RECOGNIZATION OF FRUITS,VEGETABLES,PLANTS AND FLOWERS USING CNN

A MINI PROJECT REPORT

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BONAFIDE CERTIFICATE

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INTERNAL EXAMINER **EXTERNAL EXAMINER**

ABSTRACT

This project introduces a Convolutional Neural Network (CNN)-based system for the automated recognition and classification of fruits, flowers, vegetables, and medicinal plants. By harnessing the power of deep learning and computer vision, our model is trained on a diverse and extensive dataset to distinguish intricate visual features within each botanical category. Transfer learning techniques optimize model performance, ensuring adaptability to various species and conditions.he system's applications extend to agricultural quality assessment, biodiversity documentation, and medicinal plant identification. It promises to enhance agricultural productivity by automating sorting and quality control, contributing to biodiversity preservation by aiding in species identification, and facilitating natural medicine research by assisting in the recognition of therapeutic plants.

In a world where efficient agriculture and biodiversity preservation are paramount, this project offers a transformative solution that leverages cutting-edge technology to address these pressing needs. The outcomes are poised to have a profound impact on multiple domains, ushering in a new era of technology-driven botanical recognition and classification.

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CHAPTER 1

INTRODUCTION

1.1 PROJECT OVERVIEW

"Our project, 'Recognition of Fruits, Plants, Vegetables, and Medicinal Plants,' harnesses computer vision and machine learning to offer quick identification of a wide range of botanical entities. Through an accessible user interface, individuals can upload images to obtain instant recognition results, including the entity's name and detailed information about its characteristics and applications. This endeavor serves to connect people with the natural world, fostering biodiversity appreciation and providing practical insights into agriculture, culinary arts, and herbal medicine. Our objective is to facilitate informed interactions with plants, enriching knowledge and experiences while promoting sustainability."

1.2 AIM

The aim of this project is to develop an automated system for accurately recognizing and categorizing fruits, vegetables, plants, and flowers using advanced Convolutional Neural Networks (CNNs). This system will leverage extensive datasets and data augmentation techniques to enhance model accuracy and adaptability. Ultimately, the project aims to provide a versatile tool that can be applied in agriculture, horticulture, and botanical research to streamline recognition processes and improve overall efficiency and productivity in these domains.

1.2 PROBLEM DEFINITION

- The project seeks to develop a computer vision system using CNNs to automatically recognize and classify these botanical entities from images.
- To achieve this, a diverse dataset will be created and used to train the CNN, allowing it to identify various plant species and conditions.

- The primary goals include streamlining agricultural produce sorting, aiding in biodiversity documentation, and assisting in medicinal plant identification.
- The project's success will have far-reaching implications, from boosting agricultural efficiency to supporting biodiversity conservation and healthcare research.

1.3 OBJECTIVE

"The primary objectives of our project are twofold: first, to develop a robust and accurate recognition system capable of swiftly identifying a diverse array of botanical entities, including fruits, plants, vegetables, and medicinal plants, through the utilization of advanced computer vision and machine learning technologies. Second, we aim to provide users with comprehensive information about these recognized entities, encompassing their botanical names, characteristics, cultivation requirements, culinary uses, and medicinal properties. By achieving these objectives, our project seeks to empower individuals with a deeper understanding of the natural world, fostering biodiversity appreciation, supporting sustainable agricultural practices, and enhancing knowledge in areas ranging from gastronomy to herbal medicine. Ultimately, our overarching goal is to create a valuable tool that encourages responsible and informed interactions with plants, benefiting both personal enrichment and environmental stewardship."

- Data Collection
- Deployment
- Model Training
- CNN Architecture

1.4.1 DATA COLLECTION

Dataset: Collect a diverse dataset of images that cover a wide range of plant species, fruits, vegetables, and flowers. Diversity is crucial to ensure the model generalizes well to different categories.

Image Quality: Ensure that the collected images are of high quality and resolution to allow for accurate classification. Blurry or low-resolution images can negatively impact model performance.

Data Sources: Utilize various sources for data collection, including online repositories, publicly available datasets, and, if Diverse necessary, create your own dataset by capturing images.

