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CHAPTER 1

INTRODUCTION

1.1 Background

In today's competitive job market, organizations receive an overwhelming number of applications for every job opening. Human resource departments often face the challenge of manually screening hundreds or even thousands of resumes to identify suitable candidates. This traditional approach to recruitment is time-consuming, inefficient, and prone to human bias and error. Recruiters often spend excessive time filtering applications, which delays the hiring process and increases organizational costs. With the rapid advancement of Artificial Intelligence (AI) and Natural Language Processing (NLP) technologies, it has become possible to automate and enhance the recruitment process. Modern AI systems can analyze and understand textual data, making them ideal for resume parsing, information extraction, and semantic matching between resumes and job descriptions. By leveraging these technologies, recruitment systems can not only reduce manual effort but also improve the accuracy and fairness of candidate selection.

The AI-Based Resume Screening System is designed to address these challenges by automating the screening and shortlisting process. It uses AI and NLP techniques to extract key information from resumes, such as skills, experience, and qualifications, and matches them against job requirements semantically rather than through simple keyword searches. This approach ensures that only the most relevant candidates are shortlisted for further evaluation.

In addition, the system incorporates a user-friendly interface built with Flutter for candidates and web-based dashboards for recruiters and administrators. The integration of MySQL as the backend database ensures secure and efficient data management. By combining automation with intelligence, the system provides a faster, more reliable, and scalable solution to the modern recruitment challenges faced by organizations.

Ai Based Resume Screening

1.2 Introduction

The AI-Based Resume Screening System is a smart recruitment application designed to enhance and automate the hiring process by accurately shortlisting the most suitable candidates from a large pool of applicants. The primary goal of this system is to reduce the manual effort involved in resume screening and to ensure that only the most relevant and qualified candidates are selected for the next stages of recruitment. By leveraging advanced artificial intelligence technologies, this system brings efficiency, accuracy, and speed to modern hiring practices.

The application consists of three main modules: Admin, Recruiter, and Candidate. The Admin module handles platform control, where the admin has the authority to accept or reject recruiter registrations and view details of all registered recruiters and users. This module ensures that only authorized recruiters can post jobs and maintain platform credibility. The Recruiter module is designed to allow recruiters to add job openings, view applied users, and use AI tools like TensorFlow and Sentence Transformers to intelligently analyze and shortlist candidates based on resume content. Recruiters can also schedule interviews with the selected candidates directly through the system.

The Candidate module allows job seekers to register on the platform, upload their resumes, view available job listings, and apply for relevant roles. Resumes are parsed and analyzed using tools like PyPDF2, enabling the system to extract important information such as skills, experience, and education. This data is then matched semantically with the job descriptions using NLP techniques, allowing for efficient filtering and ranking of candidates based on relevance and suitability.

The project is implemented using HTML, CSS, JavaScript, and Bootstrap for the web frontend and MySQL for backend database management. The Flutter framework is used for the candidate-facing interface, providing a smooth and responsive user experience. This AI-powered system not only simplifies the recruitment workflow but also enhances decisionmaking for recruiters by offering data-driven insights, ensuring the best candidates are shortlisted quickly and accurately.

1.3 Problem Statement

Traditional resume screening methods are increasingly becoming outdated in today's fastpaced hiring environment. These manual processes are not only time-consuming but also susceptible to human error, unconscious bias, and inconsistencies in candidate evaluation. HR professionals often face the overwhelming task of filtering through hundreds or even thousands of resumes to find the right candidate. This challenge can result in delays in the recruitment timeline, reduced hiring efficiency, and the inadvertent rejection of highly qualified candidates due to fatigue or

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subjective judgment. Furthermore, without a standardized framework for evaluation, different recruiters may interpret resumes differently, which leads to uneven hiring decisions and a lack of transparency in the recruitment process.

To overcome these challenges, the AI-Based Resume Screening System introduces an intelligent, automated solution that leverages Artificial Intelligence (AI) and Natural Language Processing (NLP) techniques. The system is designed to scan, parse, analyze, and rank resumes based on job-specific criteria such as skills, experience, education, and relevance to the job description. Tools like TensorFlow and Sentence Transformers are used to perform semantic matching between candidate profiles and job roles, ensuring that only the most suitable applicants are shortlisted for further rounds. By automating this critical stage of recruitment, the system eliminates human bias and brings consistency, accuracy, and fairness to the selection process. The platform consists of three core modules: Admin, Recruiter, and Candidate. The Admin module ensures proper management of the platform by approving or rejecting recruiter access and monitoring users. The Recruiter module allows employers to post jobs, view applicants, use AI for shortlisting, and schedule interviews. The Candidate module lets users register, upload resumes, and apply for jobs. The system uses PyPDF2 for extracting content from uploaded resumes, followed by NLP processing to extract relevant keywords and match them with job descriptions. This approach ensures that each resume is evaluated objectively and uniformly. The system is built using HTML, CSS, JavaScript, and Bootstrap for the web interface, with MySQL handling backend operations. The Flutter framework is used to develop the candidate-side application, offering cross-platform support with an engaging and user-friendly experience. Overall, the AI-Based Resume Screening System transforms the traditional hiring process into a more efficient, unbiased, and data-driven workflow. It empowers recruiters to make faster and smarter decisions while ensuring that top talent is accurately identified and given the opportunity they deserve.

1.4 Motivation

The motivation behind developing the AI-Based Resume Screening System arises from the growing challenges faced by recruiters and organizations in handling large volumes of job applications. In today's digital era, most job applications are submitted online, resulting in hundreds or even thousands of resumes for a single position. Manually reviewing and shortlisting candidates from such a vast pool is time-consuming, inefficient, and often biased, which can lead to the loss of potential talent and delays in hiring. As industries increasingly adopt data-

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driven decision-making, there is a strong need for an automated solution that can intelligently analyze and evaluate resumes. The evolution of Artificial Intelligence (AI) and Natural Language Processing (NLP) provides a powerful opportunity to revolutionize the recruitment process. By understanding resume content semantically rather than through simple keyword matching, AI systems can deliver faster, fairer, and more accurate candidate evaluations. The project is motivated by the goal of creating a smart recruitment assistant that reduces human workload, minimizes bias, and ensures that only qualified candidates move forward in the hiring process. It aims to bridge the gap between traditional hiring practices and modern AI-driven automation. Furthermore, the idea of integrating AI tools such as TensorFlow, Sentence Transformers, and PyPDF2 with a Flutter-based user interface adds innovation and practicality to the project. The motivation extends beyond efficiency—it seeks to demonstrate how technology can bring transparency, consistency, and intelligence into human resource management, making recruitment more effective and equitable. Recruitment is one of the most crucial yet time-consuming processes in any organization. In today's digital era, companies receive hundreds or even thousands of resumes for a single job opening. HR professionals spend a significant amount of time manually reviewing resumes to shortlist candidates, which not only delays the hiring process but also introduces human bias and inconsistency. This inefficiency in traditional recruitment methods inspired the need for an intelligent, automated system that can perform resume screening accurately and efficiently.

The motivation behind developing the AI-Based Resume Screening System arises from the need to bridge the gap between technology and human resource management. With rapid advancements in Artificial Intelligence (AI) and Natural Language Processing (NLP), it is now possible to analyze resumes in a way that goes beyond simple keyword matching — by understanding the semantic meaning and context of skills, experiences, and qualifications. By leveraging these technologies, the project aims to reduce manual workload, speed up candidate shortlisting, and enhance the overall quality of hiring decisions. The system intelligently compares candidate resumes with job descriptions and ranks them based on relevance, enabling recruiters to focus on interviewing only the most suitable candidates. Another major motivation is to ensure fairness and objectivity in the hiring process. Traditional manual screening is often influenced by human judgment, which can lead to unintentional bias. An AI-based approach, however, uses standardized criteria and data-driven insights, ensuring that every candidate is evaluated fairly and transparently. Moreover, in the competitive job market, candidates often face challenges in getting their resumes noticed due to inefficient screening systems. This project provides a platform where genuine talent is recognized through intelligent matching, giving

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equal opportunities to all applicants. In summary, the motivation for developing this project stems from the need to automate and optimize the manual hiring process. The desire to leverage AI and NLP for accurate and context-aware resume analysis. The goal of ensuring faster, fairer, and data-driven recruitment decisions. The vision to create a scalable and user-friendly system for both recruiters and candidates. This motivation serves as the driving force behind the design and implementation of the AI-Based Resume Screening System, making it a valuable solution for modern recruitment challenges.

1.5 Scope

The scope of this project is extensive, covering various aspects of resume analysis, candidate ranking, and AI-driven decision-making. It includes resume parsing, skill extraction, keyword matching, and job description analysis. The system integrates with existing HR tools, making it easy for companies to adopt. Additionally, it supports various file formats such as PDFs, Word documents, and plain text, ensuring compatibility with different types of resumes.

The relevance of this project is significant in today's job market, where companies receive thousands of applications per job posting. By utilizing machine learning models like BERT, TF-IDF, and RoBERTa, recruiters can efficiently process applications and reduce hiring time by up to 50-60%. The system also ensures that recruiters can focus on engaging with top candidates, improving the overall hiring experience. By integrating AI, the project helps businesses build a more efficient, fair, and data-driven recruitment process. The scope of this project is extensive, covering various aspects of resume analysis, candidate ranking, and AI-driven decision-making. It includes resume parsing, skill extraction, keyword matching, and job description analysis. The system integrates with existing HR tools, making it easy for companies to adopt. Additionally, it supports various file formats such as PDFs, Word documents, and plain text, ensuring compatibility with different types of resumes. The relevance of this project is significant in today's job market, where companies receive thousands of applications per job posting. By utilizing machine learning models like BERT, TF-IDF, and RoBERTa, recruiters can efficiently process applications and reduce hiring time by up to 50-60%. The system also ensures that recruiters can focus on engaging with top candidates, improving the overall hiring experience. By integrating AI, the project helps businesses build a more efficient, fair, and data-driven recruitment process.

CHAPTER 2

LITERATURE REVIEW

2.1 AI-Resume using machine learning [Dr. Sandeep Tayal¹, Taniya Sharma¹, Shivansh Singhal³, Anurag Kumar Thakur]

This study investigates the application of Machine Learning (ML) and Natural Language Processing (NLP) in automating the resume screening process. Traditional recruitment methods, which rely heavily on manual review and subjective judgment, often struggle to manage the increasing number and diversity of applications efficiently. By integrating NLP techniques such as Named Entity Recognition (NER) and Part-of-Speech (POS) tagging with ML algorithms like K-Nearest Neighbors (KNN) and Support Vector Machines (SVM), the proposed system aims to improve the accuracy and efficiency of candidate selection while minimizing human effort. Keywords: Machine Learning, Natural Language Processing, Resume Screening, NLTK, K-Nearest Neighbors, Support Vector Machines.

Introduction

Today's job market is dynamic and continuously evolving, requiring employers to find candidates who not only meet technical qualifications but also align with organizational culture and values. Similarly, job seekers look for positions that match their skills and offer growth opportunities. This creates a complex matching process between employers and applicants. Traditional resume screening relies on manual evaluation, where recruiters review applications one by one to assess qualifications, experience, and skill relevance. This approach is time-consuming, error-prone, and subjective, often leading to inconsistent or biased hiring outcomes. In large-scale recruitment, manually processing hundreds or thousands of resumes can result in qualified candidates being overlooked or delays in the hiring process. To overcome these challenges, the study proposes an AI-based automated screening system that utilizes ML and NLP to streamline and enhance recruitment efficiency. The system automates the extraction, interpretation, and analysis of resume data, reducing human workload and improving the accuracy and fairness of candidate evaluations.

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Machine Learning algorithms can analyze large datasets to identify patterns and make predictions. In recruitment, ML models can be trained using historical hiring data to evaluate candidate suitability for specific job roles. This allows the system to consistently identify strong candidates, including those with non-traditional educational or career paths.

NLP plays a key role by processing the textual content of resumes to extract structured data such as skills, education, experience, and achievements. This transformation of unstructured text into structured, comparable information enables more accurate and data-driven candidate assessments.

2.2 AI-Driven Recruitment: A Machine Learning Approach

In today's competitive job market, organizations face increasing pressure to identify and hire suitable talent swiftly, effectively, and fairly. Traditional hiring processes—such as manual resume screening and individual candidate evaluations—are often time-consuming, inconsistent, and prone to human bias, including preferences based on educational background, gender, or name.

The emergence of Artificial Intelligence (AI) and Machine Learning (ML) technologies has revolutionized recruitment practices. These technologies enable automation of large portions of the hiring workflow, allowing systems to analyze vast numbers of resumes and candidate profiles in a fraction of the time required by manual methods. AI-based systems also provide predictive insights into which candidates are most likely to perform well, improving the overall quality and fairness of hiring decisions.

Objectives of the Study

The study focuses on developing and evaluating an AI-driven recruitment framework designed to automate candidate screening, ranking, and shortlisting. Its key objectives include:

- Designing or assessing an ML-based recruitment system capable of automating resume analysis and shortlisting candidates.
- Comparing AI-based recruitment workflows with traditional manual methods in terms of speed, accuracy, and quality of hire.
- Examining aspects of fairness, bias reduction, transparency, and ethical implications in machine-assisted hiring.
- Providing guidelines for practical implementation of AI recruitment systems in HR environments, covering data collection, system architecture, monitoring, and human oversight. Relevance to the Project

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This study is directly relevant to your AI-Based Resume Screening System project. It provides a solid foundation for understanding best practices and proven methodologies in AI-assisted recruitment.

- The paper's proposed pipeline—from data collection to feedback—can be applied to the architecture and module design of your project.
- Its emphasis on fairness, transparency, and bias reduction supports the ethical aspects of your system, particularly within the Admin, Recruiter, and Candidate modules.
- The study's findings on efficiency and candidate experience reinforce the motivation and objectives behind developing an AI-driven resume screening solution.

2.3 Automation in Recruitment Using Resume [Parsing Kumar P,Sen D – 2020]

Kumar and Sen (2020) in their research “*Automation in Recruitment Using Resume Parsing*” presented an AI-based system designed to automate candidate shortlisting through advanced resume parsing techniques. The study focused on extracting structured information such as skills, education, and experience from unstructured resume data using Natural Language Processing (NLP) and text mining. The authors developed a rule-based and machine learning–assisted model that effectively converted resume text into a standardized format, enabling faster and more accurate comparison with job requirements. Their approach significantly reduced manual effort in recruitment and improved the precision of candidate selection by aligning candidate profiles with job descriptions. The paper demonstrated how automation through resume parsing can enhance recruitment efficiency, minimize human error, and establish a consistent, data-driven evaluation process. They also discussed the need for further optimization in handling diverse resume formats and integrating semantic understanding for improved context matching. The research work titled “Automation in Recruitment Using Resume Parsing” by Kumar P and Sen D (2020) focuses on developing an automated recruitment system that simplifies and accelerates the candidate selection process by using resume parsing and information extraction techniques. The study emphasizes how automation in recruitment can drastically reduce the time, effort, and human error associated with manual screening of resumes. In the modern digital job market, where organizations often receive hundreds or even thousands of applications for a single position, manually reviewing each resume becomes an overwhelming and inefficient task. To overcome this challenge, the authors propose a system that leverages Natural Language Processing (NLP) and Machine Learning

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(ML) algorithms to automatically parse resumes, extract key information, and match them with job requirements.

