

RESUME ANALYZER AND GENERATOR USING PYRESPARSER

A Project Stage - II Report (CS851PC)

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in

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by

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MAY - 2025



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CERTIFICATE

This is to certify that the report entitled **“Resume Analyzer And Generator Using Pyresparser”** being submitted by **Mr.SRUJAN VADDEPALLY** bearing Reg.No. **21261A05K0** and **Mr.VENAKTA SASHANK VUNGARALA** bearing Reg.No. **21261A05K2** in partial fulfilment for the award of **Bachelor of Technology (B.Tech.)** in **Computer Science and Engineering** to the **Department of CSE, Mahatma Gandhi Institute of Technology (A), Hyderabad-500075, T.S.** is a record of bonafide work carried out by them under our guidance and supervision, at our organization/institution.

The results embodied in this report have not been submitted to any other University or Institute for the award of any degree or diploma.

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Signature of HOD

Dr. C.R.K.Reddy
Professor and HOD,CSE

EXTERNAL EXAMINER

DECLARATION

We hereby declare that the work described in this report, entitled **“Resume Analyzer And Generator Using Pyresparser”** which is being submitted by us in partial fulfillment for the award of **Bachelor of Technology (B.Tech.)** in Computer Science and Engineering to the **Department of CSE, Mahatma Gandhi Institute of Technology (A)**, Hyderabad-500075, T.S. is the result of investigations carried out by us under the guidance of **Mr. M. Paramesh.**

The work is original and has not been submitted for any Degree/Diploma of this or any other university.

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ABSTRACT

The AI Resume Analyzer and Generator is a comprehensive tool designed to streamline the resume management process for both applicants and organizations. The Resume Analyzer utilizes Natural Language Processing (NLP) techniques, powered by the PyResparser library, to parse resumes and extract key details such as personal information, skills, experience levels, and job roles. These details are analyzed to generate actionable feedback for applicants, including recommendations on skills to develop, courses to pursue, potential job roles, and personalized tips for improving their resumes. For organizations, the tool provides an efficient way to track and sort resumes, visualize applicant data through analytics like pie charts for roles and experience, and manage records in a structured database.

Complementing the analyzer, the Resume Generator offers a user-friendly interface for creating professional resumes. Built using Streamlit and the reportlab library, the generator allows users to input essential details or leverage extracted data to produce visually appealing and ATS-compatible resumes in PDF format.

Keywords: Resume Analyzer, Resume Generator, PyResparser, Natural Language Processing (NLP), Resume Parsing, Streamlit, reportlab, Skill Recommendation, Job Role Prediction, ATS-Compatible Resume.

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LIST OF ABBREVIATIONS

Abbreviation	Description	Page No.
NLP	Natural Language Processing	1
ATS	Applicant Tracking System	1
LSTM	Long Short-Term Memory	6
KNN	K Nearest Neighbours	6
NER	Named Entity Recognition	6
CSV	Comma Separated Values	6
TF-IDF	Term Frequency-Inverse Document Frequency	7
SVM	Support Vector Machine	7

CHAPTER 1

INTRODUCTION

The project, Resume Analyzer and Generator Using PyResparser, leverages natural language processing (NLP) and machine learning techniques to automate and enhance the resume screening and generation processes [1][2]. The system efficiently extracts key details from resumes, including skills, experience levels, and personal information, creating a structured dataset for analysis and recommendations.

A significant focus of the project is on enabling recruiters to save time and resources by automating tedious manual screening tasks. It incorporates predictive models to recommend job roles, suggest skill improvements, and provide personalized feedback to job seekers [1][2]. Additionally, it supports visualization of applicant data, such as experience levels and skills distribution, which aids admin in identifying trends and making data-driven decisions [2][4].

The Resume Generator complements this functionality by allowing users to create professional, ATS-compatible resumes with an intuitive interface, ensuring a seamless experience from analysis to resume creation. Inspired by research on text mining and resume evaluation systems, the project integrates parsing tools, NER models, and machine learning classifiers to deliver robust, scalable solutions for recruitment challenges [1][4]. By addressing limitations like dependency on structured data and the complexity of unstructured formats, this project showcases the transformative potential of AI and data science in modern recruitment workflows [3][5].

1.1 PROBLEM STATEMENT

Recruitment is a time-intensive process, with recruiters often spending significant time manually screening resumes to identify suitable candidates. The traditional approach to resume screening is not only labor-intensive but also prone to inconsistencies, as different reviewers may interpret resumes differently. Moreover, the vast diversity in resume formats and unstructured data presents challenges in extracting and analyzing relevant information efficiently. This results in missed opportunities to identify the best talent and delays in hiring decisions.

For job seekers, the challenge lies in creating impactful resumes that align with job market requirements. Many candidates struggle to present their skills and experiences effectively, resulting in lower chances of being shortlisted for roles they are well-qualified for. Additionally, the lack of actionable feedback on resume quality and relevance further hinders their job-seeking efforts.

The need for a streamlined, automated system to analyze resumes and provide insights is more pressing than ever. Such a system should not only reduce the workload on recruiters but also assist candidates in enhancing their resumes to improve job alignment. This project aims to address these challenges by leveraging artificial intelligence and machine learning to develop an *AI Resume Analyzer and Generator* that ensures accuracy, efficiency, and scalability in the recruitment process.

1.2 EXISTING SYSTEM

- **Manual Resume Screening:** The traditional method of resume screening involves recruiters manually reviewing resumes to shortlist candidates. This process is time-consuming, prone to human errors, and often leads to inconsistencies in evaluations, as each recruiter may have their own criteria for assessing resumes. It

is not scalable for large volumes of resumes and can delay the recruitment process.

- **Keyword-Based Matching:**

Many existing systems rely on keyword-based matching techniques to filter resumes. These systems scan resumes for specific keywords that match job descriptions. While effective to an extent, this approach lacks the ability to understand the context of skills or experiences and may miss candidates with relevant qualifications but without the exact keywords, leading to inaccurate shortlisting.

- **ATS (Applicant Tracking Systems):**

ATS tools are widely used to automate resume filtering and sorting. These systems analyze resumes by scanning for keywords and ranking candidates accordingly. However, ATS often fails to assess the full scope of a candidate's capabilities, such as their experience level or potential for growth, leading to suboptimal selections for interviews.

- **Basic Resume Generators:**

Several resume generators exist, but they are often basic and fail to provide personalization based on the specific job market or career goals. They typically offer generic templates that may not align with ATS requirements, limiting their effectiveness for job seekers. These tools do not analyze the content for quality or relevance, offering limited feedback for improvement.

1.3 PROPOSED SYSTEM

The proposed AI Resume Analyzer and Generator system integrates advanced natural language processing (NLP) and machine learning techniques to automate the resume screening and generation process. The system will analyze resumes by extracting key information such as skills,

experience, education, and personal details, categorizing them into relevant sectors. This structured data will be used to provide actionable feedback to job seekers, offering recommendations on skills to enhance, potential job roles, courses for improvement, and resume tips. For recruiters, the system will automate resume sorting, provide data-driven insights, and visualize applicant data such as experience levels and skill distributions.

The Resume Analyzer will be powered by the PyResparser library for efficient resume parsing, ensuring accurate extraction of essential data from diverse resume formats. The Resume Generator will utilize Streamlit and the reportlab library, enabling users to create professional, ATS-compatible resumes quickly by leveraging the parsed data or directly inputting their details. The system will also provide features like personalized recommendations and insights into resume quality, significantly improving the hiring process for organizations and offering job seekers guidance to enhance their job applications.

By addressing the challenges of manual screening, unstructured resume formats, and limited feedback, the proposed system offers a scalable, efficient, and automated solution that streamlines recruitment workflows and improves candidate-job alignment.

1.4 REQUIREMENTS SPECIFICATION

1.4.1 Software Requirements

- PyResparser
- Streamlit
- reportlab
- Pandas
- NumPy
- Matplotlib

- Seaborn
- MySQL
- Python 3.x
- PyPDF2
- Plotly

1.4.2 Hardware Requirements

Development Machine Requirements:

- CPU: x86_64 architecture with 8 cores or more for efficient processing.
- Memory: Minimum 8 GB RAM .
- Display: Screen resolution of 1366 x 768 pixels or higher.
- Storage: At least 10 GB of free disk space for development tools, libraries, and project files.

1.4.3 Functional Requirements

- Resume Parsing
- Skill and Job Role Recommendations
- Resume Scoring
- Resume Generation (PDF)
- Data Storage in Database
- Data Visualization (e.g., pie charts, bar graphs)
- Real-time Feedback for Applicants
- Admin Dashboard for Resume Analytics

1.4.4 Non-functional Requirements

- Performance
- Scalability
- Usability
- Maintainability
- Security

CHAPTER-2

LITERATURE REVIEW

[1]Yi-Chi Chou, Chun-Yen Chao, Han-Yen Yu (2019), "A Résumé Evaluation System Based on Text Mining"

This study developed a résumé evaluation system using web crawling, text mining, and natural language processing to analyze electronic résumés in Traditional Chinese. The system graded words based on their relevance to the job market, enabling effective talent demand identification and candidate ranking for specific positions. It offered quick evaluations benefiting both recruiters and job seekers. However, challenges included the accuracy of text mining and NLP techniques and reliance on data quality.

[2]Ms. Y. Sowjanya, Mareddy Keerthana, Pulluri Suneeksha, Dorgipati Sai Sri Harsha (2023), "Smart Resume Analyser"

This paper introduced a Smart Resume Analyzer that extracts text from PDF resumes using Named Entity Recognition (NER) and categorizes it into relevant sections. Cosine similarity, TF-IDF, and KNN algorithms were applied to match resumes with job descriptions, achieving 85% parsing accuracy and 92% ranking accuracy. It also provided real-time feedback and recommendations to job seekers. Limitations included a small dataset of 50 resumes for testing and difficulties in processing unstructured formats.

[3Navale Sakshi, Doke Samiksha, Mule Divya (2022), "Resume Screening Using LSTM"

The study proposed a resume screening system using Bidirectional LSTM models to classify data extracted from PDF files and stored in CSV format. The system incorporated GitHub profiles for holistic evaluation, improving candidate profiling and prediction accuracy. While it efficiently reduced

the time required for screening, the model heavily relied on high-quality data and required advanced expertise in machine learning and data preprocessing.