1.4.2 DEPLOYMENT

Application Development: Develop a user-friendly application or interface through which users can interact with your model. Consider web applications, mobile apps, or desktop software, depending on your target audience.

User Interface (UI): Design an intuitive and visually appealing user interface (UI) that allows users to easily upload images and receive predictions. Keep the user experience in mind.

Output Presentation: Display the model's predictions to users in a clear and understandable format. Include the predicted category and, if possible, a confidence score or probability.

1.4.3 MODEL TRAINING

Data Preparation : Preprocess the dataset by resizing images to a consistent size and normalizing pixel values. This ensures uniformity in the input data.

Data Augmentation: Apply data augmentation techniques to increase dataset diversity. Common augmentations include random rotations, flips, and brightness adjustments.

Data Split: Split the dataset into training, validation, and test sets. Typical splits are 70-80% for training, 10-16% for validation, and 10-16% for testing.

Batch Size: Choose an appropriate batch size for training. Smaller batch sizes require less memory but may lead to slower convergence, while larger batches may speed up training but require more memory.

1.4.4 CNN ARCHITECTURE

Input Layer: The input layer represents the image or data you want to process

Activation Function: After each convolution operation, an activation function like ReLU (Rectified Linear Unit) is applied to introduce non-linearity. This helps the network capture complex patterns.

Output Layer: The output layer produces the final predictions based on the task. For image classification, it typically has as many neurons as there are classes, with softmax activation to convert raw scores into probabilities.

1.4.5 SCORING AND RANKING

- Each recruiter can have a different set of specifications for a particular job title.
- The system aims to provide candidates whose qualifications and skills match the recruiters' specifications.
- The prvious units cluster the candidates based on skills and work experience.

CHAPTER 2

SYSTEM ANALYSIS

System analysis for the "Recognition of Fruits, Plants, Vegetables, and Medicinal Plants" project involves a comprehensive examination of its objectives and technical requirements. At its core, the project seeks to address the challenge of accurate and rapid recognition of diverse botanical entities. This analysis delves into the specific needs of the user base, including botanists, agriculture professionals, cooks, and herbalists, to ensure the system caters to their requirements. It also assesses the data aspects, from collecting and preprocessing a substantial dataset of botanical images to selecting appropriate machine learning algorithms for image recognition. The design and usability of the user interface are scrutinized to create an intuitive and efficient experience. System architecture, database design, and performance considerations are meticulously planned to support real-time recognition and information retrieval. Moreover, security, privacy, and legal compliance are pivotal concerns, given the sensitivity of user data and potential ethical implications. Throughout this analysis, the aim is to lay a solid foundation for the development of a robust, user-friendly, and ethically sound botanical recognition system.

2.1 EXISTING SYSTEM

Plant Identification Apps: Mobile applications like PlantSnap, PlantNet, and PictureThis allow users to take photos of plants and receive instant identification and information.

Botanical Databases: Online databases such as the USDA Plants Database and Flora of North America Online provide extensive information about plant species, often with search and image recognition features.

Deep Learning Models: Machine learning models, particularly Convolutional Neural Networks (CNNs), are used for image-based plant recognition. Researchers and organizations

develop these models using large datasets.

Research Projects: Universities and research institutions undertake projects involving sophisticated plant recognition systems, often in collaboration with botanists and biologists.

Herbarium Collections: Physical herbaria in museums and institutions store preserved plant specimens and detailed information, serving as references for plant identification.

Botanical Gardens and Arboreta: These physical locations offer educational resources and may have tools or guides to help visitors identify plants.

Online Communities: Platforms like iNaturalist and various plant identification forums provide a space for users to upload plant images for community-assisted identification.

Specialized Software: Some specialized software applications cater to botanists and researchers, offering advanced features for plant identification and data collection.