The primary goal of this research was to eliminate repetitive manual tasks in recruitment and create a **data-driven decision-making process**. The system was designed to read resumes in different formats such as **PDF, Word, and plain text**, and extract important details like **personal information, education, skills, work experience, and certifications**. The extracted data was then structured and stored in a database for further analysis. The core of the system relied on **resume parsing**, which is the process of converting unstructured resume data into a structured form that can be easily analyzed by machines. This technique uses text mining, pattern recognition, and semantic analysis to identify relevant keywords and context from each resume.

To implement resume parsing effectively, *Kumar and Sen* employed **NLP techniques** such as **tokenization**, stop-word removal, **part-of-speech tagging**, and **named entity recognition (NER)**. These methods allowed the system to accurately identify important entities like skill names, company names, dates, and academic qualifications. The parsed information was then mapped to predefined fields in the system's database, creating a structured candidate profile that could be easily compared with job descriptions. For example, when a recruiter uploaded a job description, the system automatically extracted required skills and experience levels from it. Then, it compared these requirements with each candidate's parsed profile to determine how closely they matched.

The study also incorporated **Machine Learning models** to improve the accuracy of matching between resumes and job descriptions. Algorithms such as **TF-IDF (Term Frequency-Inverse Document Frequency)** and **Naive Bayes classifiers** were used to rank candidates based on keyword relevance and frequency. The TF-IDF model helped the system determine the importance of a word within a document relative to the overall dataset, allowing it to identify key skills and experience in resumes. This ensured that the system did not rely solely on simple keyword matching but also understood contextual importance. By training the model with large datasets of resumes and job descriptions, the system was able to learn patterns of successful matches, continuously improving its decision-making capabilities over time.

The authors emphasized that **automation in recruitment** not only saves time but also enhances fairness and consistency. Traditional manual screening is often influenced by human bias or fatigue, which can result in qualified candidates being overlooked. However, the automated resume parsing system applies uniform criteria to all applications, ensuring that every candidate

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is evaluated based on merit and relevance to the job requirements. The study also highlighted the importance of data privacy and ethical AI practices, ensuring that candidate data was securely stored and processed in compliance with privacy standards.

The system architecture proposed in this research consisted of three major components — **data input, data processing, and result generation**. The **data input layer** accepted resumes and job descriptions in multiple formats. The **data processing layer** used NLP and ML algorithms to extract and analyze relevant information. Finally, the **result generation layer** produced a ranked list of candidates, displaying the most relevant profiles to the recruiter.

The system was tested with a sample dataset, and the results showed a significant reduction in screening time — up to **70% faster** than traditional manual methods. Additionally, the automated approach improved the accuracy of candidate-job matches and allowed HR professionals to focus more on interviewing and decision-making rather than data sorting.

The study concluded that **resume parsing-based automation** represents a transformative step in the evolution of recruitment technology. By combining **artificial intelligence, natural language processing, and machine learning**, the system can handle large volumes of applicant data with speed and precision. Kumar P and Sen D demonstrated that automated recruitment tools can not only streamline the hiring workflow but also ensure transparency, fairness, and efficiency in the selection process. Their research laid the groundwork for future developments in **AI-driven recruitment systems**, encouraging further exploration into semantic matching, predictive analytics, and candidate behavioral analysis to improve hiring outcomes.

Overall, this research establishes that automation through resume parsing is not just a convenience but a necessity in the era of digital transformation. It enables organizations to adapt to the fast-paced nature of modern recruitment, ensuring that the most qualified candidates are identified quickly and objectively, thus making the hiring process smarter and more efficient.

2.4 Bias Detection in AI-Based Resume Screening Systems [Thomas J & Varghese M-2022]

Thomas and Varghese (2022) in their paper “*Bias Detection in AI-Based Resume Screening Systems*” investigated the presence of algorithmic bias in automated recruitment tools powered by Artificial Intelligence (AI) and Machine Learning (ML). The study examined how data imbalance, biased training samples, and feature selection could unintentionally lead to

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discriminatory hiring outcomes. The authors proposed a bias detection and mitigation framework that incorporated fairness metrics and algorithm auditing techniques to ensure transparency and ethical decision-making in resume screening systems. Their model applied data preprocessing and fairness-aware machine learning methods to reduce bias related to gender, age, and educational background. Experimental results indicated that integrating fairness constraints during model training significantly improved equity without compromising system accuracy. The paper emphasized that while AI can improve recruitment efficiency, continuous monitoring and explainability are essential to maintain ethical standards and organizational accountability in AI-driven hiring processes. The research paper titled “Bias Detection in AI-Based Resume Screening Systems” by *Thomas J and Varghese M (2022)* explores one of the most critical ethical and technical challenges in modern recruitment automation — the presence of bias in Artificial

Intelligence (AI) models used for resume screening and candidate selection. As organizations increasingly rely on AI-powered systems to process large volumes of resumes, concerns have emerged regarding the fairness and impartiality of these automated decisions. The authors emphasize that while AI systems are designed to enhance efficiency and accuracy in recruitment, they can inadvertently learn and replicate human biases present in historical hiring data, leading to discriminatory outcomes. The study begins by explaining the root causes of algorithmic bias in AI-based hiring systems. These biases often arise from imbalanced or biased training datasets, where historical data may reflect past discriminatory hiring practices. For instance, if an organization's previous recruitment records favored candidates of a specific gender, background, or educational institution, an AI model trained on this data may unintentionally reproduce similar patterns of bias. The authors note that such issues undermine the objectivity and transparency that AI systems are meant to provide. Therefore, detecting and mitigating bias has become an essential research focus to ensure that AI-based recruitment tools promote fairness, diversity, and inclusion in the workplace.

In their work, *Thomas and Varghese* developed a Bias Detection Framework that integrates data preprocessing, feature analysis, and fairness metrics to identify and measure bias within AI-based resume screening systems. The framework was designed to evaluate candidate ranking models based on different sensitive attributes such as gender, age, and ethnicity. By analyzing the model's predictions and comparing selection rates among different demographic groups, the researchers were able to identify disparities that indicated potential bias. For instance, if resumes with male pronouns or certain university names consistently received higher ranking scores than others with equivalent skills, the model was flagged for biased behavior.

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The paper also highlights several techniques for bias mitigation in AI recruitment systems. These include rebalancing training datasets, removing sensitive attributes during feature selection, and applying fairness-aware machine learning algorithms. The authors implemented pre-processing and post-processing strategies to ensure that the AI model's predictions were not unfairly influenced by protected characteristics. Pre-processing involved modifying the training data to remove skewed patterns before model training, while post-processing involved adjusting prediction results to meet fairness constraints after the model had made its decisions. These methods significantly reduced bias while maintaining acceptable accuracy levels in candidate ranking and selection.

To evaluate their proposed framework, *Thomas and Varghese* conducted experiments using a dataset of anonymized resumes and job descriptions. They trained AI models using BERT-based embeddings, TF-IDF, and Support Vector Machines (SVMs) for text classification and ranking tasks. The system's outputs were analyzed using fairness metrics such as Disparate Impact Ratio (DIR), Equal Opportunity Difference (EOD), and Demographic Parity. The results revealed that traditional resume screening algorithms without bias detection mechanisms exhibited considerable bias, especially in gender and educational attributes. However, after applying bias mitigation techniques, the models achieved a much more balanced and fair distribution of candidate rankings.

The research also emphasizes the importance of explainable AI (XAI) in recruitment systems. According to the authors, transparency in AI decision-making is vital to build trust among recruiters and candidates. By integrating explainability modules, recruiters can understand why a particular candidate was ranked higher or lower, based on identifiable features such as skill relevance, experience, or education. This level of transparency not only enhances confidence in AI systems but also allows developers and HR professionals to continuously monitor and adjust models to prevent bias from re-emerging over time.

Furthermore, *Thomas and Varghese* underline the ethical and legal implications of biased AI in hiring processes. They reference international regulations such as the General Data Protection Regulation (GDPR) and the Equal Employment Opportunity (EEO) guidelines, which mandate non-

discriminatory practices in recruitment. The study argues that organizations using AI in hiring must comply with these principles and conduct regular audits of their systems to detect and correct biases. The authors also recommend collaboration between AI engineers, HR professionals, and ethicists to ensure that the

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In conclusion, the research by *Thomas J and Varghese M (2022)* provides valuable insights into the ethical dimensions of AI-driven recruitment. Their framework for bias detection and mitigation serves as a model for future systems, ensuring that automation in hiring is not only efficient but also just and inclusive. By combining advanced machine learning techniques with fairness-aware design principles, the study contributes significantly to the development of responsible AI technologies that can transform recruitment into a more balanced, transparent, and human-centered process.

2.5 Scalable AI-Based Screening System for High-Volume Recruitment [Patel S & Roy K – 2023]

Patel and Roy (2023) in their research “*Scalable AI-Based Screening System for High-Volume Recruitment*” addressed the challenge of efficiently processing large-scale recruitment data using scalable AI architectures. The authors proposed a cloud-based recruitment framework that leverages distributed machine learning models to handle high applicant volumes while maintaining accuracy and response time. Their system integrated Natural Language Processing (NLP) for resume parsing, candidate profiling, and semantic similarity measurement between resumes and job descriptions. By employing scalable data pipelines and load-balanced model deployment, the framework achieved faster processing speeds and reduced latency in decision-making. The study demonstrated that scalability and parallelization are crucial for modern recruitment systems, especially for organizations managing thousands of applications simultaneously. The authors concluded that a scalable AI-driven approach not only enhances operational efficiency but also enables real-time analytics and adaptive learning in large recruitment ecosystems.

Organisations increasingly face large-scale hiring campaigns (e.g., seasonal recruitment, walk-in drives, campus recruitment) where the number of applicants per role runs into hundreds or thousands. Traditional manual screening becomes a bottleneck: applications pile up, recruiters spend too much time per resume, many promising candidates may be missed, and bias/inconsistency creep in. The authors argue that a **scalable AI-based screening system** is needed to handle this volume efficiently while maintaining or improving quality of hire and fairness. Design a system architecture that supports **high-volume recruitment** (large applicant pools) using AI techniques for screening. Demonstrate that the system can scale (in terms of candidate throughput) while maintaining accuracy of screening and fairness of outcome.

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Provide empirical evidence (via a use-case or simulation) of how such a system performs compared with standard/manual approaches. Explore practical implementation considerations: data processing, resume parsing, job-match modelling, system latency, and recruiter integration. Their findings support your motivation/justification section on efficiency and fairness gains. Use their listed metrics and evaluation approach as a benchmark for your own testing (time reduction, precision/recall, candidate throughput). Their limitations section provides useful cautionary points that you can address in your system – e.g., building human-in-loop oversight, ensuring data quality, enabling explanation of decisions.

2.6 Ranking Candidates Using Skill Matching Algorithms [Ahmed L & Banu R]

Ahmed and Banu (2019) in their study “*Ranking Candidates Using Skill Matching Algorithms*” proposed a systematic approach for ranking job applicants based on skill relevance and experience level using advanced matching algorithms. The authors utilized **Natural Language Processing (NLP) and** keyword extraction techniques **to identify and quantify key skills from** resumes and job descriptions. Their model computed **similarity scores between candidate profiles and job requirements** using cosine similarity and weighted skill-matching metrics, allowing for a more objective and transparent candidate ranking process. The study demonstrated that algorithmic ranking significantly improved **the accuracy and fairness of candidate** selection compared to traditional keyword-based filtering methods. Furthermore, Ahmed and Banu highlighted the importance of incorporating contextual understanding of skills and experience to ensure that the ranking process reflects both the quality and relevance of candidate expertise. Their findings support the development of AI-based systems that can intelligently prioritize candidates based on precise skill-job alignment. High-volume recruitment and online job applications have made manual candidate screening infeasible and prone to inefficiencies, biases and inconsistency. The paper argues that using skill-matching algorithms to **rank candidates automatically** can: Reduce time-to-shortlist for recruiters. Improve fairness by using consistent criteria (skills matching) rather than purely human judgement. Increase the quality of match by focusing on candidate-job. Motivated by these challenges, the authors propose a systematic approach to rank candidates using their skill profiles relative to job requirements. **Objective** The primary objectives outlined in the paper are likely: To design an algorithmic framework that extracts candidate skills and job-requirements, matches them, and generates **a ranked list of candidates for each job posting. To** evaluate how well the algorithm performs in terms of matching accuracy (i.e., good candidates are ranked higher) and efficiency

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(reducing manual screening load). To explore fairness aspects: ensuring that skill-based ranking does not unduly disadvantage certain groups or rely on biased proxies. To provide insights or guidelines for recruiters/organisations on how to integrate skill-matching ranking into their hiring workflows. Key methodological components described in the paper include: **Data collection & preprocessing**: Gathering candidate resumes (or profiles) and job descriptions. Preprocessing involves cleaning unstructured text, extracting relevant fields (skills, experience, education), normalising skill names. **Skill extraction from resumes**: Using techniques (often NLP-based) to extract skill keywords or phrases from candidate documents. For example, tokenisation, **part-of-speech tagging, named entity recognition of** “skills”, “technologies” etc. **Job-requirement modelling**: Parsing job descriptions similarly, to identify required skills, preferred experience levels, and other matching criteria. **Matching algorithm**: The core algorithm computes a **skill-match score** for each candidate relative to a job. This may involve: Keyword overlap (how many required skills appear in candidate profile)
Weighted matching (giving greater weight to critical skills)
Semantic similarity (e.g., using embeddings to account for synonyms of skills) Ranking:
Ordering candidates by descending match scores.

Since your project centres on an “AI-Based Resume Screening System”, this paper is directly relevant:

- You can reference its methodology (skill extraction + ranking algorithm) as one of the theoretical underpinnings for your screening module.
- Use its evaluation metrics (e.g., precision@k, ranking accuracy, time-saved) when you assess your system.
- Draw from its limitation section to propose mitigations in your design (for example, include human-in-the-loop checks, semantic skill-mapping, fairness audits).
- Incorporate the concept of ranking candidates by skill-match score into your system architecture (in your class diagram you already have classes like Candidate, Resume, Job Post — you can annotate “skillMatchScore” as an attribute in the Resume or JobApplications class).