[4] Panil Jain, Nandkishor Kamble, Risha Nadar, Shaikh Luqman (2022), "A Review Paper on Resume Scanning Using Python"

This review explored automated resume classification and matching using machine learning techniques, employing classifiers like Random Forest (RF), Naïve Bayes (NB), and Support Vector Machines (SVM). It improved HR efficiency by automating resume screening and accurately matching candidates to job descriptions. However, the study noted that classifier accuracy varied, with significant misclassifications, emphasizing the need for refinement and better feature engineering.

[5]Ramba S Naik, Shrinivas R Dhotre (2022), "Resume Recommendation Using Machine Learning"

This research proposed a two-phase resume recommendation system involving preprocessing (e.g., cleaning, tokenization, and TF-IDF-based feature extraction) and deployment (classification and ranking using Naïve Bayes and KNN). The system demonstrated efficiency and scalability, handling large datasets while saving time for recruiters. However, its reliance on structured data and the complexity of implementing multiple processing steps posed challenges to broader adoption.

S.NO	TITLE	AUTHORS	YEAR	METHODOLOGY	MERITS	DEMERITS
1	Smart Resume Analyser	Ms. Y.Sowjanya Mareddy Keerthana Pulluri, Sameeksha Dorgipati Sai Sri Harsha	2023	Data Extraction from PDFs using Named Entity Recognition (NER) to categorise information. Uses Cosine Similarity, TF-IDF, and KNN algorithms to match resumes with job descriptions and gives recommendations.	High Accuracy i.e., achieves 85% text parsing accuracy and 92% ranking accuracy, efficient and user friendly.	Limited Dataset and Dependent on Structured Data
2	Resume Screening Using LSTM	Navale Sakshi, Doke Samiksha, Mule Divya	2022	PDF files are used as input, and data is extracted and saved in a CSV file, cleaned and model training is done using Bidirectional LSTM	Reduces the time required for resume screening. Uses LSTM for better prediction and classification	Implementation requires advanced knowledge of machine learning and web scraping.
3	A Review Paper on Resume scanning using python	Panil Jain, Nandkishore Kamble, Risha Nadar, Shaikh Luqman	2022	It involves extracting features from resumes, classifying them using various classifiers (like RF, NB, and SVM), and matching them to job descriptions using similarity functions.	The system automates the resume screening process, making it faster and more efficient. It helps in accurately matching candidates to job descriptions.	The accuracy of the classifiers used in the project varies, with some classifiers misclassifying a significant portion of resumes.

4	Resume Recommendation using Machine Learning	Ramba S Naik, Shrinivas R Dhotre	2022	Preprocessing includes cleaning, tokenization, feature extraction (TF-IDF), and feature mapping. Deployment involves classification, similarity computation, ranking, and recommending the appropriate resume.	Uses machine learning algorithms like Naïve Bayes and k-NN to accurately match resumes with job descriptions and can handle a large number of resumes and job descriptions .	Requires a well-structured dataset for training(Dependent on data). and Involves multiple steps and algorithms, which can be complex to implement and maintain.
5	A Résumé Evaluation System Based on Text Mining	Yi-Chi Chou; Chun-Yen Chao; Han-Yen Yu	2019	The study utilized web crawling, text mining, and natural language processing to develop a system that matches job candidates with recruiters.	The system effectively identified current talent demand and quickly presented candidate rankings for specific positions, benefiting both job seekers and recruiters	Potential challenges could include the accuracy of text mining and natural language processing, and the system's reliance on data quality .

Table 2.1 Literature Survey

CHAPTER-3

DESIGN METHODOLOGY

3.1 SYSTEM ARCHITECTURE

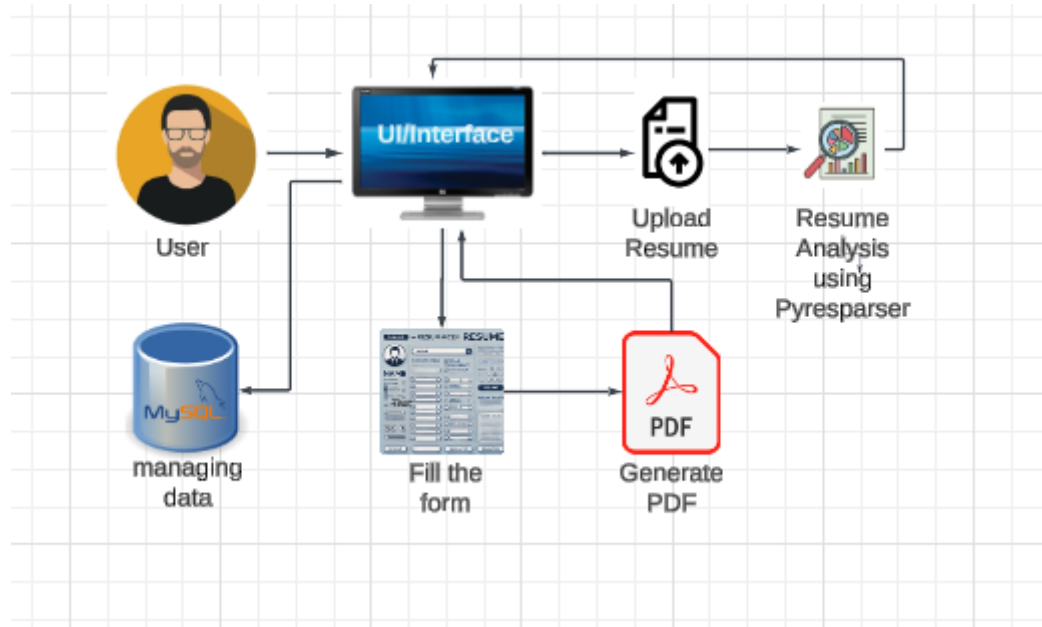


Figure 3.1: Block Diagram of Resume Analyzer And Generator Using Pyresparser

The Block Diagram in Figure 3.1 illustrates the workflow of the AI Resume Analyzer and Generator system. The process begins with the user uploading a resume or inputting data through the Resume Generator interface. In the Resume Analyzer module, the system extracts data such as name, skills, experience, and education using the PyResparser library. This extracted data undergoes analysis, generating actionable insights such as suggested skills, job roles, and improvement tips. The analyzed data is stored in a MySQL database for visualization and record-keeping.

In the Resume Generator module, the system utilizes user-provided details, such as skills, education, and experience, to create ATS-compatible resumes. The reportlab library formats this information into a professional PDF document, which is immediately made available for download. The block diagram highlights critical steps such as data

extraction, recommendation generation, and PDF resume creation, demonstrating how the system integrates parsing, analytics, and resume generation into a cohesive solution.

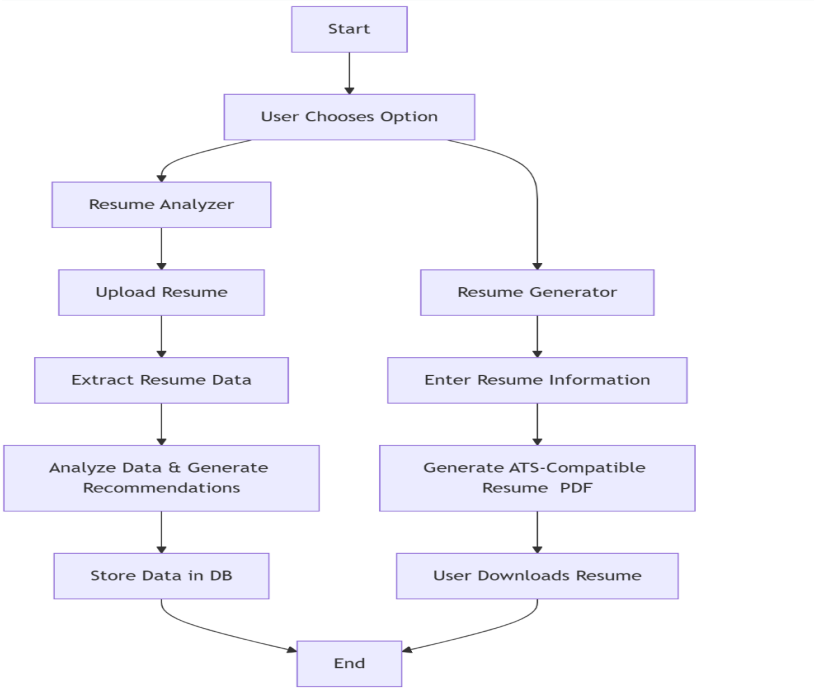


Figure 3.2 :Process Flow Diagram of Resume Analyzer And Generator Using Pyresparser

The process flow diagram in Figure 3.2 illustrates the steps involved in analyzing and generating resumes in the AI Resume Analyzer and Generator project. The system begins with the user choosing between two options: analyzing an uploaded resume or generating a new one.

For resume analysis, the uploaded document is parsed using PyResparser to extract structured data. This data is analyzed to provide recommendations, including skill suggestions, job role predictions, and improvement tips. The analyzed information is stored in a MySQL database for further visualization and administrative purposes, such as generating analytics like pie charts for skills and experience distribution.

For resume generation, the user inputs essential details such as personal

information, skills, and experience through an intuitive form interface. The system formats this data using the reportlab library to create a professional PDF resume. Users can download the final resume directly without a preview step.

The diagram highlights key steps such as resume uploading, data analysis, recommendation generation, and PDF creation, showcasing the system's efficiency in streamlining resume-related processes for both applicants and recruiters.

3.2 METHODOLOGY

The development process for the AI Resume Analyzer and Generator project follows a systematic and iterative approach, divided into the following subparts:

3.2.1 Requirements Gathering:

The first phase involved identifying key objectives, including automating the resume screening process and enabling users to generate ATS-compatible resumes. Specific requirements were outlined for extracting resume data, providing recommendations, storing analyzed data, and generating professional resumes. Feedback from recruiters and job seekers helped define the system's functional and non-functional needs.

3.2.2 System Design:

The system architecture was designed to integrate two main modules: the Resume Analyzer and the Resume Generator. The design includes components for parsing resumes using PyResparser, analyzing extracted data to provide recommendations, and generating PDF resumes using reportlab. Data flow between modules was mapped, and a database schema was developed to store analyzed data and facilitate visualization.

3.3 UML MODELS

UML is a standard language for writing software blueprints. UML is a language for specifying, visualizing, constructing, and documenting.