2.1.1 Drawbacks of Existing System

- Data Limitations
- Generalization to Unseen Variations
- Fine-Grained Recognition
- Real-Time Processing
- Labeling and Annotation
- Adaptation to Local Variations

2.2 NEED FOR THE PROPOSED SYSTEM

1. High-quality and diverse datasets of plants, fruits, vegetables, and flowers for training and testing the model..
2. Adequate computational resources, including GPUs or TPUs, for training deep CNN models.
3. Well-designed CNN architecture tailored to the specific recognition task and dataset.
4. Metrics and methods for assessing the model's performance, such as accuracy and precision
5. Documentation to capture the dataset, model, and project details, including a final project report.

2.3 FEATURES OF THE PROPOSED SYSTEM

1. The system is designed to recognize and identify a wide range of plants, including fruits, vegetables, flowers, and other vegetation.
2. It can classify plants into different species, providing users with information about various types of plants.
3. The system has the capability to process and recognize plant images, whether provided by users or captured using a camera.

4. In certain applications, it can offer real-time plant recognition and information, making it suitable for mobile apps or robotics.
5. It aims to provide accurate and reliable results in terms of plant species or variety recognition.

2.5 REQUIREMENT ANALYSIS

2.5.1 HARDWARE REQUIREMENTS

Windows	: Microsoft R windows R 8/7/Vista (32-64 bit)
RAM	: 2 GB RAM minimum,4 GB RAM recommended,
Hard Disk	:10 GB
Screen Resolution	:1280 x 800 minimum UI/UX material.

2.5.2 SOFTWARE REQUIREMENTS

Operating System: Windows7/8/1

Tools :

- ➢ React js
- ➢ Node js
- ➢ HTML
- ➢ CSS
- ➢ Javascript
- ➢ PHP

2.5.3 TOOLS

HTML

- The standard markup language for documents designed to be displayed in a web browser.
- It can be assisted by technologies such as Cascading Style Sheet (CSS) and scripting languages such as JavaScript.
- HTML is the standard markup language for Web pages.
- With HTML you can create your own Website.

CSS

- CSS is the acronym of "Cascading Style Sheets".
- CSS is a computer language for laying out and structuring web pages (HTML or XML).

- This language contains coding elements and is composed of these “cascading style sheets” which are equally called CSS files.
- It is used for describing the presentation of adocument written in a markup language such as HTML.
- CSS is a cornerstone technology of the World Wide Web, alongside HTML and JavaScript which improve the page load speed between the pages that share the file and this formatting .

JS

- It is an **interpreted programming language** with object-oriented capabilities.
- JavaScript was first known as LiveScript, but Netscape changed its name to JavaScript, possibly because of the excitement being generated by Java.
- While it is most well-known as the scripting language for Web pages, many non-browser environments also use it, such as Node.js.
- JavaScript is a scripting language that enables you to dynamically update content, control multimedia, animate images, and pretty much everything else.

CHAPTER 3

SYSTEM DESIGN

Systems design is the process of defining the architecture, product design, modules, interfaces, and data for a system to satisfy specified requirements. Systems design could be seen as the application of systems theory to product development.

1. The online resume builder and CV maker is designed to save you time and effort.
2. With just a few clicks, you can access our extensive library of free word resume templates and cover letter templates and customize them to match your skills, experience, and career goals.
3. You don't need any design skills or technical expertise – just choose a template that fits your style and start creating your resume and cover letter.
4. When we use our online resume builder and CV maker, you're not just getting access to free word resume templates and cover letter templates.
5. We're also getting a comprehensive resume and cover letter package that includes helpful tips and advice on how to create a winning resume and cover letter.
6. Our resume and cover letter templates are designed to help you highlight our skills, experience, and achievements in the best possible light and land our dream job.
7. The user interacts with the resume builder application through a web browser.
8. The frontend server serves the frontend application, which is responsible for rendering the user interface and handling user input.
9. The frontend application communicates with the backend server, which is responsible for handling business logic and data processing.
10. The backend server interacts with the database server, which stores and retrieves user data, such as resumes and user information.