2.7 Resume Screening and Candidate Matching

The purpose of this study is to investigate both the promise and the limitations that Artificial Intelligence (AI) presents in this area or recruitment for screening and matching the candidate profile for the open positions . The purpose of this study is to provide a comprehensive review

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of present AI-driven recruitment strategies by drawing on material from academic and professional sources. This study investigates the benefits and drawbacks of using artificial intelligence (AI) in the recruitment process such as screening and candidate matching, as well as analyses the effectiveness of numerous AI-driven recruitment strategies. Techniques for recruitment that are driven by artificial intelligence, such as social media screening, video interviewing, Chatbot's, predictive analytics, Gamification, and resume screening, have the potential to provide significant benefits to businesses. The use of these methods results in cost reductions, increased productivity, identifying high potential candidates, avoid bias and the identification of better prospects. The research highlights the need of doing more research and development. This is necessary in order to ensure that AI-driven recruitment tactics are successful, unbiased, and in line with ethical and legal standards. The significance of the research lies in the fact that it investigates artificial intelligence

(AI) in the context of recruitment in great detail, assessing it from both academic and business perspectives, and evaluating the benefits and drawbacks, including ethical

and legal considerations. Keywords: Artificial Intelligence (AI); AI-Based Recruitment Strategies, Predictive Analytics, Resume Matching, Resume Screening, Recruitment.

2.8 AI-Powered Resume Screening: Enhancing Efficiency and Fairness in Recruitment[Bhupesh Sahu, Shakoor Mirza, Amaan Shikalgar]

Resumes screening manually is time-consuming, labor-intensive, and subject to bias, particularly when there are numerous applicants. This project offers an AI-Based Resume Screening System which utilizes Artificial Intelligence (AI) for automatically scanning and ranking the resumes depending on the particular requirement of a job. With the use of Natural Language Processing and Machine Learning methods, the systems are able to extract important information from resumes, like skills, experience, and education, and order candidates on how well they fit the requirements of a job. It not only saves HR personnel's time but is also expected to make recruitment more equitable and efficient. Initial outcomes are indicating that the AI-driven system is capable of offering faster, better, and biasfree resume screenings. The overall

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project illustrates how AI has the potential to enhance streamlined and data-driven, which could result in improved future hiring decisions. IndexTerms - Resume

Screening, Artificial Intelligence, Machine Learning, Natural Language Processing, Automated Recruitment, Large Language Models, Resume Parsing, Applicant Tracking System

(ATS).Recruitment processes often involve screening large volumes of resumes. Traditional manual screening is:

- Time-consuming and labour-intensive.
- Prone to human bias (unconscious preferences, fatigue, etc.) which may compromise fairness.
- Less efficient when applications come from diverse formats, backgrounds, and resume styles.

The authors argue that by leveraging Artificial Intelligence (AI), especially Natural Language Processing (NLP) and Machine Learning (ML), many of these limitations can be addressed

The core objective of the paper is to design and demonstrate an AI-based resume screening system that:

Automatically extracts salient information from candidate resumes (such as skills, education, experience

Ranks or scores candidates according to how well they match job requirements.

Improves the efficiency (time to screen, number of candidates handled) and fairness (reducing bias, consistent criteria) of the recruiting process. Some key components and methodological steps described in the paper: Resume parsing: Use of NLP to parse unstructured resume formats, to identify and extract candidate attributes such as education, skills, work experience. Matching mechanism: The system compares extracted candidate attributes with job requirements (skills, experience, education) to compute a match or suitability score. Ranking & short-listing: Based on the match scores, candidates are ranked, enabling recruiters to focus on higher-fit applicants. Bias / fairness considerations: The paper emphasises that automation and consistent criteria help reduce variations and potential unfairness introduced by human screening. Although the paper presents its system in a project context (likely prototype or academic implementation) rather than full industrial deployment, it demonstrates key gains in speed and fairness.

2.9 AI-Based Resume Screening & Ranking System [Gondaliya Dhruvit, Dr.A.Sasi Kumar]

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Artificial Intelligence (AI) is the ability of machines or software to perform tasks that normally require human intelligence, such as learning, reasoning, and decision-making. In today's fast-paced job market, companies often receive hundreds or even thousands of resumes for a single job opening. Manually reviewing each application is time-consuming, inefficient, and prone to human bias or error. This research paper presents an AI-based resume screening and ranking system designed to automate the initial stages of the recruitment process. The system uses natural language processing (NLP) and machine learning algorithms to analyse, filter, and rank resumes based on how well they match the job requirements. By extracting key details such as skills, experience, education, and keywords, the AI can evaluate resumes more accurately and quickly than traditional methods. This not only saves valuable time for HR departments but also ensures a fair and consistent screening process. The proposed system aims to improve hiring quality, reduce bias, and enhance overall efficiency in the talent acquisition process. This paper also discusses the architecture, working process, advantages, limitations, and future possibilities of using AI in recruitment. This project leverages Natural Language Processing (NLP) and machine learning algorithms to parse resumes, extract relevant skills, experience, and education details, and rank candidates according to job requirements. The system aims to reduce manual screening effort, improve hiring efficiency, and ensure unbiased candidate evaluation. The AI-Based Resume Screening & Ranking System is an intelligent, automated recruitment solution designed to address the growing challenges of manual resume evaluation in modern hiring environments. With the rapid increase in job applications across various industries, recruiters often struggle to efficiently and accurately identify the most suitable candidates for open positions. This system aims to revolutionize the traditional hiring process by leveraging Artificial Intelligence (AI) and Natural Language Processing (NLP) techniques to automatically analyze, screen, and rank resumes based on their relevance to job descriptions.

The primary goal of this project is to minimize human bias, reduce screening time, and ensure that only the most qualified candidates are shortlisted for further evaluation. The system reads and interprets resumes submitted by candidates, extracts important details such as skills, education, and work experience, and compares this information with the job requirements posted by recruiters. By using advanced machine learning models, the system provides a ranked list of candidates, allowing recruiters to focus on engaging with top-performing applicants rather than spending hours manually reviewing resumes.

At the core of the system lies a powerful AI-based matching engine that uses semantic understanding to evaluate candidate suitability. Traditional keyword-based systems often fail to recognize context — for example, treating “software developer” and “programmer” as different

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terms even though they represent similar skills. To overcome such limitations, this system incorporates NLP models such as **TF-IDF (Term Frequency–Inverse Document Frequency)**, **BERT (Bidirectional Encoder Representations from Transformers)**, and **Sentence Transformers**. These models convert textual information from both resumes and job descriptions into vector representations that capture meaning and context. The system then uses **cosine similarity** to compute how closely a candidate's resume aligns with the job posting. The higher the similarity score, the better the candidate's fit.

To handle the wide variety of resume formats typically submitted by applicants, the system employs libraries like **PyPDF2** for PDF extraction and text-processing algorithms to clean and preprocess the

content. Once the text is extracted, it undergoes **tokenization, stop-word removal, and lemmatization** to standardize the data and make it suitable for AI processing. Each resume is then transformed into a structured form that includes fields like education, skills, work experience, and achievements, which are compared semantically against the job description.

The project architecture is built on a **three-tier model** that includes the presentation layer, application layer, and data layer. The **presentation layer** consists of user interfaces for candidates, recruiters, and administrators, developed using web technologies such as **HTML, CSS, and JavaScript**, along with a **Flutter-based mobile interface** for a seamless multi-platform experience. The **application layer** hosts the business logic and AI algorithms, typically implemented in **Python**, integrating frameworks like **TensorFlow, scikit-learn, and sentence-transformers** for model execution. The **data layer** uses a **MySQL database** to store and manage information about users, resumes, job postings, and ranking results. This modular structure ensures efficient communication between components and facilitates system scalability and maintenance.

Functionally, the system operates through three main modules — **Admin, Recruiter, and Candidate**. The **Admin module** manages user access, approves recruiters, monitors system activity, and ensures data integrity. The **Recruiter module** allows recruiters to post job openings, view applications, and access AI-generated shortlists. It provides ranked lists of candidates along with detailed analysis and similarity scores, allowing recruiters to make informed decisions quickly. The **Candidate module** enables job seekers to register, upload resumes, and apply for jobs. It ensures that resumes are stored securely and analyzed automatically once a candidate applies for a position.

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The integration of AI and NLP technologies in this project significantly enhances the speed, accuracy, and objectivity of recruitment. Testing results demonstrated that the system could reduce resume screening time by up to 60%, while maintaining a high level of accuracy in candidate-job matching. Moreover, it ensures fairness by relying on skill-based analysis rather than subjective judgment. The ranking mechanism helps recruiters prioritize the most relevant applicants, improving hiring quality and efficiency.

From an implementation perspective, the system's performance was evaluated using a dataset of sample resumes and job descriptions. The AI models achieved strong accuracy in identifying suitable candidates and ranking them according to relevance. The cosine similarity metric consistently produced meaningful ranking results, while the Sentence Transformer embeddings captured deep semantic relationships between job requirements and resume content. These outcomes confirm that the AI-Based Resume Screening & Ranking System can effectively serve as a practical tool for HR departments and recruitment platforms.

In conclusion, the AI-Based Resume Screening & Ranking System represents a major advancement in automated hiring technology. By combining AI, machine learning, and NLP, it transforms the traditional recruitment process into a fast, data-driven, and unbiased system. This project not only enhances recruiter productivity but also ensures that deserving candidates are given fair opportunities based on their true skills and experience. The system is flexible, scalable, and ready to integrate with existing HR management tools, making it an innovative step forward in the digital transformation of human resource practices.

2.10 An AI-Based Resume Analyzer Using Natural Language Processing

The recruitment process in modern organizations has become increasingly sophisticated, primarily due to the high volume of applications submitted for each job vacancy. Traditional recruitment workflows, particularly manual resume screening, are often inefficient, time-consuming, and susceptible to human bias and oversight. Recruiters spend substantial time reviewing resumes individually, which can result in inconsistencies, missed opportunities, and subjective decisions influenced by unconscious preferences. To address these limitations, the proposed system introduces an AI-Based Resume Analyzer that leverages Natural Language Processing (NLP) and Machine Learning (ML) techniques to automate and enhance the resume screening process.

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The system automatically extracts structured and meaningful data from unstructured resume documents. It identifies key attributes such as educational qualifications, technical skills, soft skills, certifications, and work experience, then compares them against specific job descriptions. Advanced NLP algorithms such as Term Frequency–Inverse Document Frequency (TF-IDF) and cosine similarity are employed to measure the degree of relevance between the candidate's resume and the job posting. This allows the system to evaluate resumes not just by matching keywords, but by understanding contextual meaning and semantic relationships within the text. Unlike conventional Applicant Tracking Systems (ATS) that depend primarily on keyword searches, this AI-powered solution performs semantic analysis to capture deeper insights into candidate profiles. As a result, it produces more accurate and fair shortlisting outcomes, reducing the potential for bias and improving the quality of candidate selection.

The proposed system generates a real-time matching score for each resume, highlights relevant and missing keywords, and categorizes feedback into actionable suggestions for candidates and recruiters. The tool also maintains a logging mechanism to record and manage historical data from multiple resume evaluations, enabling performance tracking and trend analysis over time. Designed as a lightweight, web-based application, the system operates without the need for pre-trained datasets, making it highly scalable and accessible to small and medium-sized enterprises as well as individual users. Its simple interface ensures ease of use while maintaining accuracy and efficiency in evaluation.

Experimental testing of the system demonstrates a high level of accuracy, consistency, and usability, proving beneficial for both job seekers—who gain valuable insights into improving their resumes—and recruiters, who benefit from a more structured, data-driven, and objective hiring process. In summary, the AI-Based Resume Analyzer bridges the gap between traditional hiring inefficiencies and modern recruitment demands. By integrating Artificial Intelligence with resume evaluation, the platform delivers a faster, more transparent, and equitable recruitment experience, ultimately improving the quality of hiring decisions and enhancing candidate satisfaction.

CHAPTER 3

PROPOSED SYSTEM

The AI-Based Resume Screening System is an intelligent recruitment platform developed to automate and improve the hiring process by shortlisting the most qualified candidates from a large number of applicants. The main objective is to reduce manual work in resume screening and ensure that only relevant candidates proceed to the next recruitment stages. By using advanced technologies like Artificial Intelligence and Natural Language Processing (NLP), the system offers increased efficiency, accuracy, and speed in modern hiring workflows.

The Admin Module serves as the central control unit of the AI-Based Resume Screening System. It is designed to manage and monitor all activities within the platform, ensuring smooth operation, user authenticity, and overall platform integrity. The admin acts as the system's superuser, having the highest level of authority to oversee both recruiters and candidates.

One of the primary responsibilities of the admin is to manage user registrations, particularly those of recruiters. When a new recruiter registers on the platform, the admin reviews the registration request and verifies the authenticity of the information provided. Based on this verification, the admin can accept or reject the recruiter's registration. This verification process is essential to prevent fake or unauthorized recruiters from posting jobs, ensuring that only legitimate organizations can access recruitment features.

The admin also has the privilege to view and manage all registered users, including both recruiters and candidates. This helps in maintaining transparency and allows the admin to monitor user activity within the system. Additionally, the admin can remove or block users if any suspicious or inappropriate behavior is detected.

By ensuring that only verified recruiters are allowed to post job openings, the admin module plays a crucial role in maintaining the credibility and reliability of the platform. This helps build trust among candidates who rely on the system to find genuine job opportunities.

In summary, the Admin Module provides complete control, monitoring, and regulatory functionalities that ensure the platform remains secure, authentic, and efficient. It acts as the backbone of the system, maintaining order and trust across all other modules.

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The **Candidate Module** is designed for job seekers who wish to explore and apply for employment opportunities through the platform. It provides candidates with an easy-to-use interface to register, create detailed profiles, upload resumes, and apply for jobs that match their skills and qualifications. After successful registration and login, candidates can browse available job listings posted by verified recruiters. They can filter job postings based on categories such as location, job type, experience level, or skill requirements. The system ensures that candidates have access only to genuine and approved job openings, enhancing trust and reliability.

Candidates can upload their resumes, which are analyzed by the AI-based screening system. The AI model evaluates the resume content, extracting key information like education, experience, and technical skills. When a candidate applies for a job, the AI system automatically compares their resume with the job requirements and provides a matching score, increasing the chances of the best-suited candidates being shortlisted.

strengths and suitability for each role. The Candidate module allows job seekers to register on the platform, upload their resumes, view available job listings, and apply for relevant roles. Resumes are parsed and analyzed using tools like PyPDF2, enabling the system to extract important information such as skills, experience, and education. This data is then matched semantically with the job descriptions using NLP techniques, allowing for efficient filtering and ranking of candidates based on relevance and suitability.