3.3.1 Use Case Diagram

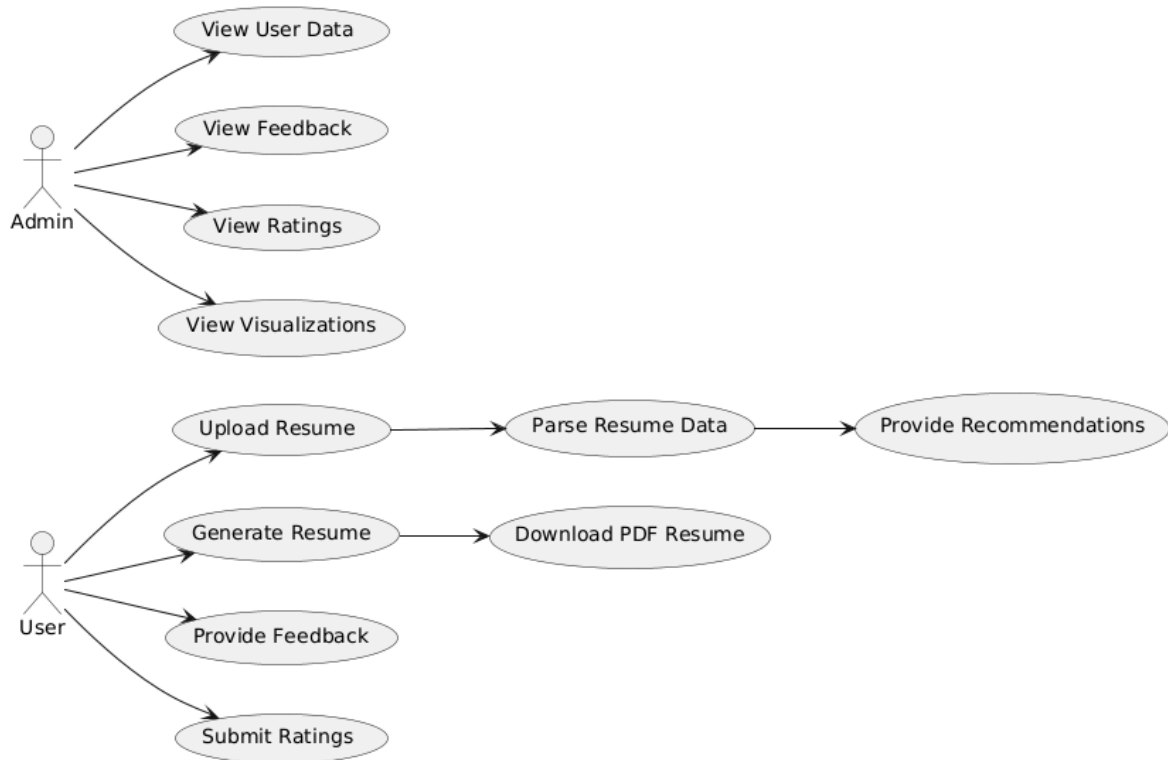


Figure 3.3 Use case diagram of Resume Analyzer And Generator Using Pyresparser

Figure 3.3 The use case diagram illustrates the interactions between the system and its users, including job applicants and recruiters. Applicants can upload resumes for analysis, generate resumes, download the generated resumes, and provide feedback to the system. Recruiters, on the other hand, can view applicant data analytics and download it for further processing. The system processes uploaded resumes to extract data, analyze it, and provide actionable recommendations. It also allows users to submit feedback, which is stored for future improvements. The diagram showcases how the system handles these core functionalities, ensuring an efficient workflow for both users.

3.3.2 Class Diagram

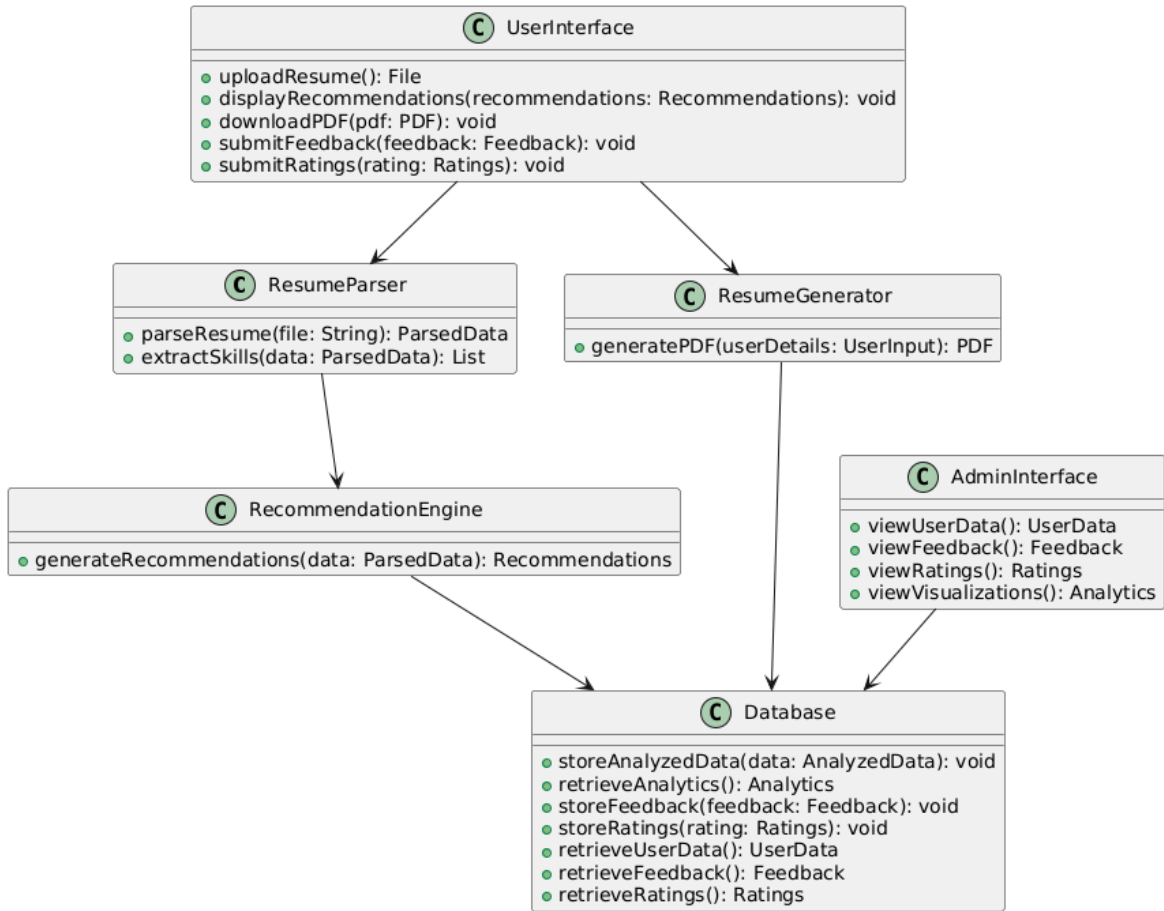


Figure 3.4 Class diagram of Resume Analyzer And Generator Using Pyresparser

Figure 3.4 class diagram illustrates the structural design of the AI Resume Analyzer and Generator system. It includes key components such as ResumeParser, responsible for extracting data from uploaded resumes, and RecommendationEngine, which analyzes this data and provides recommendations. The ResumeGenerator formats user data into professional PDFs, while the Database stores analyzed data and feedback for future use. The UserInterface facilitates user interactions, including uploading resumes, submitting feedback, and generating resumes, creating an integrated system that streamlines the entire process.

3.3.3 Sequence Diagram

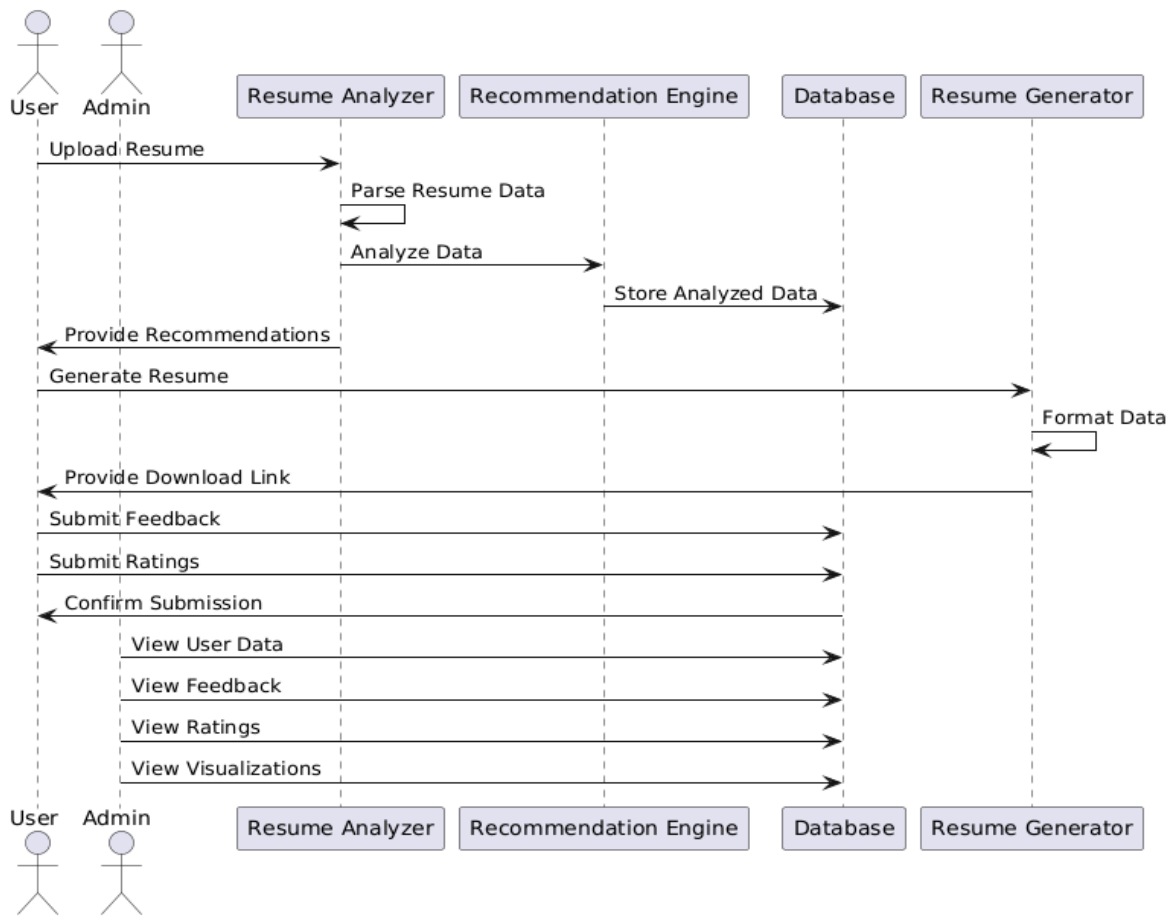


Figure 3.5 Sequence diagram of Resume Analyzer And Generator Using Pyresparser

Figure 3.5 the sequence diagram outlines the flow of interactions between users and system components during the resume analysis and generation process. First, the user uploads a resume, which is parsed by the system to extract relevant data. This data is analyzed to provide recommendations, which are then stored in a database. If the user opts for resume generation, the system formats the data into a PDF and allows the user to download it. Additionally, the user can provide feedback, which is stored for continuous system improvement. This diagram highlights the sequential steps and interaction between components, ensuring a smooth user experience.

