# Vishwakarma Institute of Information Technology

(An autonomous institute affiliated with Savitribai Phule Pune University)

# Department of Information Technology

Project I

## "Skill Recommendation System and Resume Analysis using AI"

### Submitted By:

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**Problem Statement:** "Skill Recommendation System and Resume Analysis using AI"

- Smart resume analysis involves using artificial intelligence (AI) and machine learning (ML) techniques to analyze and extract relevant information from resumes.

- This process aims to automate the initial screening of resumes, helping recruiters and hiring managers efficiently identify suitable candidates for job positions.

## Scope:

The scope of smart resume analysis is broad and encompasses several aspects of the recruitment process. Here are some key areas where smart resume analysis can be beneficial:

- **Efficient Candidate Screening**: Smart resume analysis can help recruiters quickly screen a large number of resumes, identifying top candidates based on their skills, experience, and qualifications.

- **Skill Matching**: By analyzing resumes and job descriptions, smart resume analysis can match candidates with the required skills and experience for a particular job, ensuring a better fit between candidates and job positions.

- **Automated Candidate Ranking**: Smart resume analysis can automatically rank candidates based on their suitability for a job, helping recruiters prioritize their efforts and focus on the most promising candidates.

- **Identifying Relevant Keywords**: Smart resume analysis can identify relevant keywords in resumes and job descriptions, helping recruiters find candidates who have the specific skills and qualifications they are looking for.

- **Personalized Candidate Recommendations**: By analyzing historical hiring data, smart resume analysis can provide personalized recommendations for candidates who are likely to be a good fit for a particular job or company culture.

## Objective:

The objective of smart resume analysis is to revolutionize the recruitment process by leveraging artificial intelligence and machine learning techniques to automate and enhance the screening and analysis of resumes. By using advanced algorithms, the system aims to efficiently process a large volume of resumes, extract relevant information, and match candidates with job requirements. This automation not only saves time and resources for recruiters but also ensures a more objective and unbiased evaluation of candidates based on their qualifications and skills. Additionally, smart resume analysis aims to improve the overall candidate experience by providing quicker responses and more personalized feedback. Ultimately, the goal is to streamline the recruitment process, improve the quality of hires, and drive greater efficiency in talent acquisition for organizations.

# 1) Introduction

This paper analyzes AI methods for automating HR tasks in the hiring process, with a particular emphasis on resume parsing and candidate shortlisting according to a variety of criteria like work history, interests, and skill sets. The technology expedites the decision-making process for reviewing resumes that have been shortlisted by using data visualization approaches to communicate selection outcomes. The objective of this system is to streamline the hiring process by automating the resume review process.

This project is an innovative application that automate the resume analysis process using techniques from artificial intelligence (AI) and natural language processing (NLP). This Streamlit-based online program allows users to upload their resumes, from which it parses them to extract crucial information such as contact details, skills, and experience.

Moving from resumes on paper to digital resumes has become common in the rapidly evolving corporate recruitment environment. Unfortunately, the present manual resume filling method takes a lot of time and frequently results in candidates not being able to get a job since their talents and the specifications of the position don't match. An intelligent recruitment system that makes use of AI and machine learning may match candidates with job needs and corporate culture by analyzing their resumes, abilities, and interests. By automating the screening and shortlisting of resumes, this not only increases job satisfaction and retention rates but also optimizes the recruitment process.

An overview of the increasing importance of resume analysis in the hiring process is given in the introduction. It draws attention to the difficulties recruiters and job searchers encounter while manually assessing resumes and the possible advantages of employing AI to automate this process.

## 2) Literature Survey

A literature survey on smart resume analysis reveals a growing interest in leveraging artificial intelligence (AI) and machine learning (ML) techniques to improve the recruitment process. Several studies have explored various aspects of smart resume analysis, including data extraction, feature selection, candidate ranking, and algorithm optimization.

One study by Gupta et al. (2018) proposed a framework for automated resume screening using natural language processing (NLP) techniques to extract key information from resumes and match them with job descriptions. The study demonstrated the effectiveness of their approach in reducing the time and effort required for manual resume screening.