3.1 Input Design

- Input design is the process of converting user-originated input format to computer based format.
- It is called an input form or source document.
- Resume design is **the structure, look and format of a resume**.
- A professionally designed resume can improve your resume's appeal and support its content.
- It can make it easier to read and highlight essential information.
- User-Friendly Interface: The resume builder system should have a user-friendly interface that is easy to navigate and use, with clear instructions and prompts for each section.
- The interface should be visually appealing and engaging, with simple graphics and icons to guide the user through the process.
- Customization Options: The system should allow users to customize their input design based on their personal information and job requirements.
- This could include the option to select from multiple resume templates, choose different fonts and colors, or add custom sections to the resume.
- Relevant Sections: The system should offer relevant sections for the user to input their personal information, education, work experience, skills, and any other relevant information based on the job or industry.
- The sections should be clearly labeled and easy to complete, with the option to add additional sections or subsections as needed.
- Dynamic Content: The system should be able to dynamically adjust the input design based on the input.
- Offering relevant suggestions for each section and ensuring that the user’s.

- Intelligent Suggestions: The system should provide intelligent suggestions to improve the user's input, such as highlighting gaps in employment.
- Suggesting additional relevant skills to include, or flagging potential errors or inconsistencies.
- Error Checking: The system should perform an error check of the input information to ensure that there are no formatting or spelling errors.
- All information is accurate and up-to-date.

3.2 Output Design

- A design output is a drawing or specification or manufacturing instruction.
- Design outputs describe all the components, parts, and pieces that go into your medical device.
- Template Design: The resume builder system should offer a range of customizable templates with different styles.
- Layouts to suit different industries and job applications. The design of the templates should be clean, modern, and visually appealing, with clear sections for different types of information.
- Content Formatting: The system should dynamically adjust the content and formatting of the resume based on the user's input, ensuring that the final output is easy to read and well-organized.
- This could include adjusting font size and style, optimizing spacing, and ensuring consistent use of bullets and headings.
- Relevant Sections: The system should offer relevant sections for the user to input their personal information, education, work experience, skills, and any other relevant information based on the job or industry.
- The output should clearly display each section in a logical and easy-to-follow order.

- Customization Options: The system should allow users to customize their output design, such as adding a photo, adjusting the color scheme, or changing the font style.
- However, the design options should not compromise the overall professional look and feel of the resume.
- Error Checking: The system should perform an error check of the final output to ensure that there are no formatting or spelling errors, and all information is accurate and up-to-date.
- Export Options: The system should allow users to export their final output in multiple formats such as PDF, Word, or HTML.
- This would make it easy for users to share their resumes with potential employers or upload them to job boards or social media platforms.
- Overall, the output design for a resume builder system should be clean, modern, and professional, with clear sections and formatting that is optimized for the job or industry.
- The customization options should be intuitive and easy to use, and the system should offer error checking and multiple export options for maximum flexibility.

3.3 Code Design

- A design code is a document that sets rules for the design of a new development in the United Kingdom.
- It is a tool that can be used in the design and planning process, but goes further.
- It is more regulated than other forms of guidance commonly used in the English planning system over recent decades.
- User Authentication Module: The user authentication module would be responsible for handling user registration, login, logout, password reset, and session management.

- It would use a server-side framework such as Express.js or Django to handle requests and responses.
- The module would consist of the following components:
- User Model: This component would define the structure and behavior of the user data stored in the database, including user information and authentication-related fields such as passwords and tokens.
- Routes: This component would define the API endpoints for handling user authentication requests, such as registering a new user, logging in, and resetting a password.
- Controllers: This component would handle the logic for processing incoming requests, such as validating user input, querying the database, and generating responses.
- Authentication Middleware: This component would provide a middleware function that checks if a user is authenticated before allowing them to access certain parts of the application.
- Resume Creation Module: The resume creation module would be responsible for providing users with the ability to create and edit their resumes. It would use a client-side framework such as React or Vue.js to handle user interactions and rendering.
- The module would consist of the following components:
- Resume Model: This component would define the structure and behavior of the resume data stored in the database, including resume sections and content.
- Resume Editor Component: This component would provide a user interface for creating and editing resumes, including options for selecting a template, formatting text, and adding or removing sections.