CHAPTER-4

IMPLEMENTATION AND RESULTS

To implement the *Resume Analyzer and Generator Using Pyresparser* system, Python served as the primary programming language, leveraging libraries like Pyresparser, Streamlit, and ReportLab. The project begins with analyzing resumes uploaded in formats such as PDF or DOCX, extracting structured data including name, contact details, skills, and work experience using natural language processing (NLP) techniques. The extracted data undergoes further analysis to identify gaps in skills, align experiences with job roles, and provide actionable recommendations to users. The project includes a resume generation module, where users can create a professional PDF resume based on inputs provided via the interactive Streamlit interface. Real-time previews ensure that the resume aligns with user expectations before finalizing the PDF. This modular approach integrates resume parsing, data analysis, and visualization, delivering a seamless and user-friendly experience while maintaining scalability for future enhancements.

4.1 TECHNOLOGY STACK

Programming Language: Python

Used as the core language for implementing resume parsing, data analysis, and PDF generation.

Libraries and Frameworks:

- **Pyresparser:** For extracting key information from resumes, such as name, skills, and work experience.
- **Streamlit:** For building an interactive user interface for the analyzer and generator.
- **ReportLab:** For generating customized resume PDFs.

- **Matplotlib and Seaborn:** For visualizing analytics like skill distribution and experience insights.

Natural Language Processing:

- **spaCy:** For entity recognition and text parsing.
- **TextBlob:** For analyzing and suggesting language improvements in resumes.

Database:

- **MySQL:** For managing applicant data post-analysis.

Development Environment:

- **IDE:** Visual Studio Code.
- **Version Control:** Git and GitHub for source code management.

4.2 FEATURES

Resume Parsing:

- Extracts candidate details like name, email, phone, skills, and work experience using Pyresparser.

Recommendations:

- Provides suggestions for job roles based on skills.
- Identifies missing or desirable skills and suggests certifications for improvement.

Resume Generation:

- Allows users to generate and download a customizable PDF resume.
- Includes preview functionality for real-time formatting adjustments.

Visualization:

- Displays analytics such as sector-specific skills and experience distribution through visual charts.

User-Friendly Interface:

- Offers an interactive and intuitive UI for uploading resumes and generating reports.

4.3 IMPLEMENTATION DETAILS

Resume Parsing

- Resumes uploaded by users are parsed using Pyresparser, which identifies structured fields like:
 - Name, Email, Phone Number
 - Skills, Education, and Work Experience

Recommendation Engine

- Skills and experiences are matched with predefined job role templates.
- NLP models analyze resumes to identify gaps and suggest relevant certifications or skill additions.

Visualization

- Generated insights are visualized using:
 - **Pie Charts:** Representing skills and job role distribution.
 - **Bar Graphs:** Depicting experience levels across sectors.

Resume Generator

- User inputs are collected via Streamlit and formatted using ReportLab.
- A real-time preview option ensures formatting correctness before

final PDF generation.

Data Flow

- Upload the resume (PDF or DOCX format).
- Extract fields via Pyresparser.
- Analyze and categorize the data.
- Provide recommendations and visualize insights.
- Allow the user to generate/download an optimized resume.

4.4 INSTALLATION

The installation process for the Resume Analyzer and Generator Using Pyresparser system involves setting up the required software, libraries, and configurations. The steps below provide a detailed guide for a seamless setup:

Step 1: Install Python

- Download and install Python from <https://www.python.org/>.
- Ensure Python is added to your system's PATH during installation for easy access to the python command.

Step 2: Create and Activate Virtual Environment

```
python -m venv resume_env  
source resume_env/bin/activate # For Linux/Mac  
resume_env\Scripts\activate   # For Windows
```

Step 3: Install Required Libraries

- Use pip, Python's package manager, to install the necessary libraries for the project. Open a terminal or command prompt and run the following commands:

```
pip install pyresparser spacy pandas numpy matplotlib seaborn  
streamlit requests nltk pdfminer.six reportlab PyMySQL
```

Step 4: Configure the MySQL Database

- Install MySQL on your system if it is not already installed.
- Create a new database to store IMDb data by executing the following commands in the MySQL console:

```
CREATE DATABASE resumecv;
```

```
USE resumecv;
```

- Ensure the database connection details in your code (e.g., username, password, database name) match your MySQL setup.

Step 5: Run the Main Script

- Navigate to the project directory and start the Streamlit app:

```
streamlit run app.py
```

4.5 RESULTS

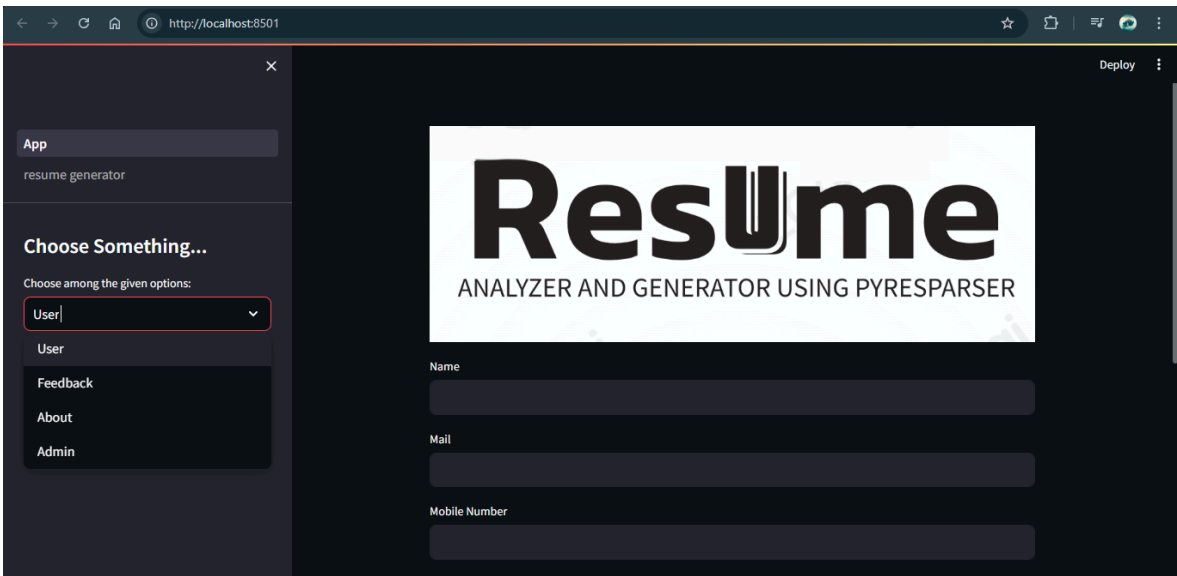


Figure 4.1 Home Page

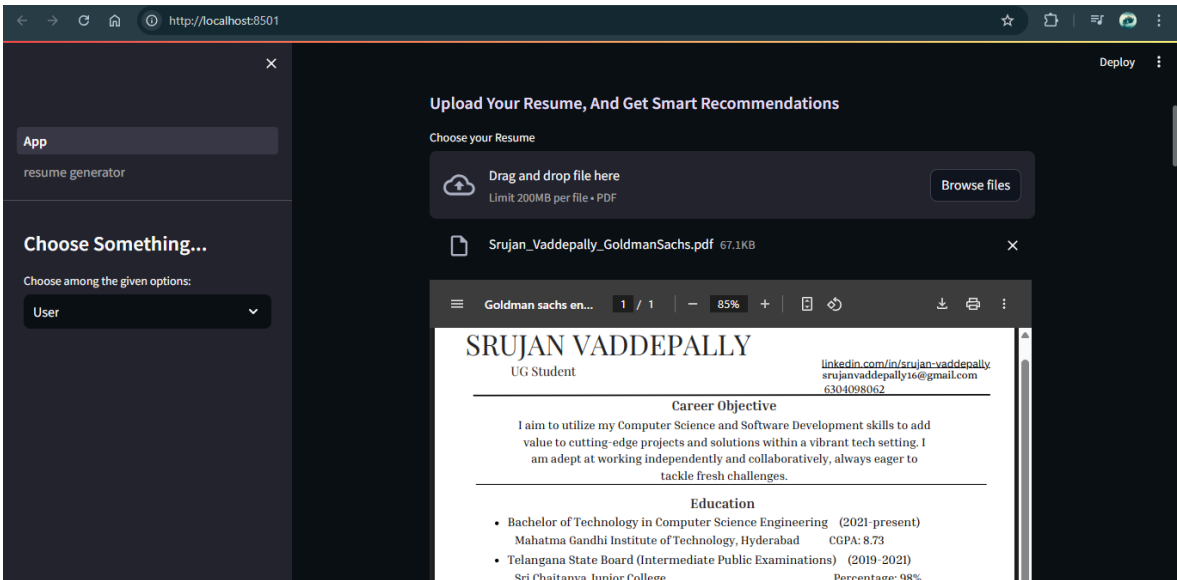


Figure 4.2 Upload Resume from the System by clicking “Browse files”