1. The article that follows is mentioned in the October 2023 publication "Smart Resume Analyser: A Case Study using RNN-based Keyword Extraction": The Smart Resume Analyser created by Patlolla Sruthi, P.N.V.K.G. Adithya, M.D. Suleman, and Palla Kunal uses natural language processing (NLP) to extract data from resumes, detecting abilities and suggesting job titles. It provides job searchers with individualized solutions that improve their resumes and increase their chances of finding employment. It provides ratings, suggests changes, and stores data using Python. NLP facilitates the understanding of unstructured material by computers, such as text, which helps in resume analysis. Job applicants' chances of getting employed are increased by the system's ability to provide them with tailored feedback. The goal of Smart Resume Analyser is to transform the application process and increase job searchers ‘efficiency. [1]

2. In the paper "CV Analysis Using Machine Learning," Mr. Sandeep Dubey and Avisha Anand with the introduction of technology such as the Internet, the recruiting process has undergone substantial evolution and e-recruitment platforms have been developed. Recruiters are forced to manually sort through a huge number of resumes in order to find qualified candidates because many online recruitment portals lack classification systems for resume screening. These websites include Ideal, Top Resume, Adecco, Monster, and Indeed, to name a few. The application of Natural Language Processing (NLP) for resume analysis is demonstrated in the Top Resume case study. [2]

## 3) Proposed Methodology

Proposed Methodology for Smart Resume Analysis using AI/ML with Admin and User Panels:

### 1. Analysis Phase:

- Define the objectives of the smart resume analysis system, such as automating resume screening and improving candidate-job matching.
- Identify the key features to extract from resumes, such as skills, experience, education, etc.
- Determine the ML algorithms and techniques to be used for resume analysis, such as NLP and classification algorithms.

### 2. Concept Design:

- Design the overall architecture of the smart resume analysis system, including separate panels for admin and normal users.
- Develop a plan for preprocessing resumes, extracting features, and matching candidates with job requirements.
- Define the user interface for each panel, including options for uploading resumes, viewing analysis results, and managing system settings (admin panel).

### 3. Implementation Phase:

**Admin Panel:**

- Dashboard: Display summary statistics such as total resumes analyzed, top skills identified, etc.
- Pie-Chart for Predicted Field Recommendations: Visual representation of the fields in which candidates are predicted to excel.
- Pie-Chart for User's Experienced Level: Visual representation of the experience levels of users.
- Resume Report: Detailed report on resume analysis, including skills matched, job recommendations, etc.

**Normal User Panel:**

- Upload Resume: Allow users to upload their resumes for analysis.

- Resume Analysis: Display the analysis results, including skills matched, job recommendations, etc.
- Skills Recommendation: Provide recommendations for improving skills based on the resume analysis.
- Courses & Certificates Recommendations: Recommend relevant courses and certifications based on the user's skills and job preferences.
- Resume Tips & Ideas: Provide tips and ideas for improving the user's resume.
- Resume Score: Provide a score indicating the strength of the user's resume.
- Bonus Video for Resume Writing Tips: Provide additional video content for resume writing tips.

## 4) Concepts/ technologies:

Smart Resume Analysis using AI/ML involves several key concepts and technologies. Here are some of the main ones:

1. **Natural Language Processing (NLP)**: NLP is used to extract relevant information from resumes, such as skills, experience, and education. Techniques like tokenization, named entity recognition (NER), and part-of-speech (POS) tagging are commonly used.

2. **Machine Learning Algorithms**: Various ML algorithms are used for resume analysis, such as:
    - Classification: To classify resumes into categories (e.g., suitable or not suitable for a job).
    - Clustering: To group resumes based on similarity.
    - Regression: To predict candidate suitability or resume quality scores.

3. **Feature Extraction**: Techniques are used to extract features from resumes, such as:
    - TF-IDF: Term Frequency-Inverse Document Frequency for keyword extraction.
    - Word Embeddings: Representing words as dense vectors for semantic analysis.
    - Sentence Embeddings: Representing entire sentences as vectors for context analysis.

4. **Deep Learning**: Deep learning models, such as neural networks, are used for complex pattern recognition and feature extraction tasks in resume analysis.

5. **Data Preprocessing**: Cleaning and standardizing resume data to remove noise and inconsistencies, ensuring that the data is suitable for analysis.