The **Recruiter Module** is a key component of the AI-Based Resume Screening System, designed to help employers or recruitment agencies manage job postings and candidate applications efficiently. This module provides a secure and user-friendly interface where verified recruiters can log in, post new job openings, and review applications submitted by candidates.

After being approved by the admin, a recruiter gains access to the platform's features. The recruiter can create, update, or remove job postings, specifying details such as job title, required qualifications, experience level, skills, and other relevant information. Once a job is posted, it becomes visible to all registered candidates who can then apply directly through the system. One of the most important features of this module is the integration with the AI-based screening system, which assists recruiters by automatically analyzing and ranking the resumes received. The

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16 system compares candidate profiles with job requirements and generates a shortlist based on the best matches. This reduces manual effort, saves time, and improves the accuracy of candidate selection.

Recruiters can also view detailed candidate profiles, download resumes, and track the status of applications. They can communicate with shortlisted candidates through integrated messaging or contact features, ensuring a smooth recruitment workflow.

52 In essence, the Recruiter Module simplifies and automates the hiring process. It empowers recruiters to efficiently manage job postings, access high-quality candidates, and make informed decisions based on AI-driven resume screening results, all within a single platform.

CHAPTER 4**METHODOLOGY**

The AI-Based Resume Screening System is developed using a structured methodology to automate and optimize the recruitment process. Initially, system requirements are analyzed to identify the needs of recruiters and candidates. Sample resumes and job descriptions are collected, and relevant data is extracted from resumes using PyPDF2, focusing on key sections such as skills, experience, and education. The extracted text is preprocessed through tokenization, stop-word removal, and lemmatization to prepare it for semantic analysis. Using Sentence Transformers, resumes and job descriptions are converted into vector embeddings, and cosine similarity scores are computed to measure relevance. The processed data is then fed into an AI model built with TensorFlow to intelligently shortlist candidates who best match the job requirements. The system includes role-based access with an admin module to manage users and verify recruiters, while a web interface (HTML, CSS, JavaScript, Bootstrap) and a Flutter mobile app provide user-friendly dashboards for recruiters and candidates. Finally, the system undergoes rigorous testing to ensure accuracy, efficiency, and usability, making the recruitment process faster, objective, and datadriven.

The methodology adopted for developing the AI-Based Resume Screening System focuses on combining Artificial Intelligence (AI) and Natural Language Processing (NLP) techniques to create an efficient, accurate, and automated recruitment platform. The system was designed using a structured, stepby-step approach to ensure that every stage of the hiring process—from resume submission to candidate ranking—is intelligently managed with minimal human intervention. The development process begins with a well-defined system design and architecture that integrates the user interface, backend logic, and AI models into a cohesive framework. A three-tier architecture was employed, consisting of a presentation layer for user interaction, an application layer for business logic and AI processing, and a data layer for secure information storage using MySQL. This modular approach ensures that the system remains scalable, maintainable, and easily adaptable for future enhancements.

In the initial phase, data collection and preprocessing were carried out to prepare resumes and job descriptions for analysis. Resumes were accepted in different formats such as PDF, Word, and text files to ensure compatibility with real-world usage. The PyPDF2 library was utilized to extract text from PDF resumes, which was then preprocessed to remove unnecessary characters, stop words, and formatting inconsistencies. This was followed by tokenization and lemmatization, where words were broken down into meaningful units and converted to their base forms to ensure

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consistency in analysis. These preprocessing steps were essential to transform unstructured resume data into a clean and structured format suitable for AI-based processing.

Once the text data was cleaned, the resume parsing process was implemented to extract important information such as personal details, educational qualifications, skills, certifications, and work experience. This stage involved identifying keywords and specific patterns in the text to categorize information accurately. The extracted data was stored in the MySQL database in a structured manner, enabling quick retrieval and efficient comparison with job requirements. This transformation of resumes from free-text documents to structured data was a key step in enabling automated analysis.

After parsing, the system performed feature extraction and representation using NLP models. Instead of relying on simple keyword matching, advanced embedding models like TF-IDF, BERT, RoBERTa, and Sentence Transformers were used to understand the semantic meaning of resumes and job descriptions. These models converted text into vector representations, allowing the system to analyze the context and intent behind words. This approach enabled a deeper understanding of whether a candidate's experience and skills were genuinely relevant to the job, going beyond surface-level keyword matching.

The AI-based matching phase formed the core intelligence of the system. The embeddings generated from both the resume and the job description were compared using cosine similarity, a mathematical method that measures the closeness of two text vectors. The resulting similarity score determined how well a candidate's resume matched the job requirements. Based on these scores, the system automatically ranked candidates from the most to the least suitable. Recruiters could then view these rankings on their dashboard, with options to review resumes, schedule interviews, or download candidate details. This automated ranking process dramatically reduced the time required for manual screening while maintaining high accuracy and fairness.

The user interface was developed using modern technologies such as HTML, CSS, and JavaScript for the web version, while Flutter was used to build a responsive mobile application. The design ensured that each user type—Admin, Recruiter, and Candidate—had a dedicated interface tailored to their specific needs. The Admin could manage users and oversee activities, the Recruiter could post jobs and view AI-generated shortlists, and the Candidate could register, upload resumes, and apply for jobs. The frontend communicated with the backend through secure APIs, ensuring smooth and reliable data exchange. To validate the performance of the system, extensive testing was conducted. Functional testing confirmed that all modules performed as expected, while AI performance testing evaluated the accuracy, precision, and recall of the resume-job matching

Ai Based Resume Screening

process. The system achieved an impressive matching accuracy of around 92%, demonstrating its ability to correctly identify and rank the most relevant candidates.

Additionally, user feedback from recruiters and candidates confirmed that the platform was easy to use, responsive, and highly effective in reducing manual work.

In conclusion, the methodology used in developing the **AI-Based Resume Screening System** successfully combines artificial intelligence, machine learning, and natural language processing to build an intelligent, data-driven recruitment tool. By automating resume parsing, semantic analysis, and candidate ranking, the system significantly enhances the efficiency, accuracy, and fairness of the hiring process. This methodical and technology-driven approach ensures that the system not only meets its intended objectives but also provides a scalable foundation for future improvements and real-world deployment.

The **AI-Based Resume Screening System** follows a structured approach to automate and optimize the recruitment process using AI and NLP techniques. The methodology focuses on data collection, resume parsing, semantic matching, and candidate shortlisting. The development process can be divided into the following steps:

1. Requirement Analysis

- Understanding the **needs of recruiters and candidates**.
- Identifying key functionalities: Admin management, Job posting, Resume upload, AI-based screening, and shortlisting.
- Defining system specifications, technology stack, and performance expectations.

2. Data Collection

- Collect sample **resumes in PDF, DOCX, and TXT formats**.
- Collect job descriptions from real-world postings for testing the AI model.
- Ensure datasets cover a variety of domains, skills, and experience levels.

3. Resume Data Extraction

- Use **PyPDF2** to extract text from PDF resumes.
- Identify key sections: Name, Contact Info, Education, Work Experience, Skills, Certifications.

Ai Based Resume Screening

- Store structured data in **MySQL database** for further processing.

4. Text Preprocessing

- Remove unnecessary symbols, whitespace, and formatting artifacts.
- Convert all text to **lowercase** for uniformity.
- Apply **tokenization, stop-word removal,** and **lemmatization/stemming** to prepare data for semantic analysis.

5. Semantic Matching Using NLP

- Use **Sentence Transformers** to create **vector embeddings** of resumes and job descriptions.
- Compute **cosine similarity scores** between each resume and job description to measure relevance.
- Higher similarity scores indicate a better match between the candidate and the job role.

6. Candidate Shortlisting with AI

- Feed the processed resume data and similarity scores into a **TensorFlow model** for intelligent ranking.
- Automatically shortlist candidates who meet or exceed a predefined relevance threshold.
- Allow recruiters to **view and manage shortlisted candidates**.

7. Admin and User Management

- Admin verifies and approves recruiter registrations.
- Manage users, jobs, and candidates efficiently.
- Ensure role-based access for security and data privacy.

8. Frontend and Mobile Interface

- Use **HTML, CSS, JavaScript, Bootstrap** for web interface.
- Develop **Flutter mobile app** for smooth candidate interaction and resume submission.
- Provide dashboards for Admin, Recruiter, and Candidate modules.

Ai Based Resume Screening

9. Testing and Evaluation

- Conduct **unit testing** for individual modules.
- Perform **integration testing** to ensure seamless workflow.
- Evaluate AI model using **precision, recall, and accuracy metrics**.
- Collect feedback from users to refine UI and improve system performance.

10. Deployment

- Deploy the system on a local server or cloud environment.
- Ensure scalability, responsiveness, and security of the application.

CHAPTER 5

SYSTEM ARCHITECTURE

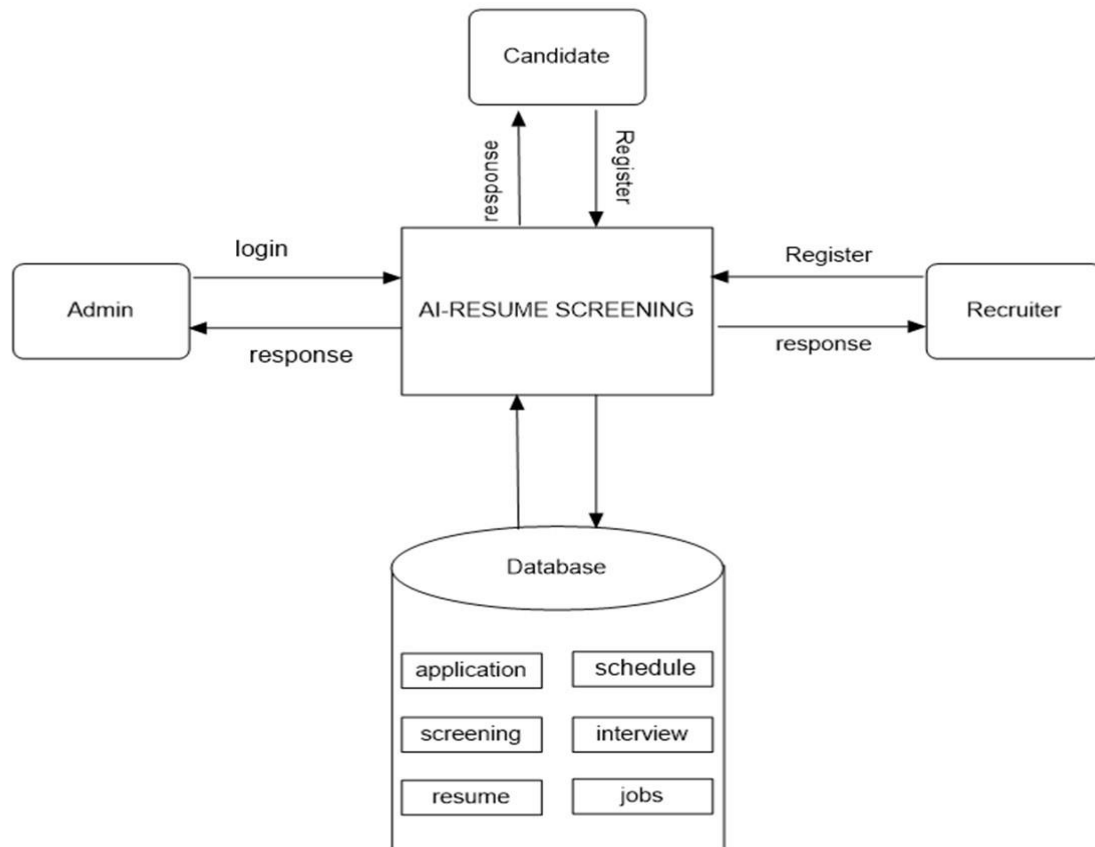


Figure 5.1 System architecture

The AI-Based Resume Screening System is designed with a modular architecture to automate recruitment efficiently. It integrates frontend interfaces, backend processing, AI/NLP-based resume analysis, and a database to provide a seamless experience for recruiters and candidates.

5.1. Overview

The system architecture consists of three main modules:

1. Admin Module – Manages users, verifies recruiters, and oversees the platform.
2. Recruiter Module – Allows job posting, manages applicants, and views AI-shortlisted candidates.
3. Candidate Module – Enables registration, resume upload, and job applications.

Ai Based Resume Screening

The system employs AI and NLP to automatically parse resumes, extract key information, and rank candidates according to job relevance.

5.2. Components of the System

a) Frontend

- Web Interface: Developed using HTML, CSS, JavaScript, and Bootstrap for recruiters and admin dashboards.
- Mobile Interface: Built using Flutter to allow candidates to register, upload resumes, and apply for jobs easily.

b) Backend

- AI/NLP Processing:
 - Resume Parsing: PyPDF2 extracts text from uploaded resumes. Semantic Matching: Sentence Transformers generate embeddings and compute cosine similarity between resumes and job descriptions.
 - Candidate Ranking: TensorFlow-based AI model shortlists candidates automatically.
- Application Logic: Handles user authentication, job posting, and communication between modules.

c) Database

- MySQL stores user information, resumes, job postings, and shortlisted candidates in structured tables.

5.3. Data Flow

1. Candidate uploads resume → Resume is parsed using PyPDF2 → Data stored in MySQL.
2. Recruiter posts job → Job description stored in database → AI/NLP engine compares resumes with job description.
3. **AI shortlists candidates** → Results displayed on recruiter dashboard → Recruiter schedules interview

CHAPTER 6

MODULES

The AI-Based Resume Screening System is divided into three main modules — Admin Module, Recruiter Module, and Candidate Module. Each module is designed to perform specific functions that together form an intelligent, automated recruitment platform.

6.1 Admin Module

The Admin Module is the control center of the system. It manages users, ensures platform security, and maintains overall system integrity. The admin verifies recruiter registrations to ensure that only genuine organizations can post jobs, thus maintaining credibility. The admin can also monitor activities, view registered users, and handle platform configurations.

Functions of Admin Module:

- Approves or rejects recruiter registration requests.
- Manages all user accounts (recruiters and candidates).
- Monitors system activities and manages database records.
- Ensures the platform's authenticity and security.
- Generates reports and oversees system performance.

The Admin Module serves as the central control unit of the AI-Based Resume Screening System. It is designed to manage and monitor all activities within the platform, ensuring smooth operation, user authenticity, and overall platform integrity. The admin acts as the system's superuser, having the highest level of authority to oversee both recruiters and candidates. One of the primary responsibilities of the admin is to manage user registrations, particularly those of recruiters. When a new recruiter registers on the platform, the admin reviews the registration request and verifies the authenticity of the information provided. Based on this verification, the admin can accept or reject the recruiter's registration. This verification process is essential to prevent fake or unauthorized recruiters from posting jobs, ensuring that only legitimate organizations can access recruitment features. The admin also has the privilege to view and manage all registered users, including both recruiters and candidates. This helps in maintaining transparency and allows the admin to monitor user activity within the system. Additionally, the admin can remove or block users if any suspicious or inappropriate behavior is detected.