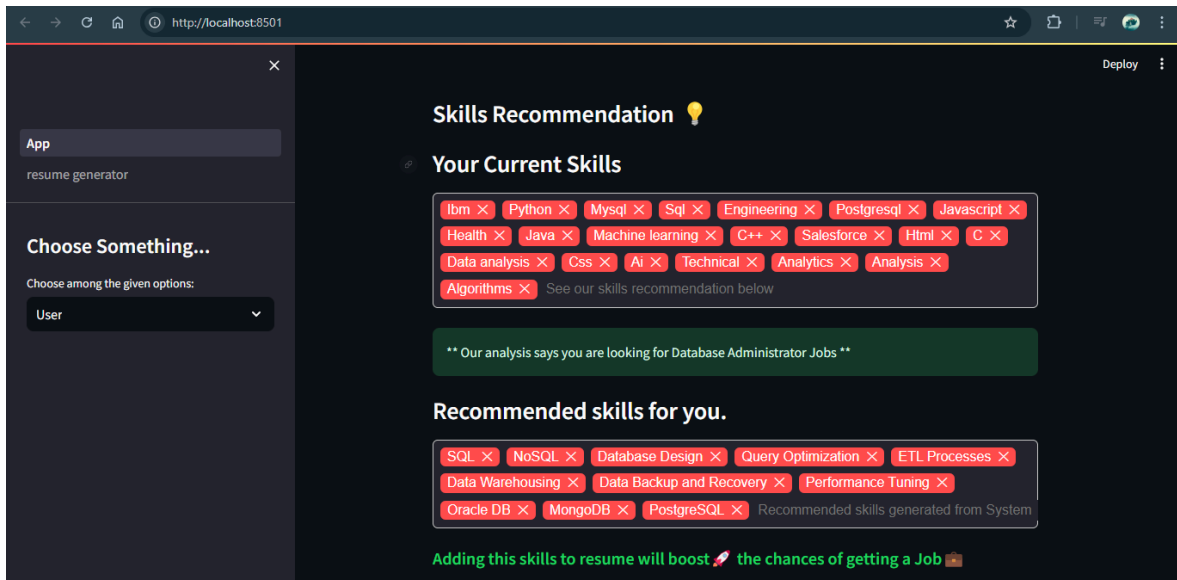


Figure 4.3 Recommending Skills Based on the Resume.

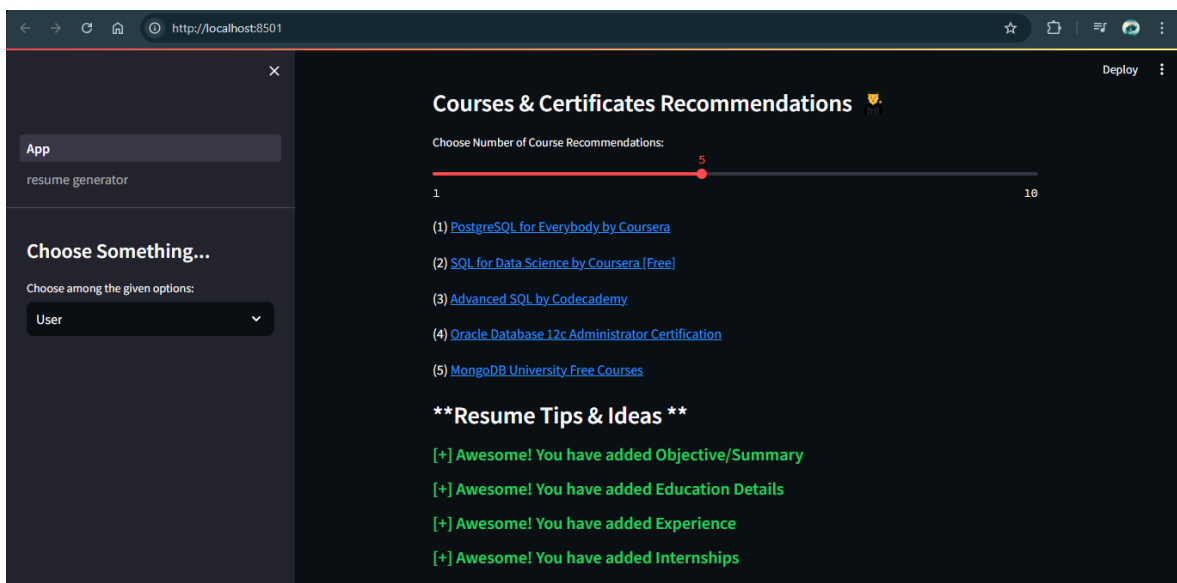


Figure 4.4 Courses and Certification Recommendations and Resume Tips and Ideas.

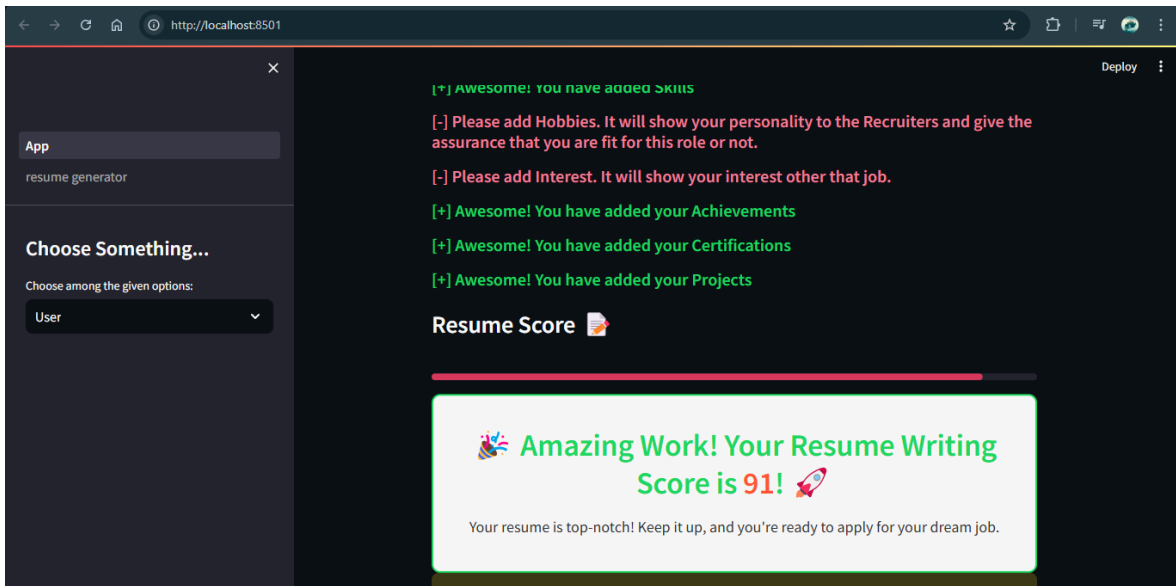


Figure 4.5 Score Given to the Resume according to its content

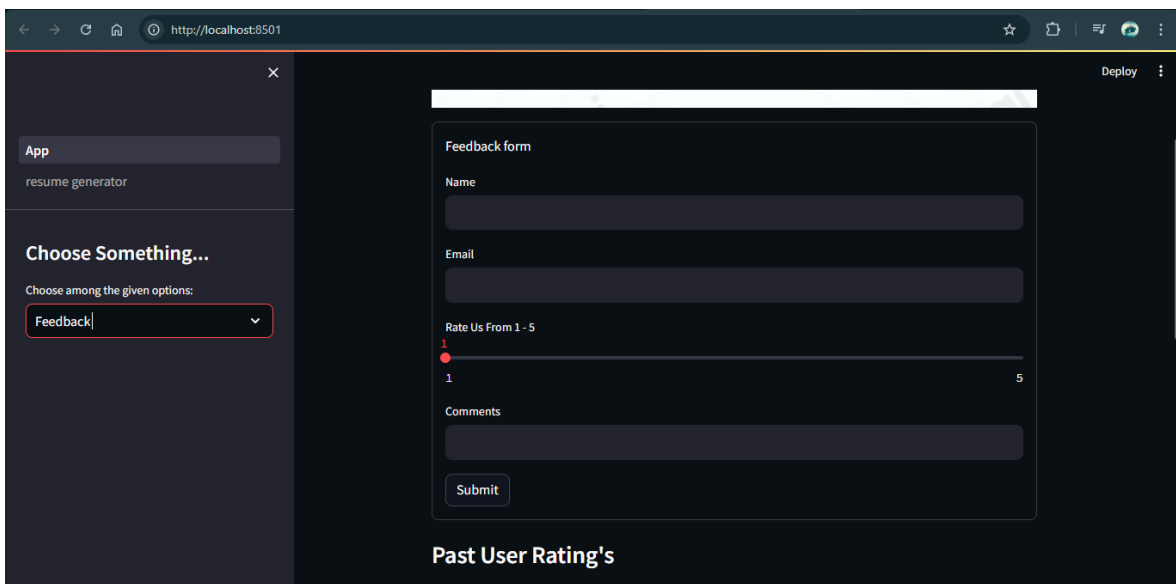


Figure 4.6 Feedback Form for User.