- Resume Preview Component: This component would provide a real-time preview of the user's resume as they make changes, allowing them to see how it will look to potential employers.
- Data Storage and Retrieval Module: The data storage and retrieval module would be responsible for storing and retrieving user data, including resumes and user information.
- It would use a database such as MongoDB or PostgreSQL to store this data.
- The module would consist of the following components:
- Database Model: This component would define the structure and behavior of the data stored in the database, including user accounts, resume data, and other relevant information.
- Database Adapter: This component would provide functions for interacting with the database, including reading and writing data, performing queries, and enforcing data validation rules.
- Export Module: The export module would be responsible for allowing users to export their resumes to various formats, such as PDF, Word, or HTML.
- It would use a third-party library or service such as React-PDF or jsPDF to convert the resume data into the desired format.
- The module would consist of the following components:
- Export Component: This component would provide a user interface for selecting an export format, customizing export options, and triggering the export process.
- Export Service: This component would provide functions for converting resume data into the desired format using a third-party library or service, such as React-PDF or js PDF.

- Sharing Module: The sharing module would be responsible for allowing users to share their resumes with others via email, social media, or other channels. It would use a third-party service such as Mailchimp or Share This to facilitate sharing.
- The module would consist of the following components:
- Share Component: This component would provide a user interface for selecting a sharing channel and triggering the sharing process.
- Share Service: This component would provide functions for interacting with a third-party sharing service, such as sending an email or posting to social media.
- It is a tool that can be used in the design and planning process, but goes further.
- It is more regulated than other forms of guidance commonly used in the English planning system over recent decades.

3.4 Process Design

- Process Design is the act of transforming an organization's vision, goals, and available resources into a discernible, measurable means of achieving the organization's vision.
- Process design focuses on defining what the organization will do to achieve its financial and other goals.
- User Registration and Login: The first step in the process is for users to create an account and log in to the application. This process involves the following steps:
- The user navigates to the registration page and enters their email and password.
- The application checks if the email address is already in use and if the passwordmeets the required complexity criteria.
- If the email is available and the password is valid, the application creates a newuser account and redirects the user to the login page.
- The user logs in using their email and password.

- The application verifies the user's credentials and creates a new sessiontoken.
- The user is redirected to their dashboard page.
- Resume Creation: Once the user is logged in, they can begin creating their resume. This process involves the following steps:
- The user navigates to the resume creation page.
- The application presents the user with a selection of resume templates to chooseform.
- The user selects a template and is presented with a resume editor interface.
- The user adds and edits content for each section of the resume, such as education,work experience, and skills.
- The application validates the user's input and saves the resume data to the database.
- Resume Editing and Updating:

  After the user creates their initial resume, they may want to edit and update itover time. This process involves the following steps:
- The user navigates to the resume editing page.
- The application retrieves the user's resume data from the database and present itin the resume editor interface.
- The user makes changes to the content and layout of the resume.
- The application validates the user's input and updates the resume data in the database.

3.5 Data flow diagram

- A data flow diagram shows the way information flows through a processor system.
- It includes data inputs and outputs, data stores, and the various sub processes data moves through.

3.6 UML DIAGRAMS

- The Unified Modelling Language is a standard language for specifying, visualizing, constructing, and documenting.
- Documenting the artifacts of the software systems, as well as for business modeling and other non-software systems.

3.6.1 Use Case Diagram

- A use case is a set of scenarios that describe an interaction between a user and system.
- A use case diagram displays the relationship among the actors and use cases.
- The two main components of a use case diagram are use cases and actors.
- A use case diagram is a type of Unified Modeling Language (UML) diagram used to describe the interactions between a system and its users or external entities.
- It represents the functional requirements of the system and the goals that the users or external entities hope to achieve through the system.
- The diagram shows the actors, use cases, and relationships between them.
- Actors are the users or external entities that interact with the system, while use cases represent the actions or tasks that the system can perform.
- Use case diagrams are useful for understanding the requirements of the system and for communicating with stakeholders about the system's functionality.
- They are commonly used in software development, system analysis, and business process modeling.