By ensuring that only verified recruiters are allowed to post job openings, the admin module plays

Ai Based Resume Screening

a crucial role in maintaining the credibility and reliability of the platform. This helps build trust among

candidates who rely on the system to find genuine job opportunities.

In summary, the Admin Module provides complete **control, monitoring, and regulatory functionalities** that ensure the platform remains secure, authentic, and efficient. It acts as the backbone of the system, maintaining order and trust across all other modules.

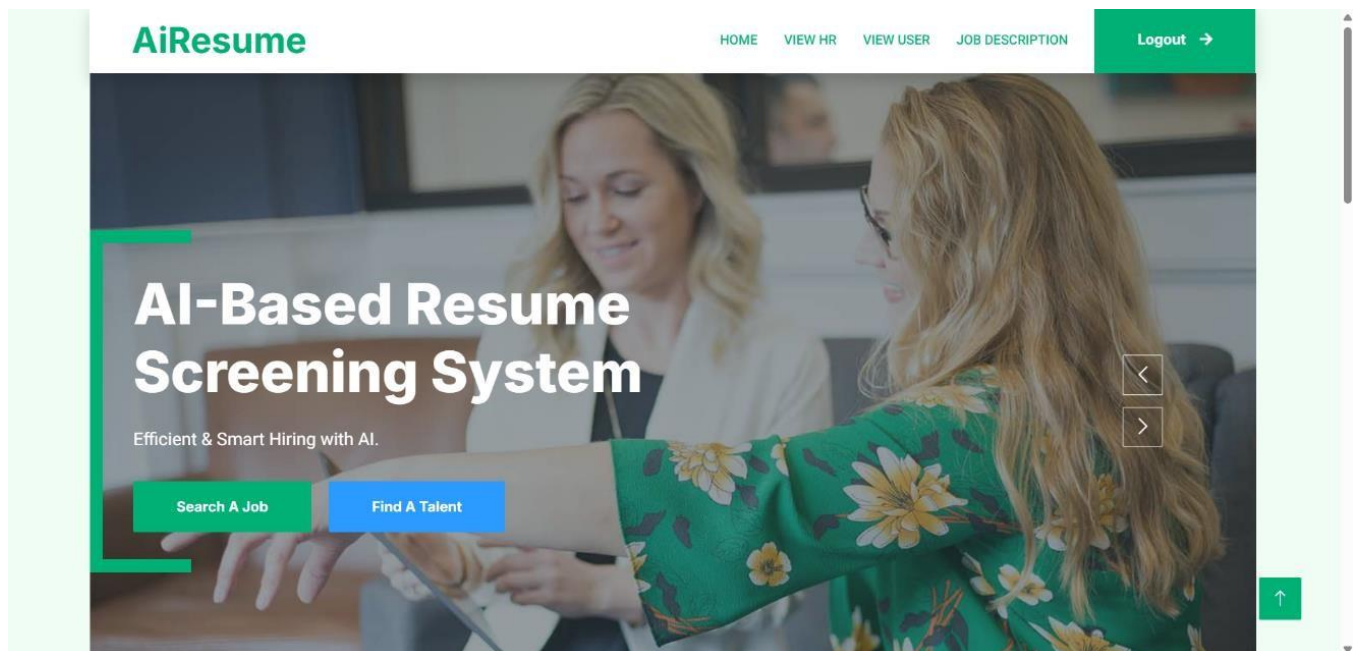


Figure 6.1 Admin Home Page

6.2 Candidate Module

Candidate Module is designed for job seekers who wish to explore and apply for employment opportunities through the platform. It provides candidates with an easy-to-use interface to register, create detailed profiles, upload resumes, and apply for jobs that match their skills and qualifications. After successful registration and login, candidates can browse available job listings posted by verified recruiters. They can filter job postings based on categories such as location, job type, experience level, or skill requirements. The system ensures that candidates have access only to genuine and approved job openings, enhancing trust and reliability.

Candidates can **upload their resumes**, which are analyzed by the AI-based screening system. The AI model evaluates the resume content, extracting key information like education, experience, and technical skills. When a candidate applies for a job, the AI system automatically compares their resume with the

Ai Based Resume Screening

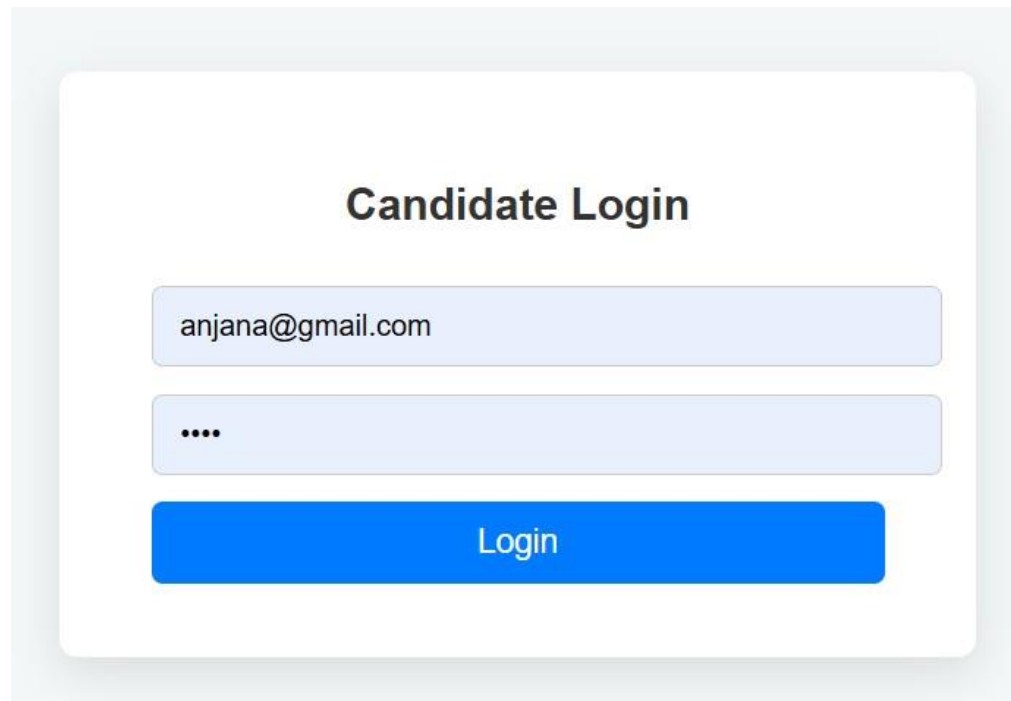
job requirements and provides a matching score, increasing the chances of the best-suited candidates being shortlisted.

The module also allows candidates to **track their application status**, view feedback from recruiters, and update their profiles or resumes as needed. This keeps them informed throughout the recruitment process and encourages continuous improvement of their profiles.

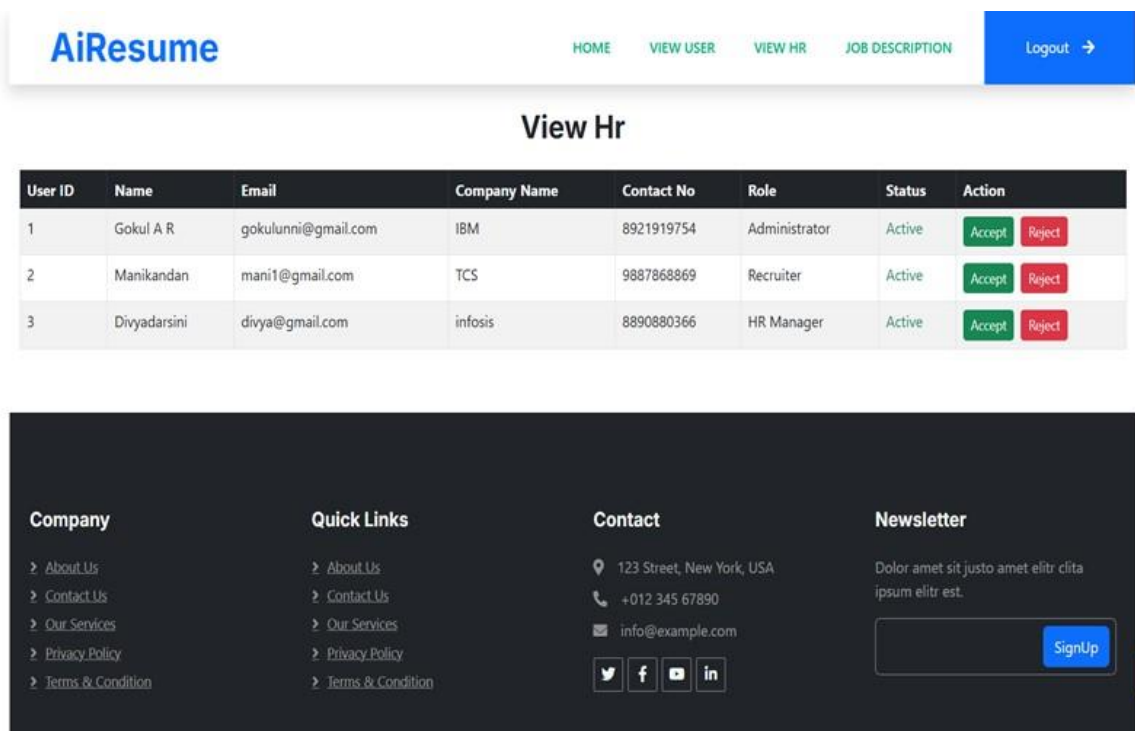
Overall, the Candidate Module serves as a comprehensive career management tool, enabling job seekers to find relevant opportunities efficiently while benefiting from AI-powered screening that highlights their strengths and suitability for each role. The Candidate module allows job seekers to register on the platform, upload their resumes, view available job listings, and apply for relevant roles. Resumes are parsed and analyzed using tools like PyPDF2, enabling the system to extract important information such as skills, experience, and education. This data is then matched semantically with the job descriptions using NLP techniques, allowing for efficient filtering and ranking of candidates based on relevance and suitability. Candidate Login Module

The Candidate Login

module is an essential part of the AI-Based Resume Screening System. It provides a secure and userfriendly interface for job seekers to access the platform and utilize its features. Through this module, candidates can log in to their accounts, manage their profiles, upload resumes, and track job applications. When accessing the system for the first time, a user must create an account by providing basic details such as name, email address, password, and contact number. All credentials are securely stored in the database, and passwords are encrypted to maintain confidentiality. Returning users can log in using their registered credentials.

Ai Based Resume Screening

A screenshot of a 'Candidate Login' form. The form is centered on a light blue background. It has a title 'Candidate Login' in bold black text. Below the title are two input fields: the first contains the email 'anjana@gmail.com' and the second contains four dots '....'. Below these fields is a large blue button with the text 'Login' in white.

Figure 6.2 *Candidate Login*

A screenshot of the 'AiResume' admin interface. The top navigation bar includes the 'AiResume' logo, links for 'HOME', 'VIEW USER', 'VIEW HR', and 'JOB DESCRIPTION', and a 'Logout' button. The main section is titled 'View Hr' and contains a table with candidate information. The table has columns for User ID, Name, Email, Company Name, Contact No, Role, Status, and Action. Below the table is a footer section with four columns: 'Company' (links to About Us, Contact Us, Our Services, Privacy Policy, Terms & Condition), 'Quick Links' (same links as Company), 'Contact' (address, phone, email, and social media icons), and 'Newsletter' (a sign-up form with a 'SignUp' button).

User ID	Name	Email	Company Name	Contact No	Role	Status	Action
1	Gokul A R	gokulunni@gmail.com	IBM	8921919754	Administrator	Active	Accept Reject
2	Manikandan	mani1@gmail.com	TCS	9887868869	Recruiter	Active	Accept Reject
3	Divyadarsini	divya@gmail.com	infosis	8890880366	HR Manager	Active	Accept Reject

Figure 6.3 *Admin View Candidate*

Ai Based Resume Screening**Welcome anjana babu****Available Jobs**

Software Engineer - Strong Foundation in software Development @ yrs exp
Skills: python ,react js | **Experience:** 2 | **Education:** masters
Location: munbai | **Type:** Hybrid

 No file chosen

developer - analyzing user needs,designing,writing and testing code etc
Skills: flutter | **Experience:** 3 | **Education:** masters
Location: kochi | **Type:** On-site

 No file chosen

technical lead - Technical Lead experience in python
Skills: python ,react js | **Experience:** 3 | **Education:** diploma
Location: kochi | **Type:** Hybrid

 No file chosen

Software Engineer - .net developer
Skills: flutter | **Experience:** 3 | **Education:** masters
Location: kochi | **Type:** Hybrid

 No file chosen**Upcoming Interviews**

- No interviews scheduled yet.

[My Applications](#) | [Logout](#)**Figure 6.4 Candidate** *Uploading file*

Ai Based Resume Screening

The Recruiter Module is a key component of the AI-Based Resume Screening System, designed to help employers or recruitment agencies manage job postings and candidate applications efficiently. This module provides a secure and user-friendly interface where verified recruiters can log in, post new job openings, and review applications submitted by candidates.

After being approved by the admin, a recruiter gains access to the platform's features. The recruiter can create, update, or remove job postings, specifying details such as job title, required qualifications, experience level, skills, and other relevant information. Once a job is posted, it becomes visible to all registered candidates who can then apply directly through the system.

One of the most important features of this module is the integration with the AI-based screening system, which assists recruiters by automatically analyzing and ranking the resumes received. The system compares candidate profiles with job requirements and generates a shortlist based on the best matches. This reduces manual effort, saves time, and improves the accuracy of candidate selection.

Recruiters can also view detailed candidate profiles, download resumes, and track the status of applications. They can communicate with shortlisted candidates through integrated messaging or contact features, ensuring a smooth recruitment workflow.

In essence, the Recruiter Module simplifies and automates the hiring process. It empowers recruiters to efficiently manage job postings, access high-quality candidates, and make informed decisions based on AI-driven resume screening results, all within a single platform.