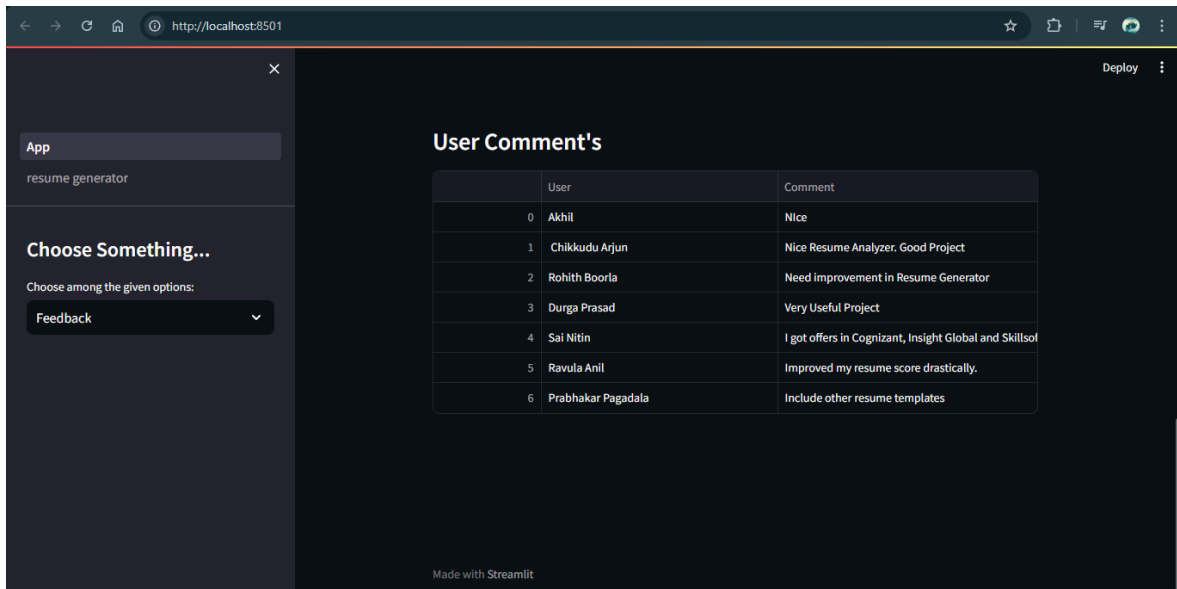


Figure 4.7 Previous User's Comments in Feedback Form

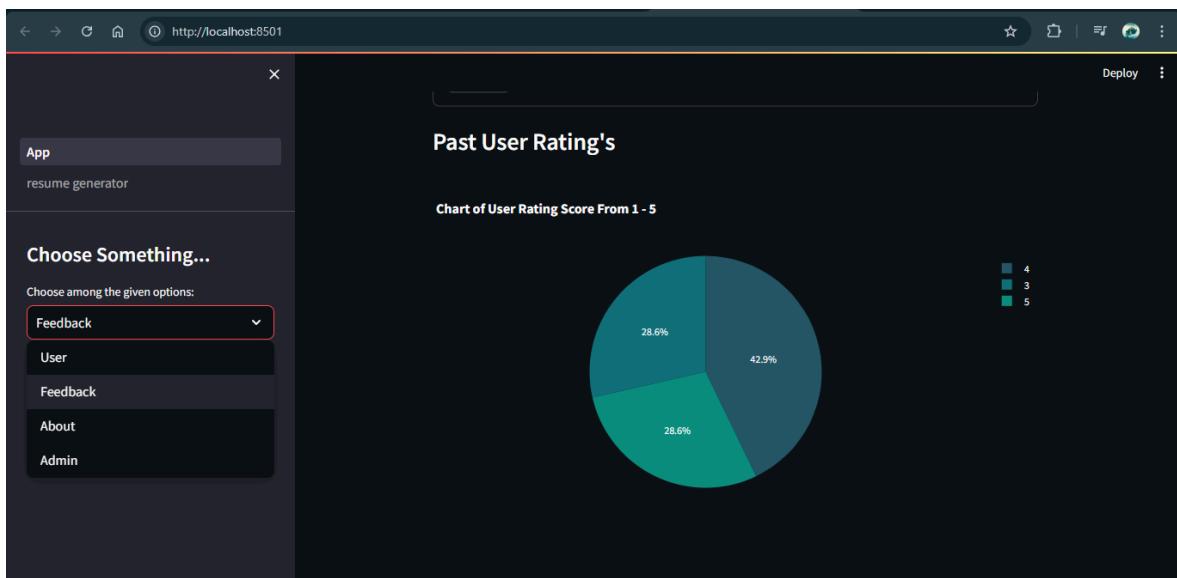


Figure 4.8 Past User Ratings

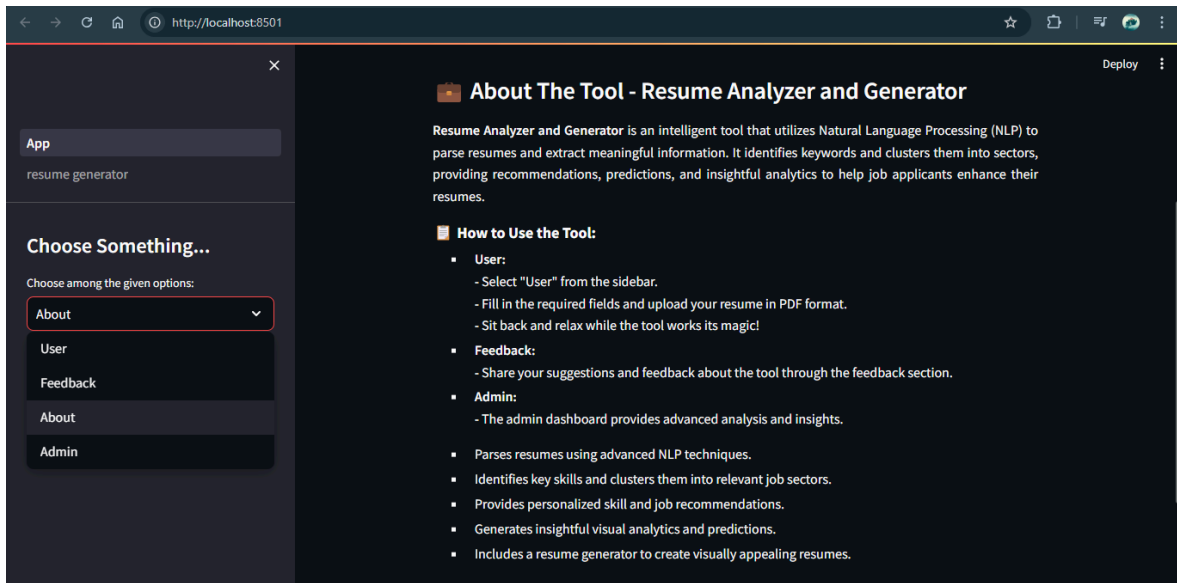


Figure 4.9 About Page

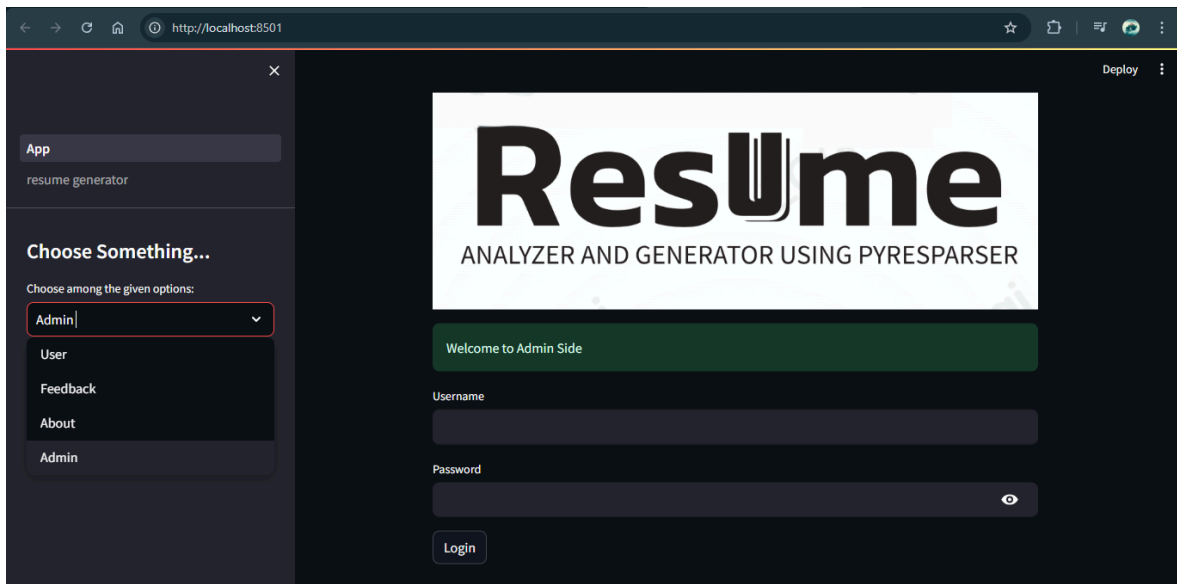


Figure 4.10 Admin Credentials Page

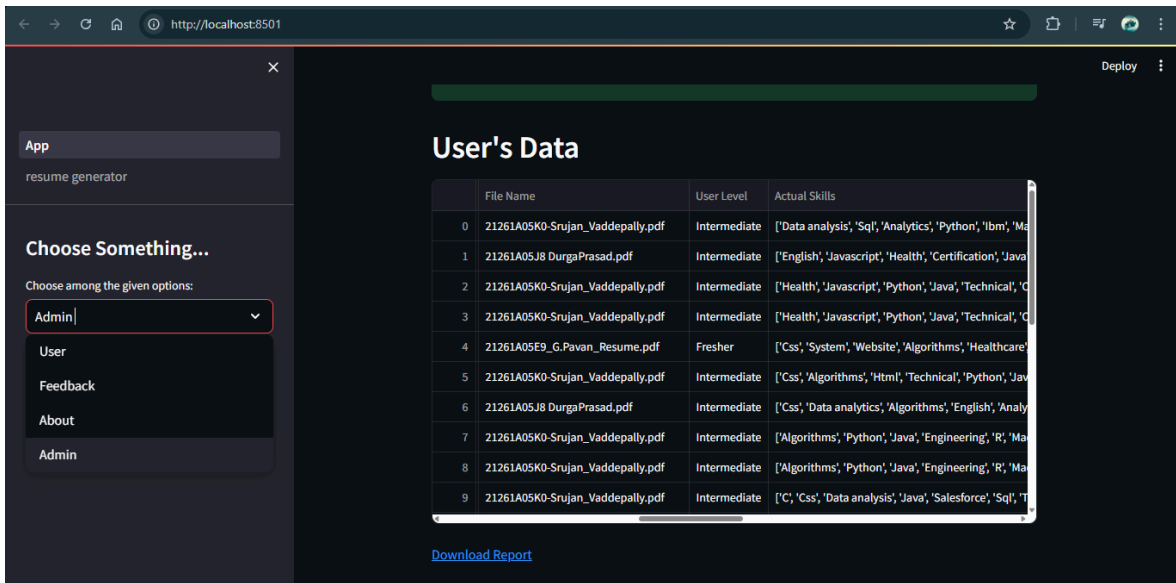


Figure 4.11 Contains User's Data and Other Data Visualisations.

The screenshot shows the 'Resume Generator' application with the 'Personal Information' section. The form includes the following fields and sections:

- Full Name:** Enter your full name (e.g., John Doe)
- Contact Info:** Add email, phone number, and address
- Career Objective:** Write a brief statement about your career goals
- Upload Profile Photo (Optional):** Drag and drop file here or Browse files

The browser address bar shows 'http://localhost:8501/resume_generator'.

