew.py*



Deploy

AI Resume Screening & Candidate Ranking System

Job Description

Enter the job description

Preferred Qualifications:

Experience with [insert relevant frameworks, libraries, or tools specific to your company, e.g., React, AWS, Docker, Kubernetes].

Familiarity with agile development methodologies (e.g., Scrum, Kanban).

Upload Resumes

Upload PDF files

Drag and drop files here

Limit 200MB per file • PDF

Browse files

Resume.1.pdf.pdf

376.8KB

×

Resume 3.pdf.pdf

0.6MB

×

**Fig 2**

*This figure is outpt come when I was run resume app code in windows powershell.code run and executed. successfully*

localhost:8502

Deploy

Drag and drop files here

Limit 200MB per file • PDF

Browse files

Resume.1.pdf.pdf

376.8KB

×

Resume 3.pdf.pdf

0.6MB

×

Resuma 2.pdf.pdf

0.6MB

×

Ranking Resumes

	Resume	Score
2	Resume.1.pdf.pdf	0.3478
1	Resume 3.pdf.pdf	0.2217
0	Resuma 2.pdf.pdf	0.1592

**Fig 3**

*This figure shows output of ranking the resume those I was upload for searching as for our job description. Show they select resume1is good as for our job description.*

## 4.2 GitHub Link for Code:

<https://github.com/suraj-93349/AICTE-PROJECT-1-AI-RESUME-SCREENING-CANDIDATE-RANKING-SYSTEM.git>

**OUTPUTS RESULTS SCREEAN RECORDING  
VIDEO LINK:**

[https://drive.google.com/file/d/1OHIcTs47d02kg97M1bNW4Zh5qMXb6Drh/view?usp=drive\\_link](https://drive.google.com/file/d/1OHIcTs47d02kg97M1bNW4Zh5qMXb6Drh/view?usp=drive_link)

## CHAPTER 5: DISCUSSION AND CONCLUSION:

### 5.1 Future Work

While the **AI Resume Screening & Candidate Ranking System** significantly improves the recruitment process, there are areas for further enhancement and optimization:

#### 1. Improved Bias Mitigation

AI models can inadvertently inherit biases from training data. Future improvements can include:

- **Bias Detection Algorithms** to identify and mitigate discriminatory patterns.
- **Diverse and Balanced Training Data** to ensure fairness across different demographics.

#### 2. Deep Learning Enhancements

- Implementing **transformer-based models** (e.g., **BERT, GPT**) for **better semantic understanding** of resumes and job descriptions.
- Using **neural networks for ranking** to refine candidate scoring.

#### 3. Adaptive Learning and Feedback Mechanism

- Developing an **AI model that learns from past hiring decisions** to refine ranking over time.
- Collecting **HR feedback** on ranked candidates to **continuously improve the system**.

#### 4. Integration with HR Systems

- **ATS (Applicant Tracking System) Integration:** Enhancing compatibility with existing HR software for seamless recruitment.
- **LinkedIn and Job Portals Integration:** Allowing automatic profile analysis from online job platforms.

#### 5. Multi-Language Support

- Enhancing NLP capabilities to **analyze resumes in multiple languages**, making the system more versatile for global recruitment.

#### 6. Real-Time Candidate Interaction

- Adding a **chatbot** or **automated email responses** to **engage candidates** based on screening results.

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### 5.2 Conclusion:

The **AI Resume Screening & Candidate Ranking System** successfully addresses key challenges in recruitment by automating **resume parsing, candidate ranking, and job matching**. The implementation of **machine learning (ML)** and **natural language processing (NLP)** enables **faster, more accurate, and unbiased hiring decisions** compared to traditional manual screening.

#### Key Contributions of the Project:

- ✓ **Reduced HR workload** by automating resume analysis.
- ✓ **Faster hiring process** by ranking candidates efficiently.
- ✓ **Fair and objective candidate selection** using AI-driven scoring.

✓ **Scalable solution** adaptable for different job roles and industries.

While existing resume screening methods rely on **keyword-based filtering**, this system introduces **context-aware AI techniques** that improve ranking accuracy and hiring efficiency. The project demonstrates the **potential of AI in transforming HR operations**, reducing bias, and ensuring a **more data-driven, fair recruitment process**.

With future enhancements such as **deep learning integration, bias reduction techniques, and HR system compatibility**, this project can serve as a **foundation for next-generation AI-powered hiring solutions**.



**Fig 7**

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