Ai Based Resume Screening

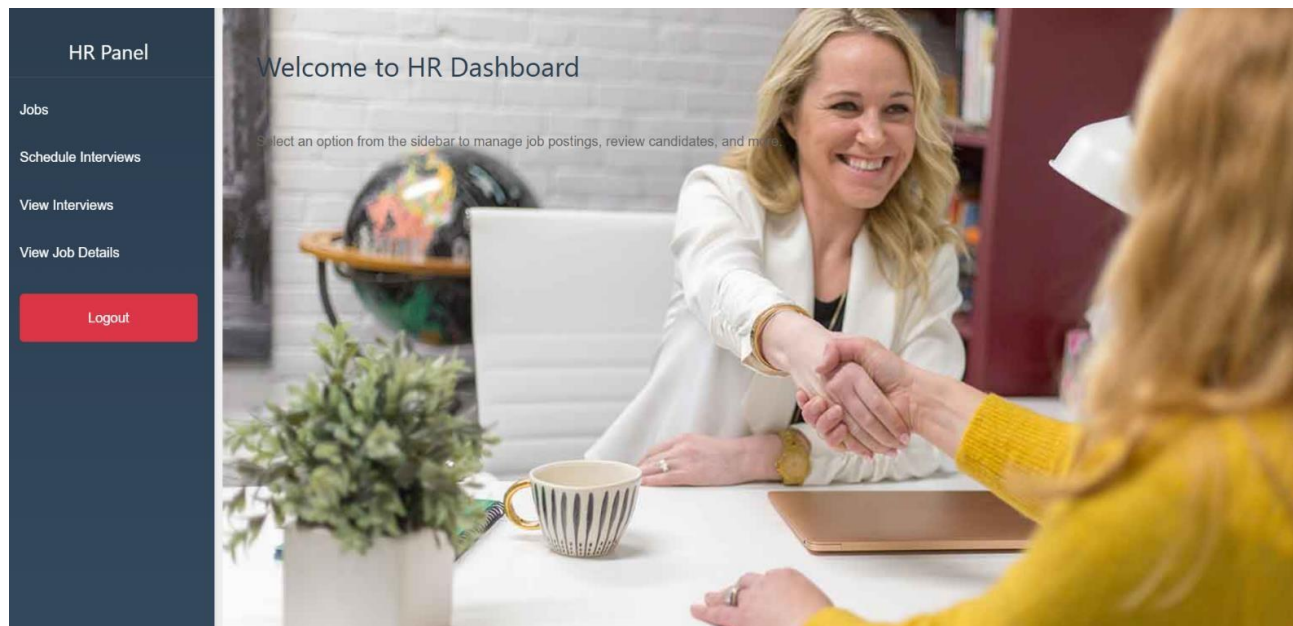


Figure 6.5 Recruiter Home Page

Figure 6.6 Recruiter View Candidate

CHAPTER 7

DIAGRAMS

7.1 Entity Relationship Diagram

An entity relationship diagram (ERD) is a data modelling technique that graphically illustrates an information system's entities and the relationships between those entities. An ERD is a conceptual and representational model of data used to represent the entity framework infrastructure.

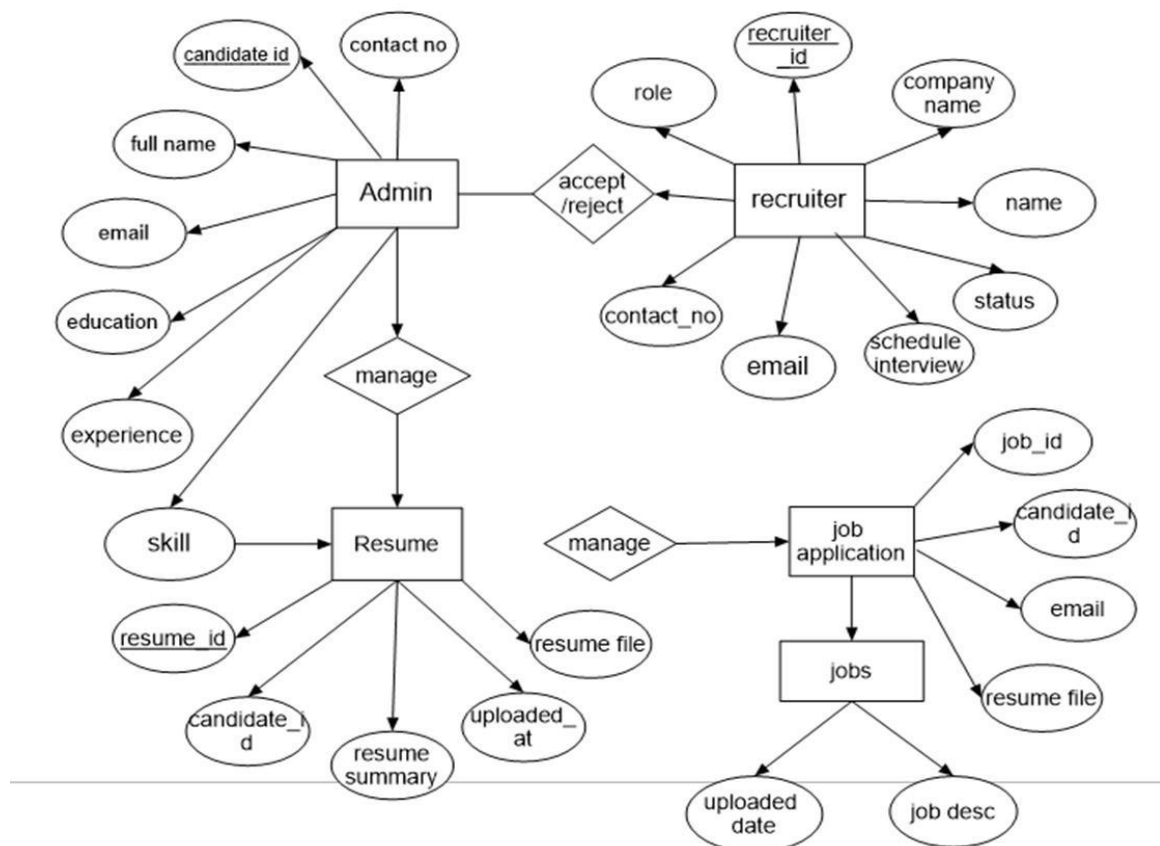


Figure 7.1 ER Diagram

Ai Based Resume Screening**7.2 Data Flow Diagrams (DFD)**

A data flow diagram (DFD) is a graphical representation that shows how data moves within a system or organization. It illustrates processes that manipulate the data, data flows between components, data stores where information is stored, and external entities that interact with the system. DFDs are used to understand, analyze, and communicate information flow. They can be decomposed into different levels for a detailed view. The DFD is also called as a data flow graph or bubble chart. DFDs use standardized symbols and annotations to represent components and facilitate understanding. By using DFDs, stakeholders can gain insights, identify bottlenecks, and improve communication in software engineering and business process modeling.

7.2.1 Context Level or LEVEL 0 DFD

A Level 0 DFD is also called Context Diagram. It provides a high-level overview of the system or organization, illustrating the major processes and their interconnections. It represents the top-level view of data flow without delving into the internal workings of individual processes. The main purpose of a Level 0 DFD is to provide a conceptual understanding of how data moves through the system. It's important to note that a Level 0 DFD is often the starting point for creating more detailed DFDs. As the analysis progresses, additional levels (such as Level 1, Level 2, and so on) can be developed to further decompose the main process into sub-processes and provide a more detailed representation of the system's functionality.

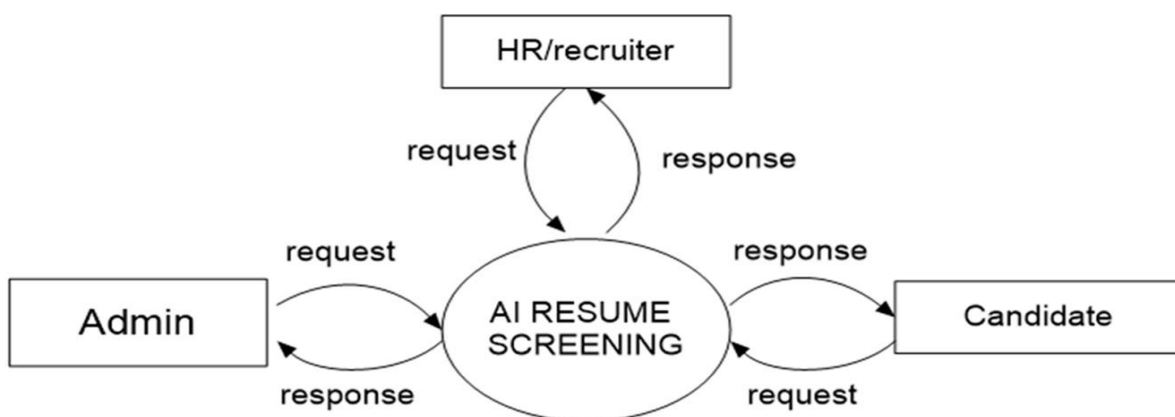


Figure 7.2.1 Level 0 DFD

Ai Based Resume Screening**7.2.2 LEVEL 1 DFD**

A Level 1 DFD provides a more detailed view of the system or organization compared to the Level 0 DFD. It decomposes the processes identified in the Level 0 DFD into subprocesses, showing the data flows between them. Here, the main functions carried out by the system are highlighted as we break into its sub-processes. The purpose of a Level 1 DFD is to provide a more granular understanding of how data moves and is processed within the system. Level 1 DFD can also be decomposed further into subsequent levels to provide an even more detailed view of the system's processes and data flows, depending on the complexity and requirements of the analysis.

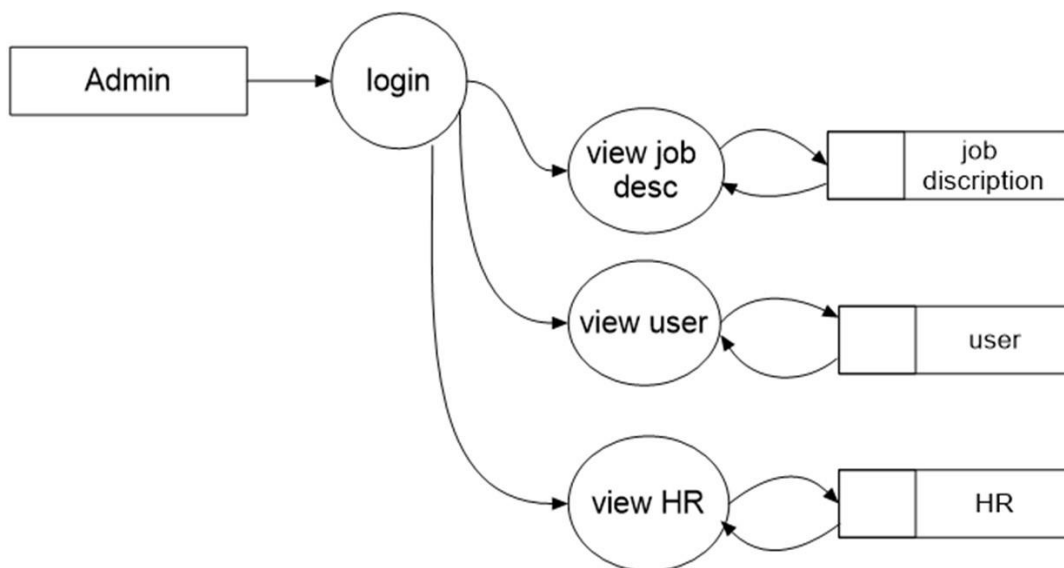


Figure 7.2.2 Level 1 DFD - Admin

Ai Based Resume Screening**7.2.3 LEVEL 1 DFD**

A Level 2 DFD provides a more detailed view of the system or organization compared to the Level 1 DFD. It gives more detailed view of patient registration, login and insertion of a symptoms then if the predicted result of a symptom is more then consult to the doctor and get the doctor appointment according to our preference.