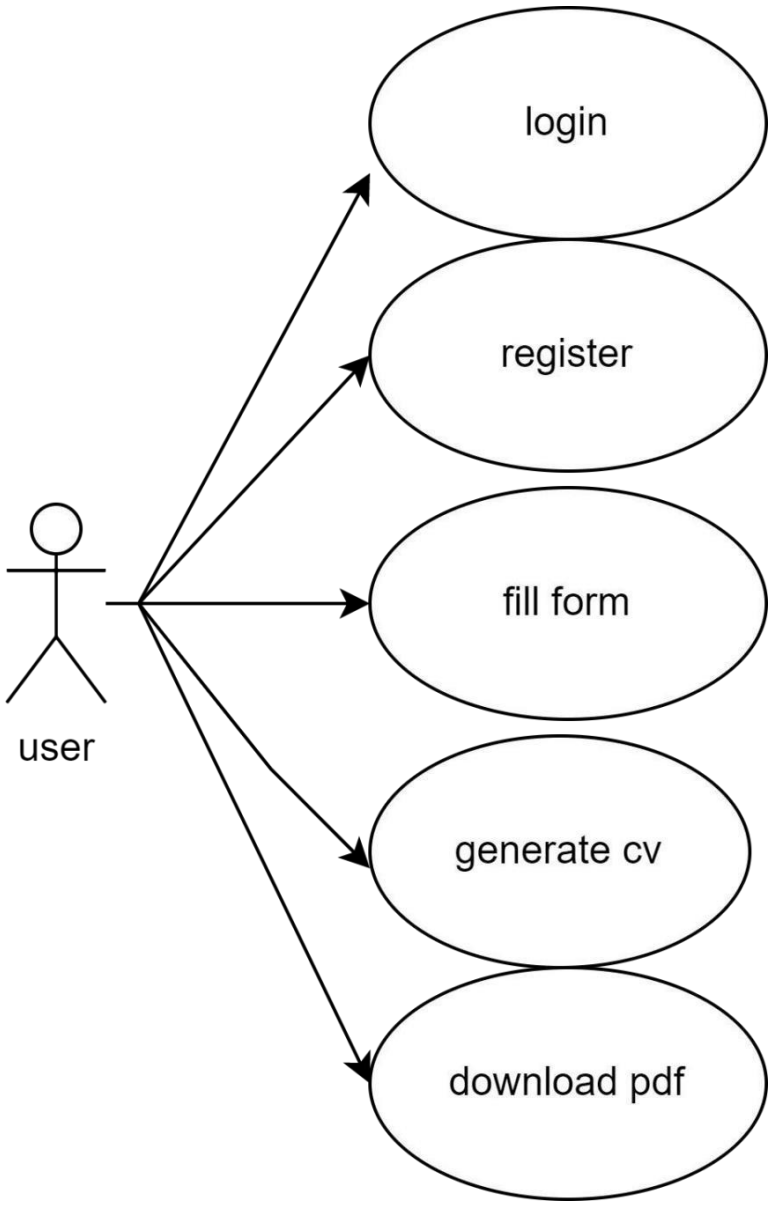

Figure 3.1 Use case diagram

- In this use case diagram,we have to register ,after registration is completed, then wehave to login.
- After login, we have to fill the form with important credentials and then, we have to download the resumes in pdf format.

3.6.2 Class Diagram

- Class diagrams are the most common diagrams used in UML. Class diagram consists of classes, interfaces, associations and collaborations.
- Class diagrams basically represent the object oriented view of the system which is static in nature.
- Active class is used in the class diagram to represent the concurrency of the system.
- This is the most widely used diagram at the time of system construction.
- Class diagrams are one of the most useful types of diagrams in UML as they clearly map out the structure of a particular system by modeling its classes, attributes, operations, and relationships between objects.
- With our UML diagramming software, creating these diagrams is not as overwhelming as it might appear.
- Class diagram shows a collection of classes, interfaces, associations, collaborations, and constraints. It is also known as a structural diagram.
- A class diagram in the Unified Modeling Language is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations, and the relationships among objects.