6. **Model Evaluation**: Techniques for evaluating the performance of ML models, such as cross-validation, confusion matrices, and metrics like accuracy, precision, recall, and F1 score.

7. **Database Management**: Storing and managing resume data and analysis results using databases like MySQL.

8. **User Experience (UX) Design**: Designing user interfaces that are intuitive and easy to use for both administrators and users.

9. **XAMPP:**

- XAMPP is a free and open-source cross-platform web server solution stack package developed by Apache Friends. The name "XAMPP" stands for:
- X: Cross-platform
- A: Apache (Web server)
- M: MariaDB (Database)
- P: PHP (Server-side scripting language)
- P: Perl (Programming language)

- XAMPP provides a convenient environment for developing and testing web applications on a local machine.
- XAMPP is known for its straightforward installation process and user-friendly control panel for configuring server components.
- XAMPP is available for Windows, Linux, and macOS, making it a versatile solution for developers using different operating systems.
- The control panel allows users to start and stop Apache and MySQL with a simple click, facilitating easy management of the local server environment.
- phpMyAdmin, a web-based administration tool for managing MySQL databases, is included in XAMPP.

## 5) SRS

## System Architecture:

- Main module of the system consists of four modules as Information Extraction, Resume Analysis, Resume Classification and Results Visualization. Candidates' resumes and evaluation criteria are the inputs to the system and stored in the system database

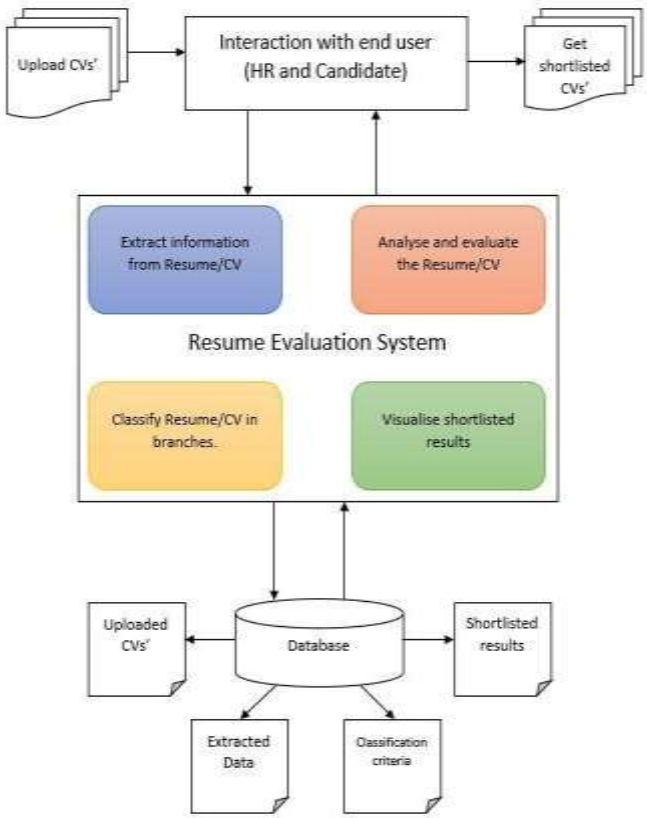
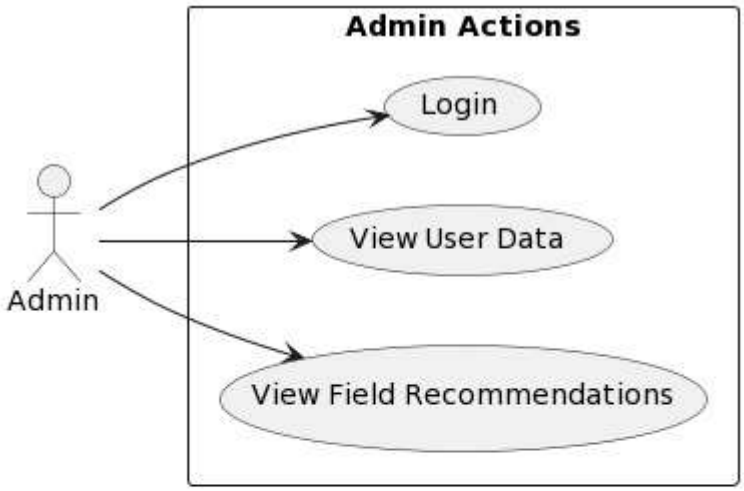