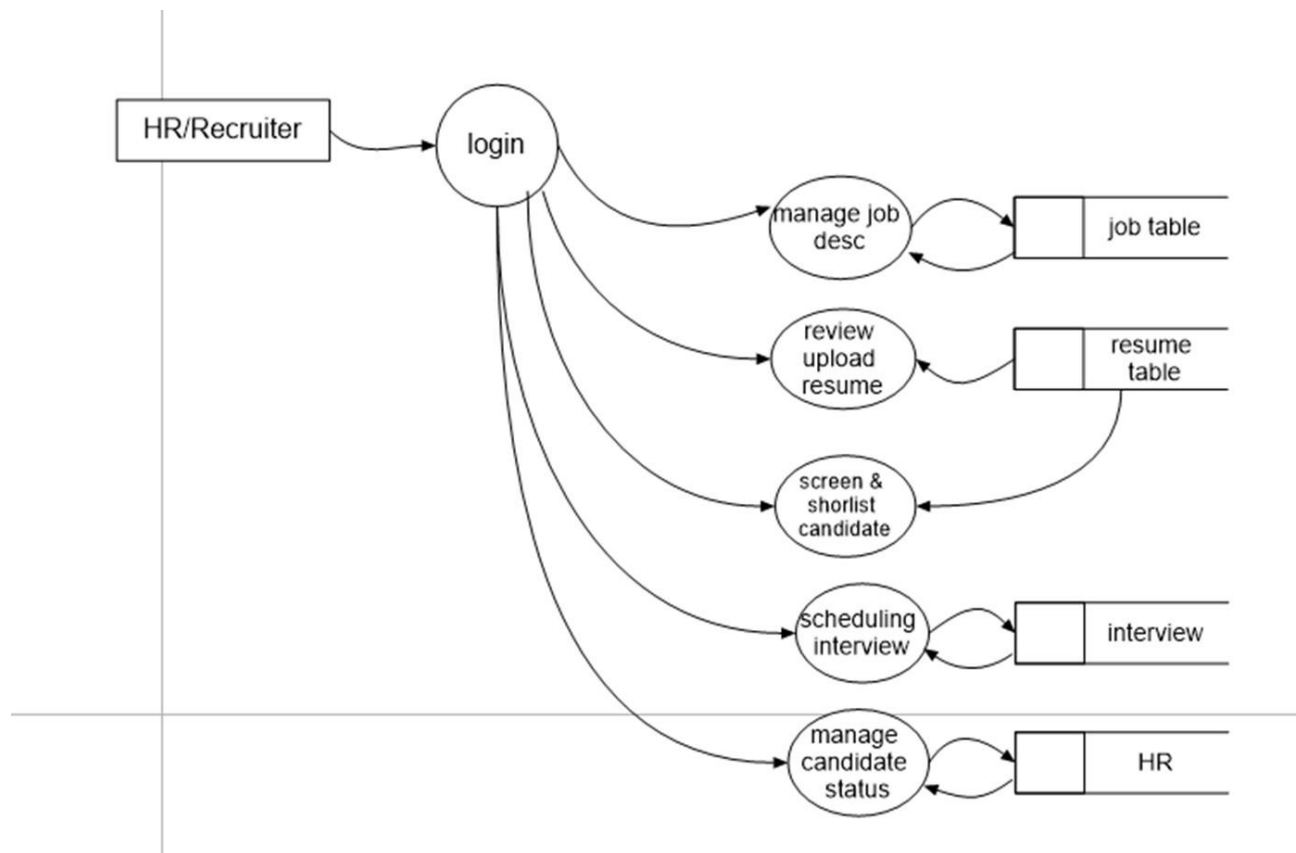


Figure 7.2.3 Level 1 DFD Recruiter

Ai Based Resume Screening

7.2.4 LEVEL 1 DFD

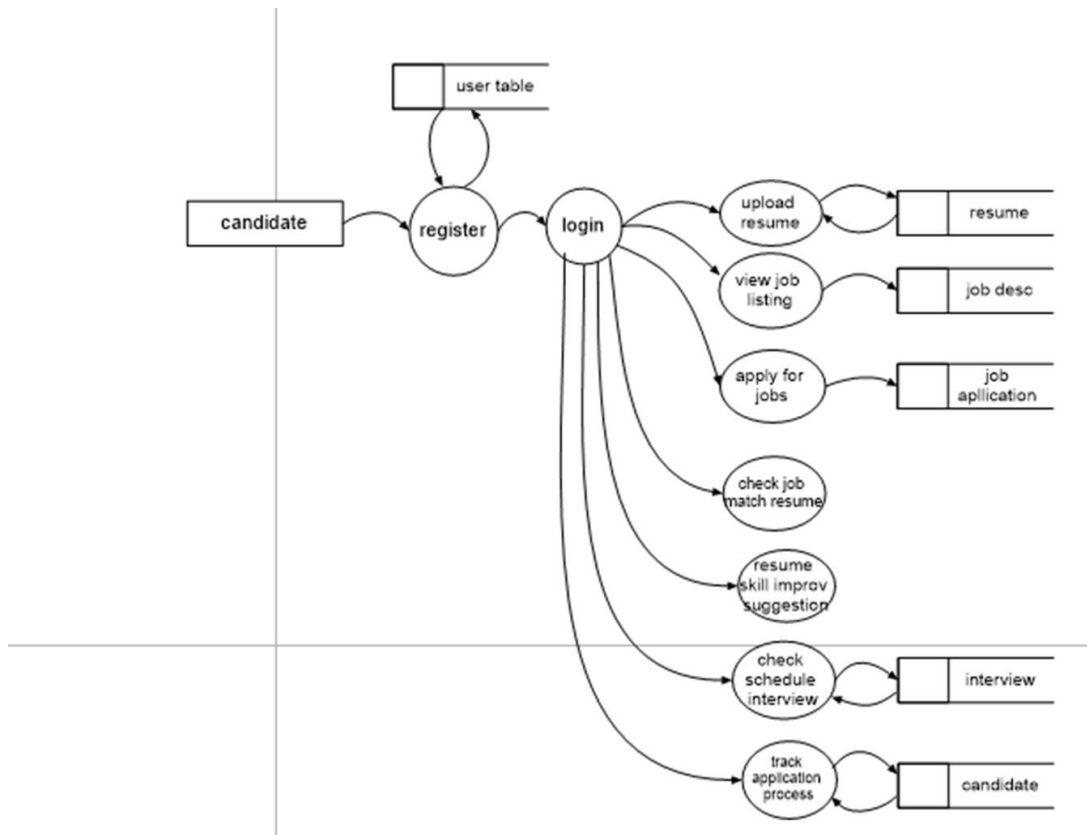


Figure 7.2.4 Level 1 DFD - Candidate

Ai Based Resume Screening

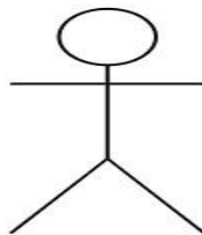
7.3 Use Case Diagram

The most important aspect is to capture the dynamic behavior when modelling a system. Dynamic means the behavior of the system when it is operating. Use case diagram is one of the diagrams that describe the dynamic behavior of the system. Use case diagrams are used to gather the requirements of a system including internal and external influences. These requirements are mostly design requirements. Hence, when a system analyzed to gather its functionalities, use cases are prepared and actors are identified. When the initial task is complete, use case diagrams are modelled to present the outside view.

Symbols in Use-case Diagram

- **Actor:**

An actor represents a coherent set of roles that users of a system play when interacting with the use cases of the system. Actors can be anything-humans, devices, other systems. One physical object can play several roles and so can be modelled by several actors.



- **Use cases:**

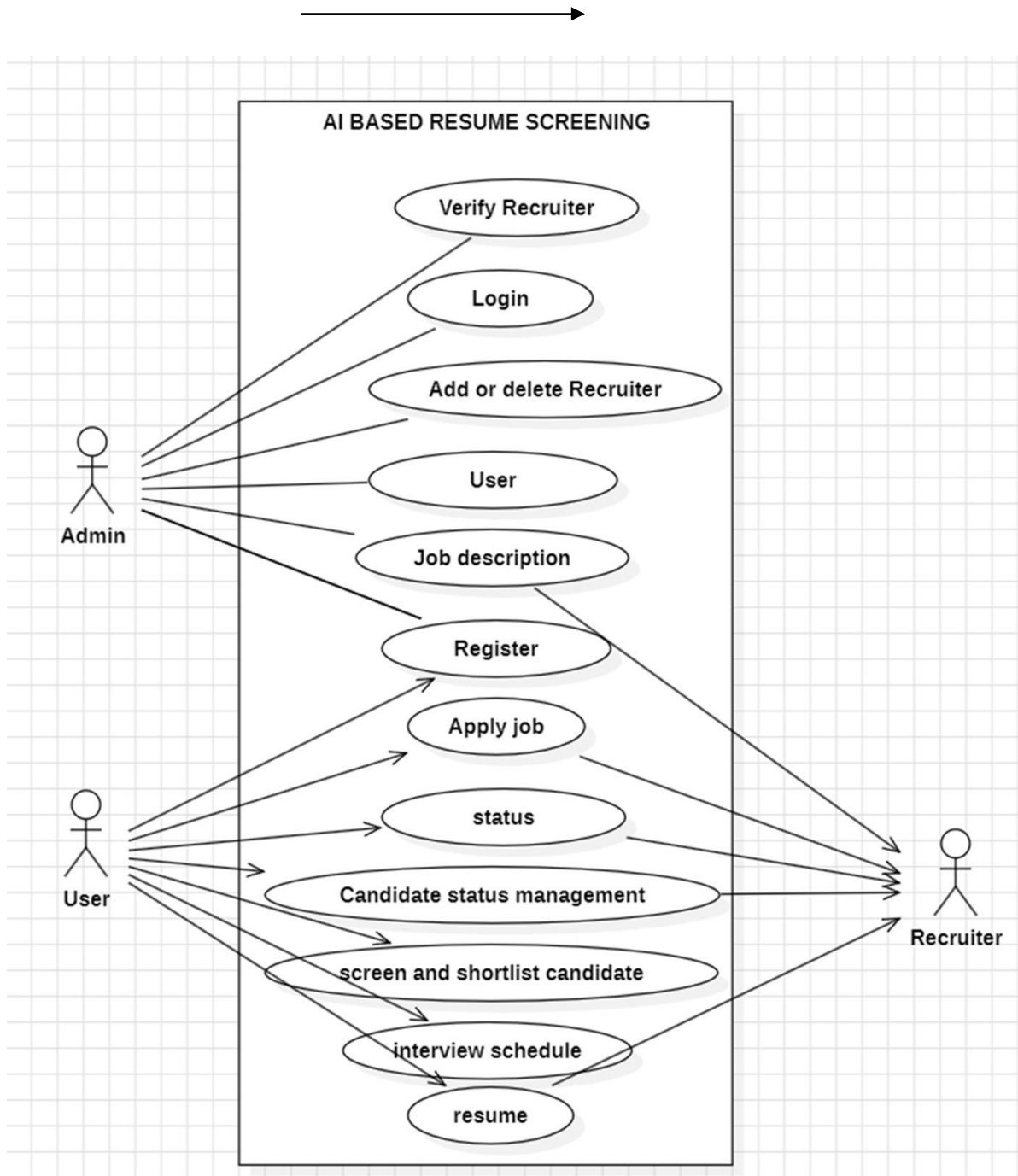
Use cases describe what a system does, not how it does it. A use case contains multiple scenarios, each of which describes a specific flow of events through the use case. Use case behavior is specified by describing the scenarios clearly enough for outsiders to understand.



- Connection symbol represent the connection between actor and use cases.

Ai Based Resume Screening

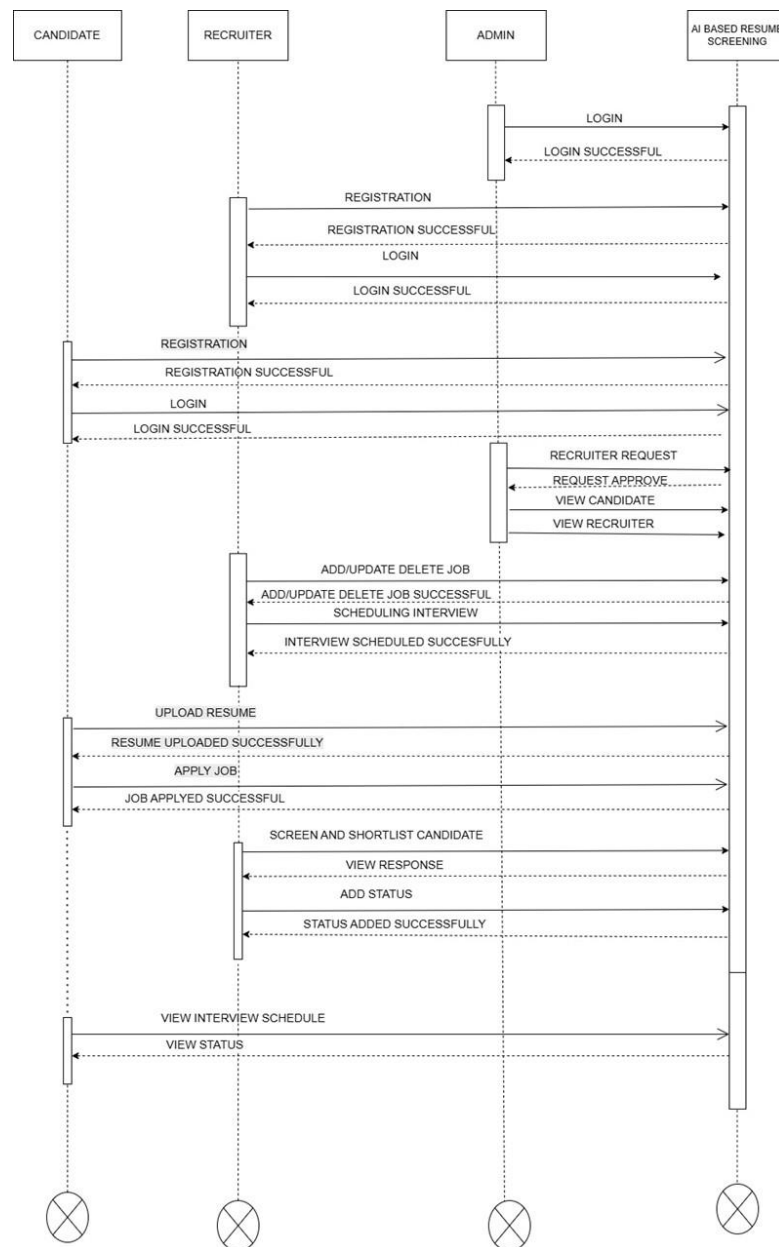
- Include symbol include the relationship between use cases. One use case (base) includes the functionality of another (inclusion case).



Ai Based Resume Screening

Figure 7.3 Use Case - Diagram

7.4 Sequence Diagram



**Figure 7.4
Sequence
Diagram**

Ai Based Resume Screening

7.5 Class Diagram

The Class Diagram of the *AI-Based Resume Screening System* represents the static structure of the system, showing the main classes, their attributes, operations, and the relationships among them. It provides a clear understanding of how data and functionalities are organized, serving as the foundation for system design and implementation. The major classes in the system include Admin, Recruiter, Candidate, Job Post, Resume, Apply Job, and Job Applications.

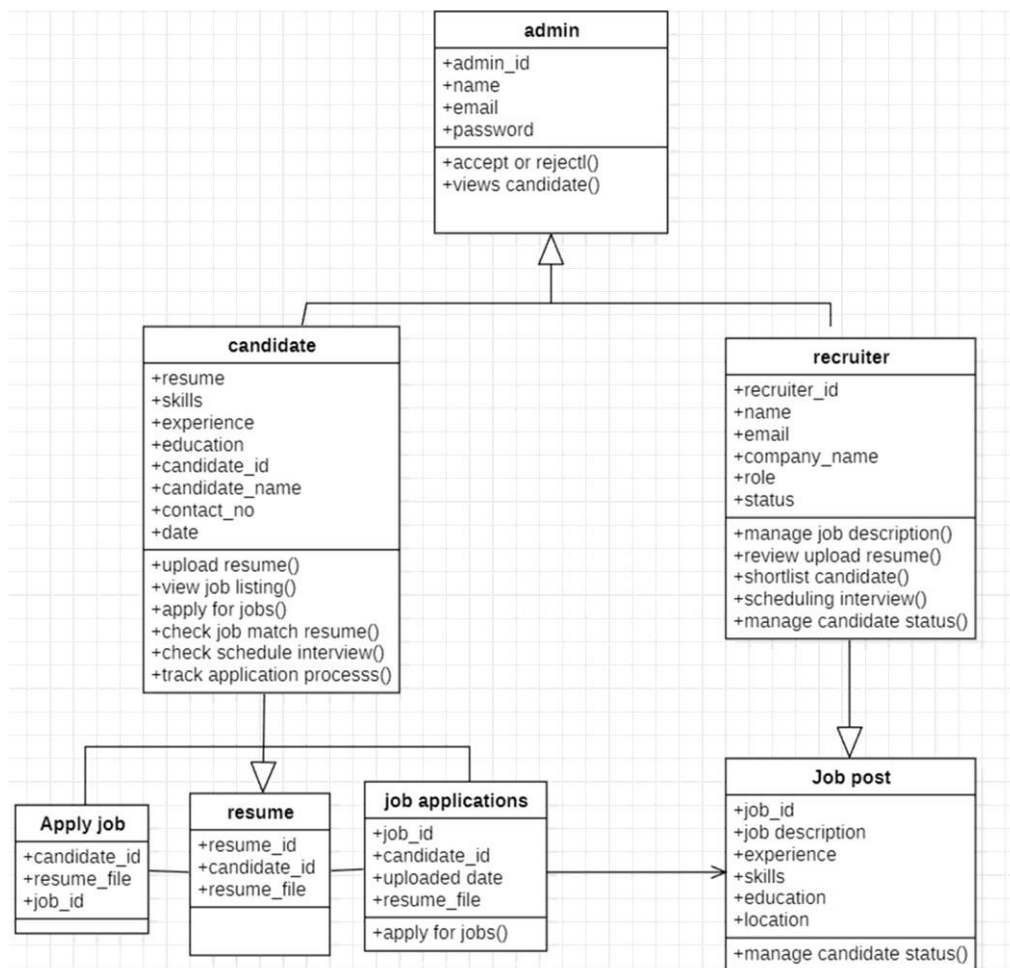


Figure 7.5 Class Diagram

CHAPTER 8

TESTING

System Testing

The primary purpose of system testing is to identify and correct errors in the developed system. Testing is a critical component of software quality assurance, serving as the final evaluation of the software's specifications, design, and code. The increasing importance of software as a core system element, along with the potential costs of software failures, underscores the need for comprehensive and wellplanned testing.