Figure 4.12 Resume Generator - Personal Information

The screenshot shows a web browser at `http://localhost:8501/resume_generator`. On the left, a sidebar contains an 'App' section with a 'resume generator' button. The main content area is titled 'Educational Background'. It features a 'Number of Education Entries' field with a value of 1 and minus/plus controls. Below this are five input fields: 'Degree 1' (placeholder: 'Type of Degree (e.g., B.Tech, M.Sc)'), 'Institution 1' (placeholder: 'Institution Name (e.g., ABC University)'), 'Years 1' (placeholder: 'Years of Study (e.g., 2018-2022)'), and 'Marks 1' (placeholder: 'Enter marks secured (e.g., 85%)'). A 'Deploy' button is in the top right corner.

Figure 4.13 Resume Generator - Educational Background

The screenshot shows the same web browser. The sidebar remains the same. The main content area now displays two sections. The first section is titled 'Technical Skills' with the instruction 'List your technical skills' and a large text input area with the placeholder 'Enter one skill per line (e.g., Python, React, SQL)'. The second section is titled 'Professional Experience' with the instruction 'Work Experience' and a large text input area with the placeholder 'Describe your experience one line at a time (e.g., Software Engineer at XYZ Corp)'. The 'Deploy' button is still in the top right corner.

Figure 4.14 Resume Generator - Technical Skills and Professional Experience

The screenshot shows the 'Projects' section of the Resume Generator application. On the left, a sidebar contains a close button (X) and a menu with 'App' and 'resume generator'. The main area has a title 'Projects' with a link icon. Below it, there's a 'Number of Projects' field with a value of 2 and minus/plus buttons. This is followed by two project entries. Each entry has a 'Project X Title' field with a placeholder 'Project Name (e.g., Resume Builder App)' and a 'Project X Description' text area with a placeholder 'Describe the project details (e.g., Developed a tool using Python and Streamlit)'. A 'Deploy' button is in the top right.

Figure 4.15 Resume Generator - Projects Information

The screenshot shows the 'Achievements' and 'Certifications' sections of the Resume Generator application. The sidebar is the same as in the previous figure. The main area has a title 'Achievements' and a text area for 'Your Achievements' with a placeholder 'Enter achievements one per line (e.g., Won XYZ Hackathon 2023)'. Below this is a horizontal separator line. The next section is titled 'Certifications' and has a text area for 'Your Certifications' with a placeholder 'Enter certifications one per line (e.g., AWS Certified Solutions Architect)'. At the bottom of the main area is a 'Generate Resume' button.

Figure 4.16 Resume Generator - Achievements and Certification

GitHub : <https://github.com/srujan5565/Resume-Analyzer-Generator>

4.6 TESTING

4.6.1 Unit Testing

Unit testing involves testing individual components of the system to ensure each module works as expected before integration into the larger system.

- **Resume Parsing:**

The resume parsing function is tested with sample resumes to ensure proper extraction of key details such as name, email, phone number, skills, and work experience.

- Example: For a resume containing "Python Developer with 5 years of experience," the system should correctly extract "Python Developer" under skills and "5 years" under experience.

- **Recommendation System:**

Functions responsible for generating job role and skill suggestions are tested with mock input data to verify that the suggestions align with expected outcomes.

- Example: Inputting "Python, SQL" as skills should suggest "Data Analyst" as a job role.

- **PDF Generation:**

The PDF generation module is tested to ensure the output is formatted correctly, including all user-provided information.

- Example: Verify that a generated resume includes the correct name, contact details, and layout as specified.

4.6.2 Functional Testing

Functional testing ensures the system behaves as expected under various scenarios:

- **Valid Inputs:**

Testing resumes with proper formatting and complete information

ensures the system accurately extracts data and provides recommendations.

- **Invalid Inputs:**

The system is tested with incomplete or poorly formatted resumes to verify error handling. For example:

- Empty resumes trigger appropriate error messages.
- Resumes missing sections, like skills or experience, prompt warnings but do not crash the system.

- **Recommendations:**

Verifies that the recommendation engine provides job roles and certifications based on extracted skills.

- Example: Skills like "Machine Learning, Python" should suggest "Machine Learning Engineer."

- **Visualizations:**

Ensures that analytics like skill distributions and experience graphs are generated and displayed correctly.

4.6.3 System Testing

System testing validates the integrated system, ensuring seamless operation from user input to output generation.

- **End-to-End Testing:**

Tests the entire workflow:

- Uploading a resume → Data extraction → Recommendations → PDF generation.

- **Interface Testing:**

Ensures the Streamlit interface dynamically updates and displays extracted information, recommendations, and visualizations without glitches.

- **Error Handling:**

Validates that the system gracefully handles unexpected scenarios, such as unsupported file formats or empty input fields.

4.6.4 Performance Testing

Performance testing evaluates the system's ability to handle concurrent users and large datasets efficiently:

- **Response Time:**

Verified that the system processes resumes and provides results (parsing and recommendations) within a few seconds.

- **PDF Generation Efficiency:**

Checked that resumes are generated in under 2 seconds, even for resumes with extensive details.

4.6.5 Integration Testing

Integration testing ensures smooth communication between system components, including the parser, recommendation engine, and PDF generator.

- **Resume Parser and Recommendation Engine:**

Verifies that parsed data is correctly passed to the recommendation engine for generating suggestions.

- **Recommendation Engine and PDF Generator:**

Ensures the recommendations and extracted data are accurately reflected in the generated PDF.

- **Interface and Backend:**

Validates that the user interface dynamically interacts with backend modules to update and display results without errors.

4.6.6 Acceptance Testing

User Acceptance Testing (UAT) ensures the system meets functional requirements and is user-friendly.

- **Ease of Use:**

Non-technical users upload resumes and verify that extracted information, recommendations, and visualizations are accurate and understandable.

- **Accuracy of Recommendations:**

Verified by users to ensure job role and skill suggestions align with their career goals.

- **Resume Generation:**

Users confirm that the generated resume matches their input, with proper formatting and layout.

CHAPTER 5

CONCLUSION AND FUTURE SCOPE

5.1 CONCLUSION

The *Resume Analyzer and Generator Using Pyresparser* is an advanced system that combines natural language processing (NLP), data analysis, and PDF generation to provide a seamless experience for both job seekers and recruiters. By leveraging tools like Pyresparser, spaCy, and Streamlit, the project efficiently extracts essential resume details, offers actionable insights, and generates professional resumes.

This system bridges the gap between raw resume data and meaningful insights by offering skill-based recommendations, job role predictions, and sector-specific visualizations. It simplifies the recruitment process for employers while empowering candidates to enhance their profiles. The project showcases the effective integration of cutting-edge NLP techniques with practical applications, highlighting its potential for innovation and scalability.

In conclusion, the *Resume Analyzer and Generator* successfully meets its objectives and demonstrates the ability to streamline resume management processes. Its modular design and user-focused approach make it a valuable tool for modern recruitment and career development.

5.2 FUTURE SCOPE

The future scope of the *Resume Analyzer and Generator Using Pyresparser* is vast, with several opportunities for enhancement and growth. By integrating advanced technologies and expanding its capabilities, the system can evolve into a highly sophisticated platform catering to a global audience.

1. **Advanced NLP Models**

Incorporating state-of-the-art models like BERT, RoBERTa, or GPT can improve the accuracy of information extraction and recommendation generation. These models could better understand complex resumes, including those with unstructured or unconventional formats, to provide more precise insights.

2. **Multi-Language Support**

Expanding the system to support multiple languages will make it accessible to a global audience. This capability would allow users to analyze resumes written in different languages, providing inclusive recommendations and insights.

3. **Enhanced User Customization**

Future iterations could allow users to customize resume templates dynamically, enabling greater personalization in the PDF generation process. This feature would provide users with the ability to tailor resumes to specific job applications.

4. **Cloud-Based Deployment**

Deploying the system on a cloud platform would enhance scalability, enabling it to handle larger datasets and concurrent users efficiently. This would also facilitate remote access for users and organizations.

5. **Integration with Applicant Tracking Systems (ATS)**

Adding compatibility with ATS software would allow recruiters to directly import analyzed resumes into their systems, streamlining the hiring workflow further.

The *Resume Analyzer and Generator* holds immense potential for development and innovation, making it a robust solution for the evolving needs of the job market and recruitment landscape.

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Appendix A:Source code

resume_parser.py

```
import os
import multiprocessing as mp
import io
import spacy
import pprint
from spacy.matcher import Matcher
from . import utils

class ResumeParser(object):
    def __init__(
        self,
        resume,
        skills_file=None,
        custom_regex=None
    ):
        nlp = spacy.load('en_core_web_sm')
        custom_nlp = spacy.load("en_core_web_sm")
        self.__skills_file = skills_file
        self.__custom_regex = custom_regex
        self.__matcher = Matcher(nlp.vocab)
        self.__details = {
            'name': None,
            'email': None,
            'mobile_number': None,
            'skills': None,
            'degree': None,
            'no_of_pages': None,
        }
        self.__resume = resume
        if not isinstance(self.__resume, io.BytesIO):
            ext = os.path.splitext(self.__resume)[1].split('.')[1]
        else:
            ext = self.__resume.name.split('.')[1]
        self.__text_raw = utils.extract_text(self.__resume, '.' + ext)
        self.__text = ' '.join(self.__text_raw.split())
        self.__nlp = nlp(self.__text)
        self.__custom_nlp = custom_nlp(self.__text_raw)
        self.__noun_chunks = list(self.__nlp.noun_chunks)
        self.__get_basic_details()

    def get_extracted_data(self):
        return self.__details

    def __get_basic_details(self):
```



```

        cust_ent = utils.extract_entities_wih_custom_model(
            self.__custom_nlp
        )
        name = utils.extract_name(self.__nlp, matcher=self.__matcher)
        email = utils.extract_email(self.__text)
        mobile = utils.extract_mobile_number(self.__text,
self.__custom_regex)
        skills = utils.extract_skills(
            self.__nlp,
            self.__noun_chunks,
            self.__skills_file
        )
        entities = utils.extract_entity_sections_grad(self.__text_raw)
        try:
            self.__details['name'] = cust_ent['Name'][0]
        except (IndexError, KeyError):
            self.__details['name'] = name
        self.__details['email'] = email
        self.__details['mobile_number'] = mobile
        self.__details['skills'] = skills
        self.__details['no_of_pages'] =
utils.get_number_of_pages(self.__resume)
        try:
            self.__details['degree'] = cust_ent['Degree']
        except KeyError:
            pass
        return
def resume_result_wrapper(resume):
    parser = ResumeParser(resume)
    return parser.get_extracted_data()

if __name__ == '__main__':
    pool = mp.Pool(mp.cpu_count())
    resumes = []
    data = []
    for root, directories, filenames in os.walk('resumes'):
        for filename in filenames:
            file = os.path.join(root, filename)
            resumes.append(file)
    results = [
        pool.apply_async(
            resume_result_wrapper,
            args=(x,)
        ) for x in resumes
    ]
    results = [p.get() for p in results]
    pprint.pprint(results)