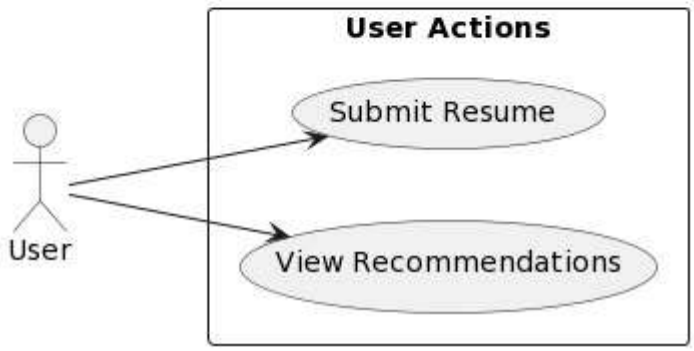

Fig. System Architecture

- Information extraction is conducted on those resumes to extract relevant data and eliminate the unwanted data. Classification is performed on that data using classification criteria existing in database. Classification results in the shortlisted resumes. Entire results are then displayed to the users.

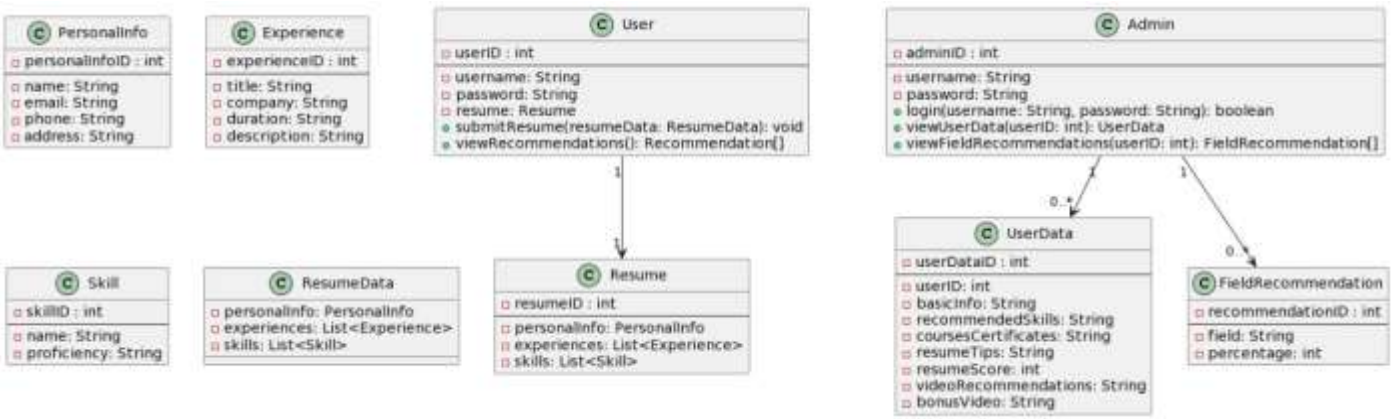
# DIAGRAM

## 1) Use Case:

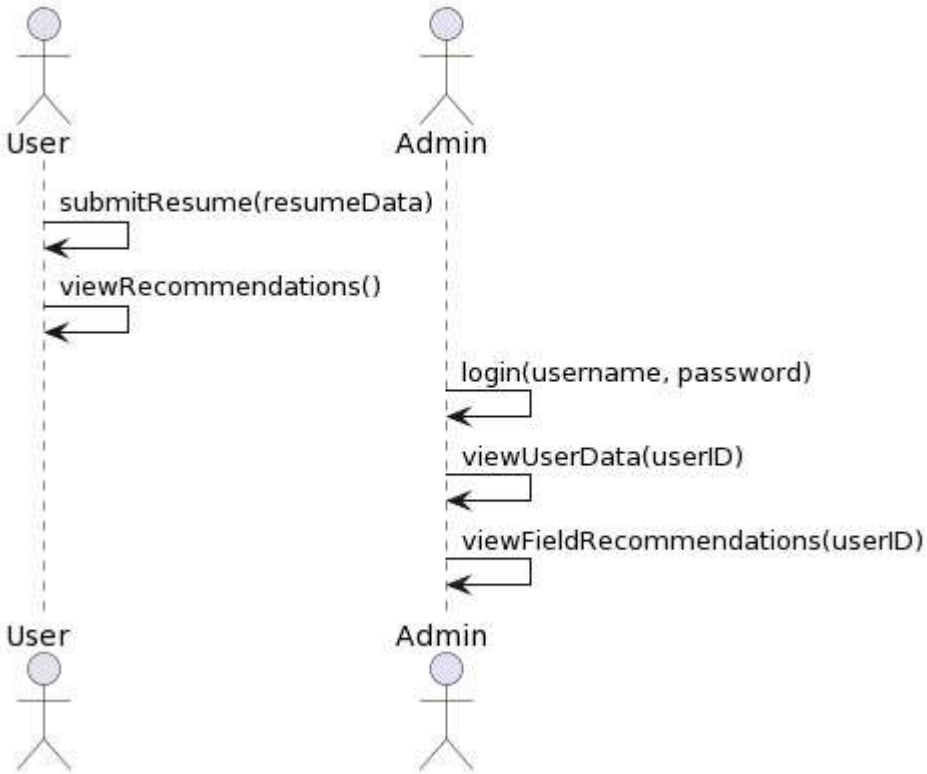


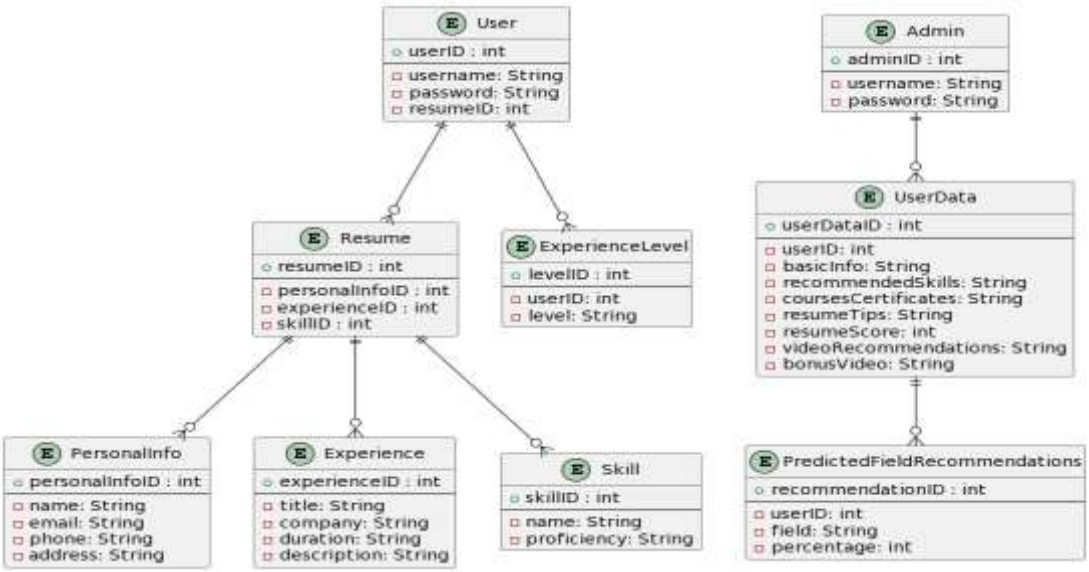