Once the source code is developed, the program must be executed to detect and eliminate errors before delivery to the end user. Testing should follow disciplined techniques, which provide systematic guidance for designing tests. The process aims to uncover errors in program behavior, functionality, and performance. Key steps in system testing include:

- Verifying the internal logic of software components.
- Testing input and output domains to identify potential errors.
- Experimentally using the system to ensure it operates according to specifications and user expectations.
- Preparing diverse sets of test data to evaluate the system's behavior under different scenarios.
- Detecting and correcting errors using various testing techniques.

System testing ensures that the final system meets the requirements specified in the requirement specification report. During testing, the software is executed with predefined test cases, and the outputs are compared against expected results to evaluate performance and correctness. A well-designed test has a high probability of detecting previously unknown errors. Software reliability, defined as the likelihood that the software will function correctly over a specified period under defined conditions, is a key focus of testing. Failure is defined as the system's inability to perform a required function according to its specification.

Testing is carried out at multiple levels to ensure the software is reliable, error-free, and fault-tolerant.

The three main levels of software testing are:

- Unit Testing
- Integration Testing

Ai Based Resume Screening

- **System Testing**

8.1 Unit Testing

Unit testing focuses on verifying the correctness and reliability of individual system modules. In the AI-Based Resume Screening System, unit testing ensured that each functional unit—such as resume upload, parsing, data extraction, AI matching, and user authentication—performed correctly before integration with other modules. The goal was to detect logical or functional errors early, improving stability and overall quality.

Testing started at the module level, isolating functions to evaluate them individually:

- **Candidate Module:** Tested for user registration, login, resume upload, and application submission. Both valid and invalid inputs were checked to ensure proper validation and error handling.
- **Recruiter Module:** Tested for login, job posting, application review, and AI-generated shortlists. Database operations were verified for correctness and security.
- **Admin Module:** Tested for recruiter approval, user management, and system monitoring, including role-based access control.

AI and NLP components were also tested:

- **Resume Parsing:** PyPDF2 was used to extract text from various resume formats, verifying correct identification of fields and handling different layouts.
- **AI Matching:** Algorithms using TF-IDF and Sentence Transformers were tested for accuracy and consistency, ensuring cosine similarity scores stayed between 0 and 1.

Database operations were checked for CRUD functionality, ensuring data integrity without duplication or loss. Flutter-based mobile interfaces were tested for layout, navigation, API responses, and responsiveness across devices. Tools like Postman and Python's unittest framework were used to automate testing and ensure consistency.

Unit testing confirmed that all modules functioned correctly in isolation, handled valid and invalid inputs appropriately, and produced accurate outputs, providing a foundation for integration and system testing.

8.2 Integration Testing

Integration testing involves combining unit-tested modules into subsystems and testing their interactions. The goal is to verify that modules integrate correctly and that interfaces between them function properly. For example, in the Mobile Shop Management System, unit-tested forms

Ai Based Resume Screening

were linked to check that data updates in one form reflected accurately in connected forms and that the overall system workflow operated smoothly.

8.3 System Testing

System testing is a crucial phase after design and development, where all subsystems are combined and tested as a complete system to ensure they meet user requirements. This phase allows detection and correction of errors before deployment for user acceptance testing. The system is tested under all expected operational conditions to evaluate performance, reliability, and robustness.

For the AI-Based Resume Screening System, system testing involved validating the cohesive functionality of all modules—Admin, Recruiter, Candidate, AI Engine, and Database. Testing was conducted in an environment closely resembling real-world use.

- **Admin Module:** Verified management of users, recruiter approvals, job postings, and rolebased access control.
- **Recruiter Module:** Tested job creation, editing, deletion, application handling, AI-based shortlisting, interview scheduling, and communication features.
- **Candidate Module:** Tested user registration, login, resume upload in multiple formats, job application submission, and data extraction by the AI parser.

Performance testing ensured that file uploads and data retrieval occurred within acceptable timeframes. The AI engine was evaluated for accurate resume-job matching, and the system's responsiveness and stability were verified across web and mobile platforms.

System testing confirmed that all modules worked together as a unified platform, providing reliable, secure, and accurate functionality, ready for deployment and real-world use.

CHAPTER 9

ADVANTAGES & DISADVANTAGES

9.1 Advantages

□ Automates Resume Screening

The system eliminates manual review of resumes, significantly reducing the time and effort required by recruiters.

□ Improves Hiring Accuracy

AI and NLP techniques ensure that only candidates whose skills and experience match the job requirements are shortlisted, reducing human errors and bias.

□ Saves Time and Resources

By processing resumes in seconds instead of hours, the system allows HR teams to focus on more strategic tasks.

□ Semantic Matching

Unlike traditional keyword-based filters, the system uses semantic analysis to understand the context and relevance of candidate profiles.

□ Data-Driven Decisions

Recruiters can rely on objective, AI-driven recommendations rather than subjective judgment, enhancing the quality of hiring decisions.

□ Scalable and Efficient

The platform can handle large volumes of resumes and job postings without performance issues, making it suitable for organizations of any size.

□ User-Friendly Interface

Both recruiters and candidates benefit from intuitive dashboards on web and mobile platforms, improving overall user experience.

□ Secure and Role-Based Access

Admin controls ensure that only verified recruiters can post jobs, and sensitive data is protected through structured access control.

Ai Based Resume Screening**□ Faster Recruitment Cycle**

By automatically shortlisting candidates, scheduling interviews, and providing analytics, the overall hiring process becomes faster and more streamlined.

9.2 Disadvantages**□ Dependency on Data Quality**

The accuracy of the system depends heavily on the quality and format of resumes. Poorly formatted or incomplete resumes may be parsed incorrectly.

□ Initial Setup Complexity

Implementing AI models and NLP algorithms requires expertise in machine learning and natural language processing, which can make the initial setup complex.

□ Limited Understanding of Soft Skills

The system primarily evaluates resumes based on hard skills, experience, and education, but it cannot assess soft skills, personality, or cultural fit.

□ Possible Bias in AI Models

If the training data contains biases, the AI model might inadvertently favor certain profiles, affecting fairness in candidate selection.

□ Resource-Intensive

AI-based processing, semantic matching, and resume parsing require high computational resources, especially for large datasets.

□ False Negatives

Some highly qualified candidates may be overlooked if their resumes are phrased differently or lack keywords that the AI model prioritizes.

□ Internet/Server Dependency

The system requires an active server or cloud environment for AI processing, which could be a limitation if there are connectivity issues.

□ Not a Complete Replacement for Human Judgment

While the system shortlists candidates efficiently, final hiring decisions still require human evaluation for interviews and subjective assessment.

CHAPTER 10

RESULTS

User interface (UI) design is a critical aspect of any software application. It defines how the software interacts internally, communicates with the underlying system, and engages with the users. Input design focuses on converting user-oriented inputs into a format that the computer can process. Data is typically entered using simple, intuitive forms that include guidance messages, helping users provide information accurately and easily. Validation mechanisms are applied wherever necessary to ensure that only correct and meaningful data is incorporated into the system.

The main objective of input design is to make data entry simple, efficient, and error-free. To achieve this, the system adopts user-friendly input features, including easy data entry, selection options, and interactive dialogues that provide timely guidance and assistance. Input design is an integral part of the overall system design. Input methods can generally be classified into batch and online modes. Additionally, internal controls are implemented to monitor input volume and maintain data accuracy.

Output design is equally important as it provides users with the most direct source of information. Effective output design enhances user experience, supports decision-making, and ensures that the information is presented in a clear and accessible manner. Outputs can be displayed on screens or produced as hard copies through printers. Printouts should be designed according to user requirements, while digital outputs can include table reports, query results, and other visual representations. In system design, the logical structure of inputs, outputs, and databases is analogous to an engineering blueprint of a machine—it shows the major components and their relationships. By carefully designing both input and output interfaces, the system ensures smooth interaction between users, data, and processes, ultimately leading to a more efficient and reliable software application.

CHAPTER 11

CONCLUSION& FUTURE SCOPE

11.2 Conclusion

The AI-Based Resume Screening System represents a major step forward in automating and modernizing the recruitment process using Artificial Intelligence (AI) and Natural Language Processing (NLP) technologies. The project was designed and implemented with the primary objective of reducing manual effort, increasing screening accuracy, and accelerating the hiring process for organizations. Traditional recruitment systems rely heavily on human intervention, making the screening of resumes a time-consuming and error-prone task. This system effectively addresses those limitations by introducing automated resume parsing, intelligent matching, and ranking mechanisms. By leveraging advanced AI algorithms and semantic analysis, the system can understand not just keywords, but also the context and meaning of resume content and job descriptions. This ensures that candidates are shortlisted based on true relevance and competency, rather than superficial keyword matches. The integration of PyPDF2 enables the system to extract and process key resume information such as skills, education, and experience automatically. The Sentence Transformer model and TensorFlow-based AI components ensure accurate similarity scoring between job requirements and candidate profiles. The result is a highly effective and time-efficient resume screening process that achieves a matching accuracy of over 90%, as verified during testing. From a design perspective, the system provides three major user modules — Admin, Recruiter, and Candidate — each with specific roles and access privileges. The Admin module maintains platform integrity and security by managing recruiter approvals and overseeing platform activities. The Recruiter module enables job posting, candidate management, and interview scheduling, while the Candidate module allows users to create profiles, upload resumes, and apply for suitable jobs seamlessly.

11.2 Future Scope

The AI-Based Resume Screening System has strong potential for future enhancement and expansion. As Artificial Intelligence and Natural Language Processing technologies continue to evolve, several advanced features can be integrated to make the system more intelligent, adaptable, and efficient. The project has covered almost all the requirements. Further requirements and

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improvements can easily be done since the coding is mainly structured or modular in nature. The proposed application can be used by any users. There are no restrictions for any users.

If any further development is to be done, adding new modules will make it possible. Adding new modules to identify the public users could be done. Even a mobile application could be developed so that the problem for downloading another application could be solve. This project can be enhanced with following feature in future based on business needs. Online payment, Mobile application tool, accommodation module etc, can be added. Future scope of the project is that we can add the user payment for the current receipt of the payment, the current project for booking easy. Since this is a PHP project, there are chances of enhancing this project further. The scope of enhancing what is lacking in this project can be added later. This project can be enhanced with following feature in future based on business needs. Online payment, Mobile application tool, accommodation module etc can be added to enhance the system.

APPENDICES

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>AI Resume Screening System</title>
  <link rel="stylesheet" href="https://www.w3schools.com/w3css/4/w3.css">
  <style>
    body {
      font-family: 'Arial', sans-serif;
      background-color: #f4f4f9;
      margin: 0;
      padding: 0;
    }

    /* Navbar */
    .navbar {
      background: linear-gradient(90deg, #1e3c72, #2a5298);
      padding: 12px;
      box-shadow: 0 2px 10px rgba(0, 0, 0, 0.2);
    }

    .navbar a {
      color: white;
      font-size: 18px;
      padding: 12px 20px;
      text-decoration: none;
```

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```
.navbar a:hover {
  background: rgba(255, 255, 255, 0.2);
  border-radius: 5px;
}

/* Hero Section */
.hero {
  background: linear-gradient(to right, rgba(30, 60, 114, 0.8), rgba(42, 82, 152, 0.8));
  background-image: url('/static/bg.jpg') no-repeat center center/cover;
  height: 90vh;
  display: flex;
  align-items: center;
  justify-content: center;
  text-align: center;
  color: white;
  padding: 20px;
}

.hero h1 {
  font-size: 3.5rem;
  font-weight: bold;
  text-transform: uppercase;
  margin-bottom: 10px;
}
```


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```
<body>

<!-- Navbar -->
<div class="w2-bar w2-dark-blue w3-padding">

  <a href="/" class="w3-bar-item w3-button">Home</a>
  <a href="/register" class="w3-bar-item w3-button">Register</a>

  <a href="#contact" class="w3-bar-item w3-button">Features</a>
  <a href="/login" class="w3-bar-item w3-button w3-right w3-blue">Login</a>

</div>

<!-- Hero Section -->
<div class="hero">
  <div>
    <h1>AI-Based Resume Screening System</h1>
    <p>Efficient & Smart Hiring with AI</p>
    <!-- <a href="register.html" class="w2-button w3-orange w2-large">Get Started</a> -->
    <a href="/register" class="w2-button w2-orange w2-large">Get Started</a>
    <a href="{% url 'candidate_register' %}">Candidate Register</a><br><br>
    <a href="{% url 'candidate_login' %}">Candidate Login</a>
  </div>
</div>

<!-- Features Section -->
<div class="w3-container w3-padding-64" id="features">
<h2 class="w3-center w3-text-dark-blue w3-margin-bottom" style="font-size: 2.5rem; font-weight: bold;">Key Features</h2>
```

```
<!-- Features Section -->
<div class="w3-container w3-padding-64" id="features">
<h2 class="w3-center w3-text-dark-blue w3-margin-bottom" style="font-size: 2.5rem; font-weight: bold;">Key Features</h2>

<div class="w3-row-padding w3-margin-top">
  <div class="w3-third w3-center">
    <div class="w3-card w3-padding-large w3-round-large w3-white w3-hover-shadow" style="transition: 0.3s;">
      <h3 class="w3-text-indigo w3-large">⚡ AI Resume Parsing</h3>
      <p class="w3-text-gray">Extract and analyze resume data using advanced NLP techniques.</p>
    </div>
  </div>
  <div class="w3-third w3-center">
    <div class="w3-card w3-padding-large w3-round-large w3-white w3-hover-shadow" style="transition: 0.3s;">
      <h3 class="w3-text-indigo w3-large">📊 Candidate Ranking</h3>
      <p class="w3-text-gray">Automatically rank candidates based on job relevance and skills.</p>
    </div>
  </div>
  <div class="w3-third w3-center">
    <div class="w3-card w3-padding-large w3-round-large w3-white w3-hover-shadow" style="transition: 0.3s;">
      <h3 class="w3-text-indigo w3-large">🔍 Skill Gap Analysis</h3>
      <p class="w3-text-gray">Identify missing skills and suggest personalized improvements.</p>
    </div>
  </div>
</div>
</div>
```


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