```

resume_generator.py

```
import base64
from reportlab.lib.pagesizes import letter
from reportlab.platypus import (
    SimpleDocTemplate, Paragraph, Spacer, Table, TableStyle, Image,
    HRFlowable
)
from reportlab.lib.styles import getSampleStyleSheet, ParagraphStyle
from reportlab.lib import colors
import streamlit as st
import tempfile
import os
from PIL import Image as PILImage
from io import BytesIO

def generate_resume_pdf_template1(data):
    with tempfile.NamedTemporaryFile(delete=False, suffix=".pdf") as
temp_pdf:
    pdf_file = temp_pdf.name

    doc = SimpleDocTemplate(
        pdf_file,
        pagesize=letter,
        leftMargin=36,
        rightMargin=36,
        topMargin=24,
        bottomMargin=36,
    )
    styles = getSampleStyleSheet()

    # Styles
    name_style = ParagraphStyle(
        "name_style",
        parent=styles["Heading1"],
        fontName="Times-Roman",
        fontSize=18, # Larger font size for name
        textColor=colors.black,
        spaceAfter=6,
    )

    contact_style = ParagraphStyle(
        "contact_style",
        parent=styles["BodyText"],
        fontName="Helvetica",
        fontSize=10,
        textColor=colors.black,
        spaceAfter=6,
```

```

)
section_title_style = ParagraphStyle(
    "section_title_style",
    parent=styles["Heading2"],
    fontName="Times-Roman", # Set to Times New Roman
    fontSize=14, # Increased font size for section titles
    alignment=1, # Center alignment
    textColor=colors.black,
    spaceAfter=4,
)
bullet_style = ParagraphStyle(
    "bullet_style",
    parent=styles["BodyText"],
    bulletText="• ", # Add bullet before text
    fontName="Helvetica",
    fontSize=11,
    textColor=colors.black,
    spaceAfter=3,
)
normal_style = ParagraphStyle(
    "normal_style",
    parent=styles["BodyText"],
    fontName="Helvetica",
    fontSize=11,
    textColor=colors.black,
)

elements = []

header_table_data = [
    [
        Paragraph(f'<b>{data["name"]}</b>', name_style),
        # Image(data["photo"], width=100, height=100) if data["photo"] else
        "",
    ]
]
header_table = Table(header_table_data, colWidths=[400, 150])
elements.append(header_table)
elements.append(Spacer(1, 6))
elements.append(Paragraph(data["contact"], contact_style))
elements.append(Spacer(1, 8))

elements.append(HRFlowable(width="100%", thickness=1,
color=colors.black))
elements.append(Spacer(1, 4))
elements.append(Paragraph("<b>Career Objective</b>",
section_title_style))

```

```

elements.append(Paragraph(data["career_objective"], normal_style))
elements.append(Spacer(1, 8))
        elements.append(HRFlowable(width="100%",    thickness=1,
color=colors.black))
elements.append(Spacer(1, 4))
elements.append(Paragraph("<b>Education</b>", section_title_style))
for edu in data["education"]:
    elements.append(Paragraph(edu, bullet_style))
elements.append(Spacer(1, 8))

        elements.append(HRFlowable(width="100%",    thickness=1,
color=colors.black))
elements.append(Spacer(1, 4))
if data["experience"]:
    tech_exp_table_data = [
        [
            Paragraph("<b>Technical Skills</b>", section_title_style),
            Paragraph("<b>Experience</b>", section_title_style),
        ]
    ]
    max_rows = max(len(data["skills"]), len(data["experience"]))
    for i in range(max_rows):
        tech_exp_table_data.append([
            Paragraph(data["skills"][i], bullet_style) if i < len(data["skills"])
else "",
            Paragraph(data["experience"][i], bullet_style) if i <
len(data["experience"]) else "",
        ])
    tech_exp_table = Table(tech_exp_table_data, colWidths=[250, 250])
    tech_exp_table.setStyle(TableStyle([
        ("ALIGN", (0, 0), (-1, -1), "LEFT"),
        ("FONTNAME", (0, 0), (-1, -1), "Helvetica"),
        ("FONTSIZE", (0, 0), (-1, -1), 11),
        ("BOTTOMPADDING", (0, 0), (-1, -1), 3),
    ]))
    elements.append(tech_exp_table)
else:
        elements.append(Paragraph("<b>Technical Skills</b>",
section_title_style))
    for skill in data["skills"]:
        elements.append(Paragraph(skill, bullet_style))
elements.append(Spacer(1, 8))

        elements.append(HRFlowable(width="100%",    thickness=1,
color=colors.black))
elements.append(Spacer(1, 4))
elements.append(Paragraph("<b>Projects</b>", section_title_style))

```


```

for proj in data["projects"]:
    elements.append(Paragraph(f"<b>{proj['title']}</b>", normal_style))
    for line in proj["description"]:
        elements.append(Paragraph(line, bullet_style))
    elements.append(Spacer(1, 8))

    elements.append(HRFlowable(width="100%", thickness=1,
color=colors.black))
    elements.append(Spacer(1, 4))
    ach_cert_table_data = [
        [
            Paragraph("<b>Achievements</b>", section_title_style),
            Paragraph("<b>Certifications</b>", section_title_style),
        ]
    ]
    max_rows = max(len(data["achievements"]), len(data["certifications"]))
    for i in range(max_rows):
        ach_cert_table_data.append([
            Paragraph(data["achievements"][i], bullet_style) if i <
len(data["achievements"]) else "",
            Paragraph(data["certifications"][i], bullet_style) if i <
len(data["certifications"]) else "",
        ])
    ach_cert_table = Table(ach_cert_table_data, colWidths=[250, 250])
    ach_cert_table.setStyle(TableStyle([
        ("ALIGN", (0, 0), (-1, -1), "LEFT"),
        ("FONTNAME", (0, 0), (-1, -1), "Helvetica"),
        ("FONTSIZE", (0, 0), (-1, -1), 11),
        ("BOTTOMPADDING", (0, 0), (-1, -1), 3),
    ]))
    elements.append(ach_cert_table)

doc.build(elements)
return pdf_file

```

st.title("Resume Generator )

template = st.radio("Select Template", ["Template 1 - Classic", "Template 2 - Modern"])

Section for User Inputs

st.markdown("## Personal Information")

data = {

 "name": st.text_input("Full Name", placeholder="Enter your full name (e.g., John Doe)"),

 "contact": st.text_area("Contact Info", placeholder="Add email, phone number, and address"),

```

    "career_objective": st.text_area("Career Objective", placeholder="Write a
brief statement about your career goals"),
    # "photo": st.file_uploader("Upload Profile Photo (Optional)", type=["jpg",
"jpeg", "png"]),
}

st.markdown("---")
st.markdown("### Educational Background")
num_edu_entries = st.number_input("Number of Education Entries",
min_value=1, step=1, value=1)
data["education"] = [
    f'{st.text_input(f'Degree {i+1}', placeholder="Type of Degree (e.g., B.Tech,
M.Sc))}', "
    f'{st.text_input(f'Institution {i+1}', placeholder='Institution Name (e.g.,
ABC University))}', "
    f'{st.text_input(f'Years {i+1}', placeholder='Years of Study (e.g.,
2018-2022))}', "
    f'Marks: {st.text_input(f'Marks {i+1}', placeholder='Enter marks secured
(e.g., 85%))}'"
    for i in range(num_edu_entries)
]

st.markdown("---")
st.markdown("### Technical Skills")
data["skills"] = st.text_area(
    "List your technical skills",
    placeholder="Enter one skill per line (e.g., Python, React, SQL)",
).split("\n")

st.markdown("---")
st.markdown("### Professional Experience")
data["experience"] = st.text_area(
    "Work Experience",
    placeholder="Describe your experience one line at a time (e.g., Software
Engineer at XYZ Corp)",
).split("\n")

st.markdown("---")
st.markdown("### Projects")
num_projects = st.number_input("Number of Projects", min_value=1,
step=1, value=1)
data["projects"] = [
    {
        "title": st.text_input(f'Project {i+1} Title', placeholder="Project Name
(e.g., Resume Builder App)",
        "description": st.text_area(
            f'Project {i+1} Description",

```

```

        placeholder="Describe the project details (e.g., Developed a tool
using Python and Streamlit)"
    ).split("\n"),
    }
    for i in range(num_projects)
]

st.markdown("---")
st.markdown("## Achievements")
data["achievements"] = st.text_area(
    "Your Achievements",
    placeholder="Enter achievements one per line (e.g., Won XYZ
Hackathon 2023)",
).split("\n")

st.markdown("---")
st.markdown("## Certifications")
data["certifications"] = st.text_area(
    "Your Certifications",
    placeholder="Enter certifications one per line (e.g., AWS Certified
Solutions Architect)",
).split("\n")

if st.button("Generate Resume"):
    if template == "Template 1 - Classic":
        pdf_path = generate_resume_pdf_template1(data)
    else:
        pdf_path = generate_resume_pdf_template2(data)

    if pdf_path:
        # Convert the PDF to base64 for embedding in an iframe
        with open(pdf_path, "rb") as pdf_file:
            pdf_data = pdf_file.read()
            b64_pdf = base64.b64encode(pdf_data).decode("utf-8")
            pdf_display = f<iframe
src="data:application/pdf;base64,{b64_pdf}" width="700" height="900"
type="application/pdf"></iframe>'
            st.markdown(pdf_display, unsafe_allow_html=True)
        with open(pdf_path, "rb") as pdf_file:
            st.download_button("Download Resume", pdf_file.read(),
"enhanced_resume.pdf", "application/pdf")
            os.unlink(pdf_path)

```