## 2) class diagram:



## 3) Sequence Diagram

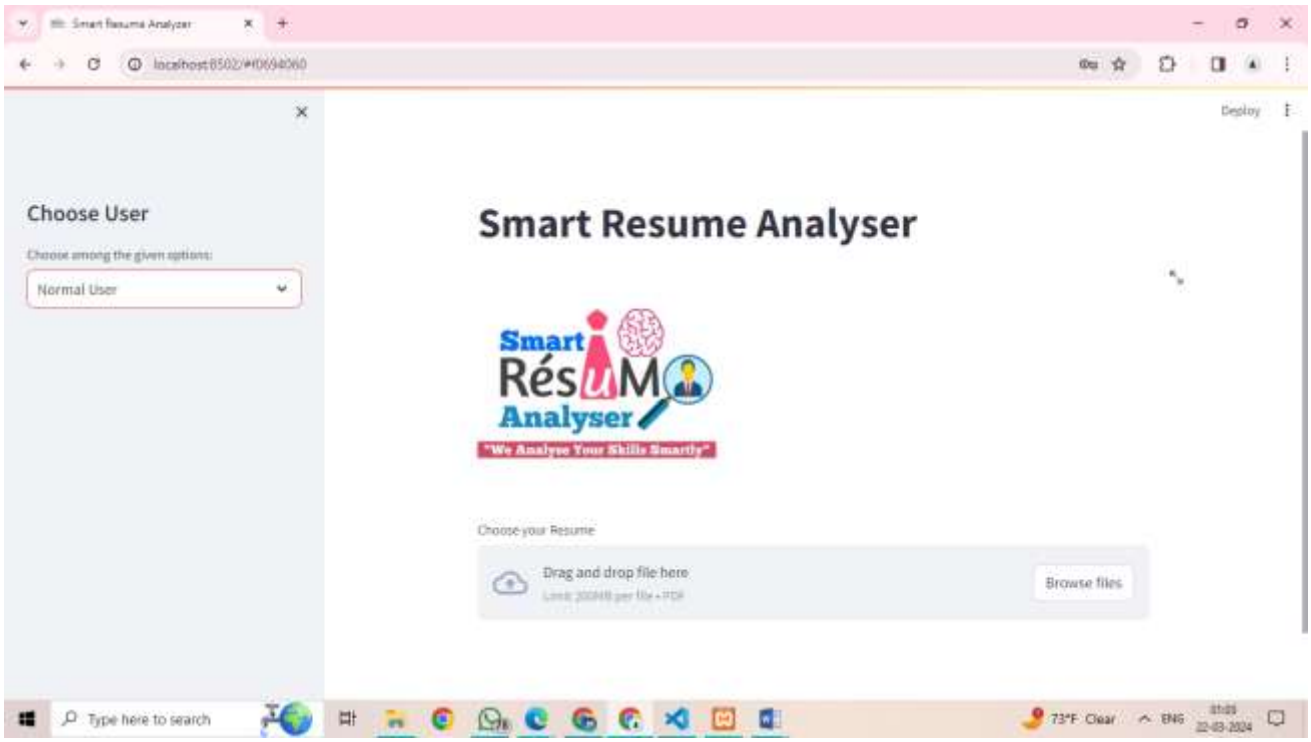


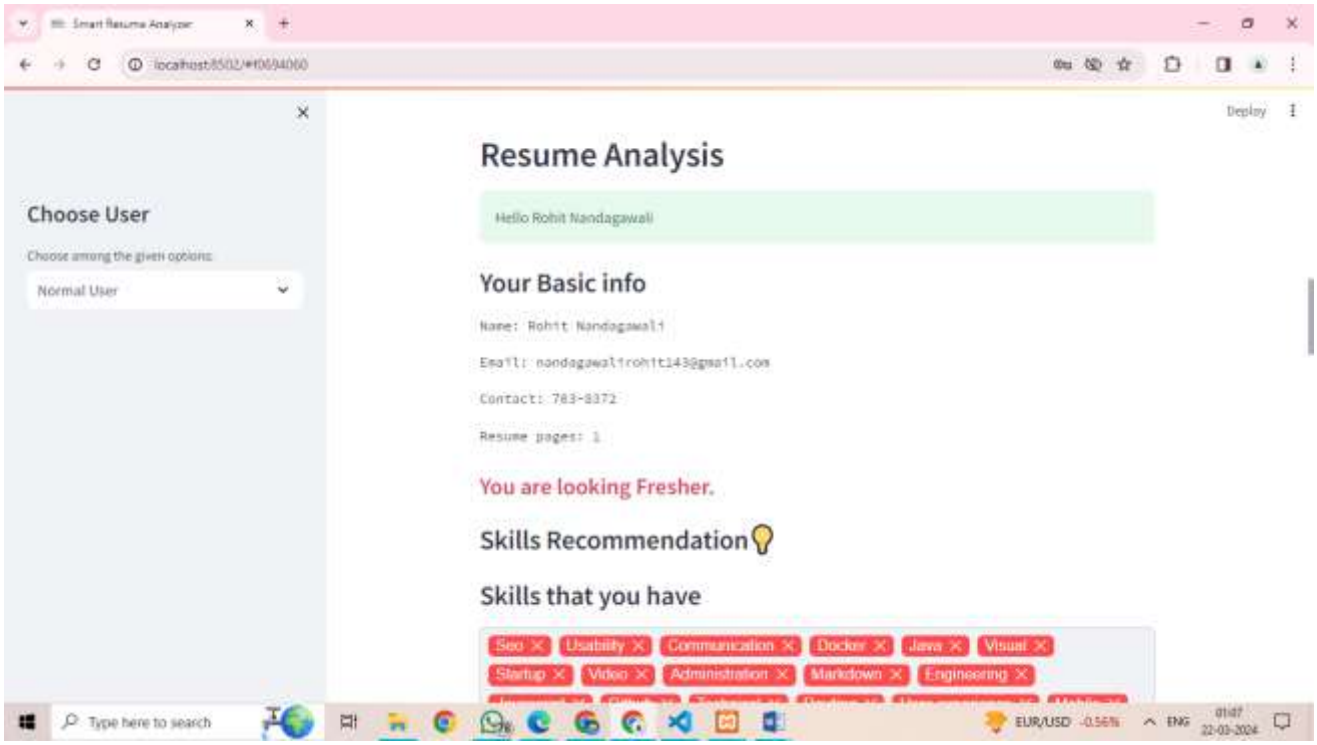

## ER Diagram:



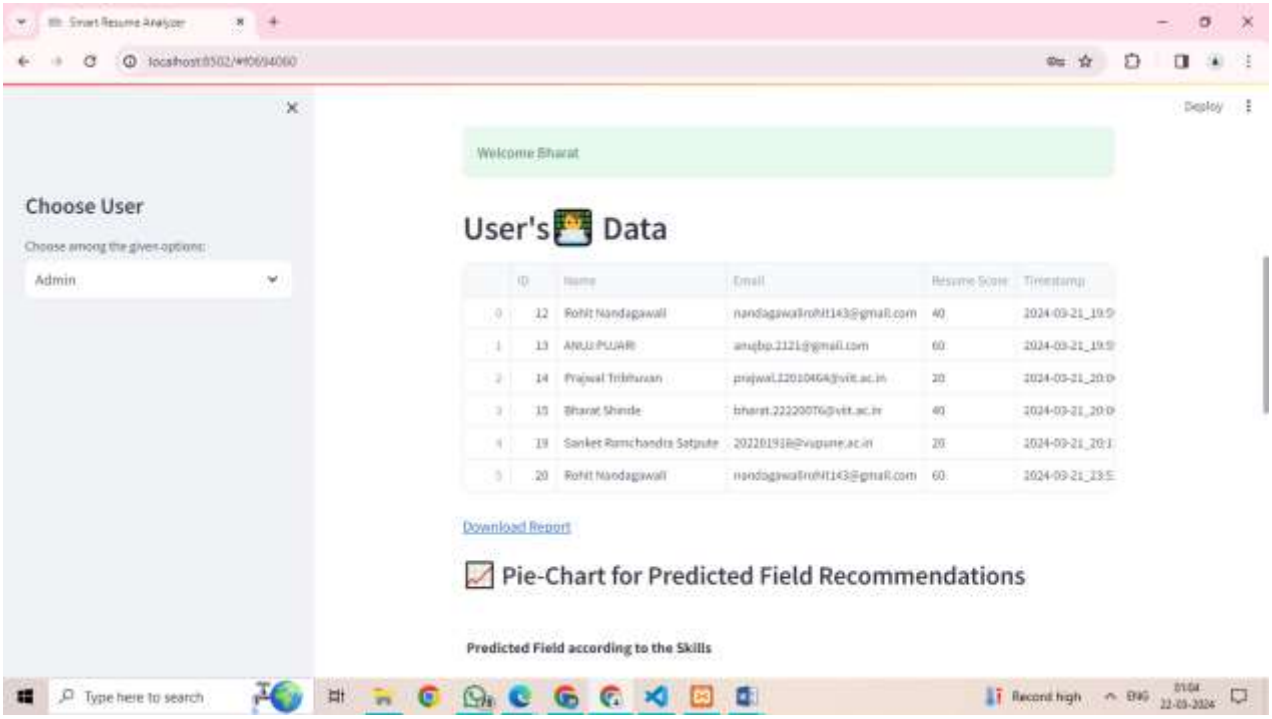
# Result:

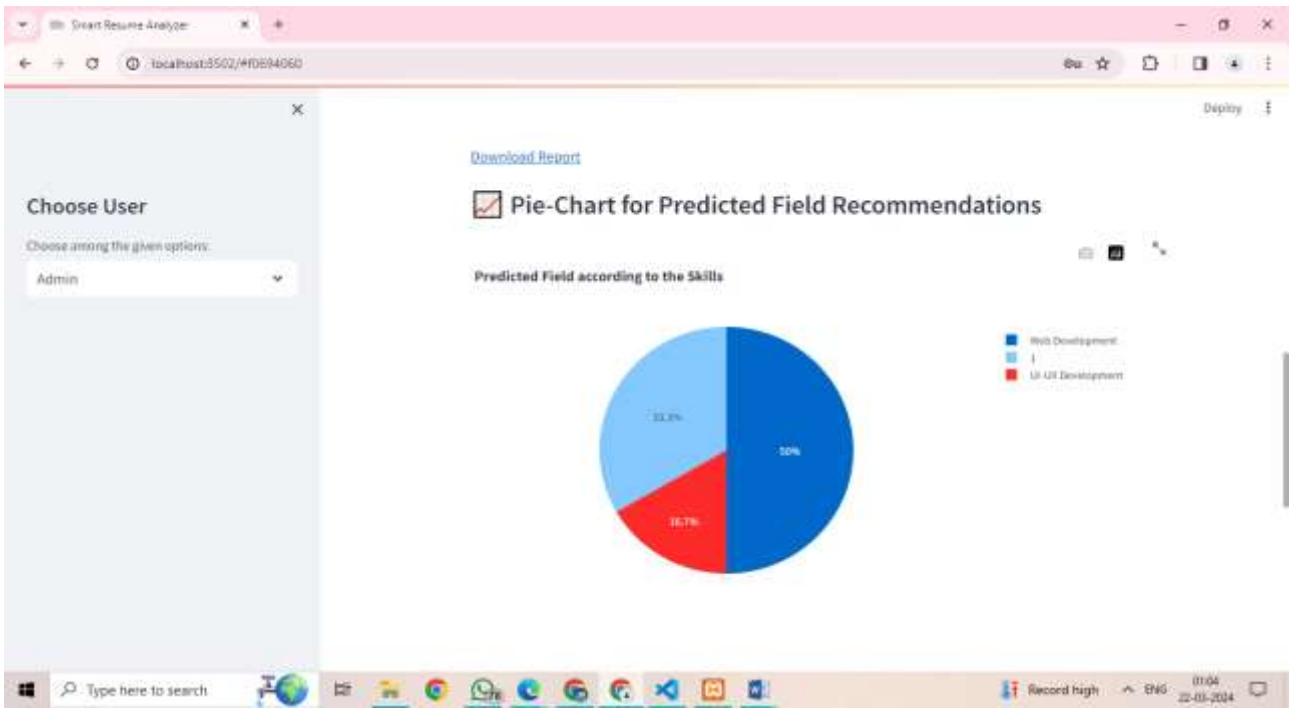
## User – Panel



## Admin Panel:


Choose User
Admin
Welcome Bharat
User's Data
Download Report
Pie-Chart for Predicted Field Recommendations
Predicted Field according to the Skills


Choose User
Admin
Download Report
Pie-Chart for Predicted Field Recommendations
Predicted Field according to the Skills

## Conclusion

In conclusion, Smart Resume Analysis using AI/ML offers significant benefits for streamlining the recruitment process and improving candidate selection. By leveraging advanced technologies such as natural language processing (NLP) and machine learning (ML), organizations can automate the screening of resumes, extract relevant information, and match candidates with job requirements more efficiently and effectively.

The system architecture for Smart Resume Analysis includes components for user interfaces, data processing, database management, feedback mechanisms, security, scalability, and integration with external systems. This architecture provides a comprehensive framework for building a robust and scalable Smart Resume Analysis system.

## References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