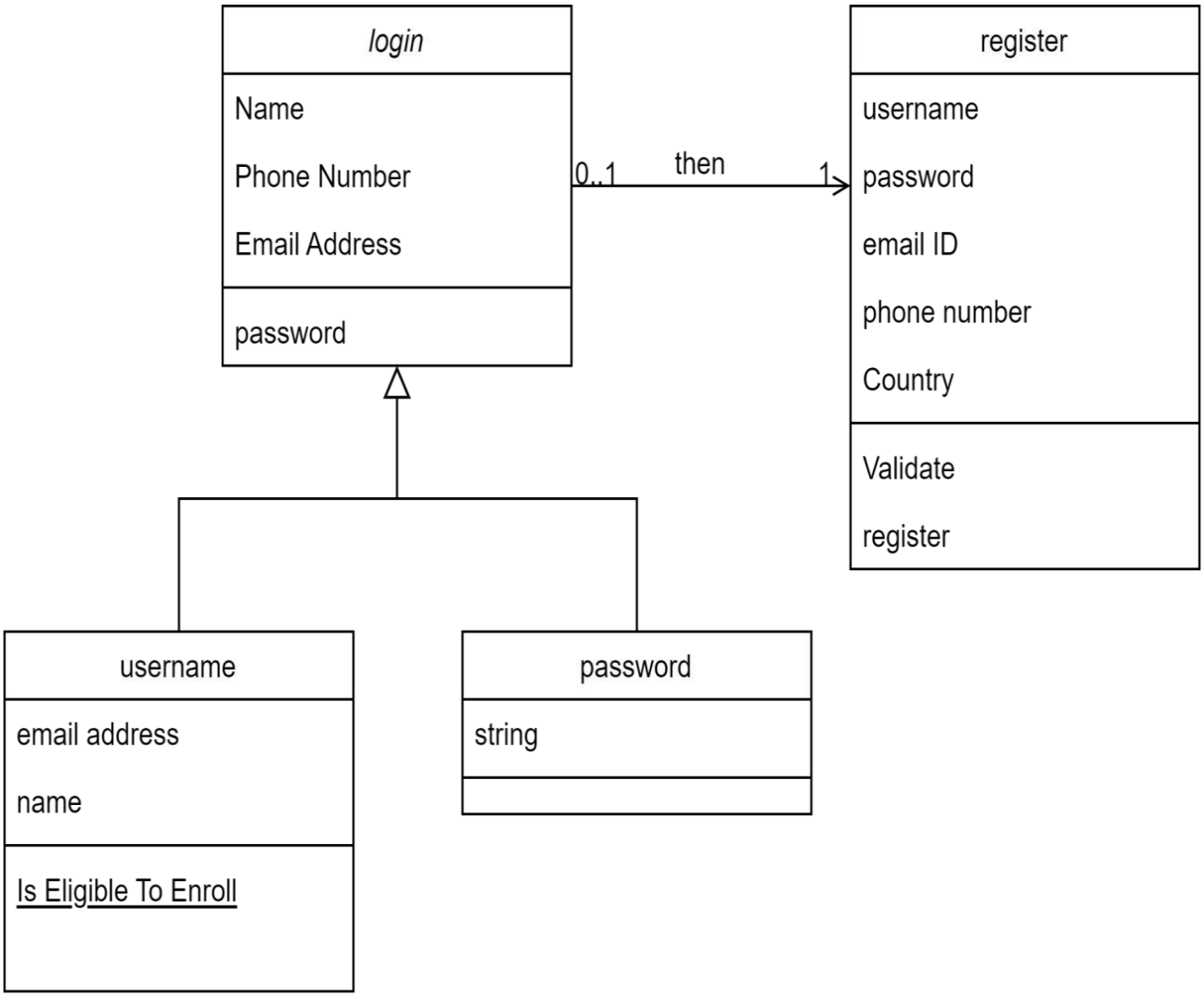

Figure 3.2 Class diagram

- In this class diagram,we have to register, after registration is completed,then we have to login.
- After login, we have to fill the form with important credentials and then, we have to download the resumes in pdf format.
- After that, if we want to edit the file again ,then we again edit and generate a pdf.

3.6.3 Sequence Diagram

- A sequence diagram is an interaction diagram. Sequence diagram is used to visualize the sequence of calls in a system to perform a specific functionality.
- A sequence diagram is a type of interaction diagram because it describes how and in what order a group of objects works together.

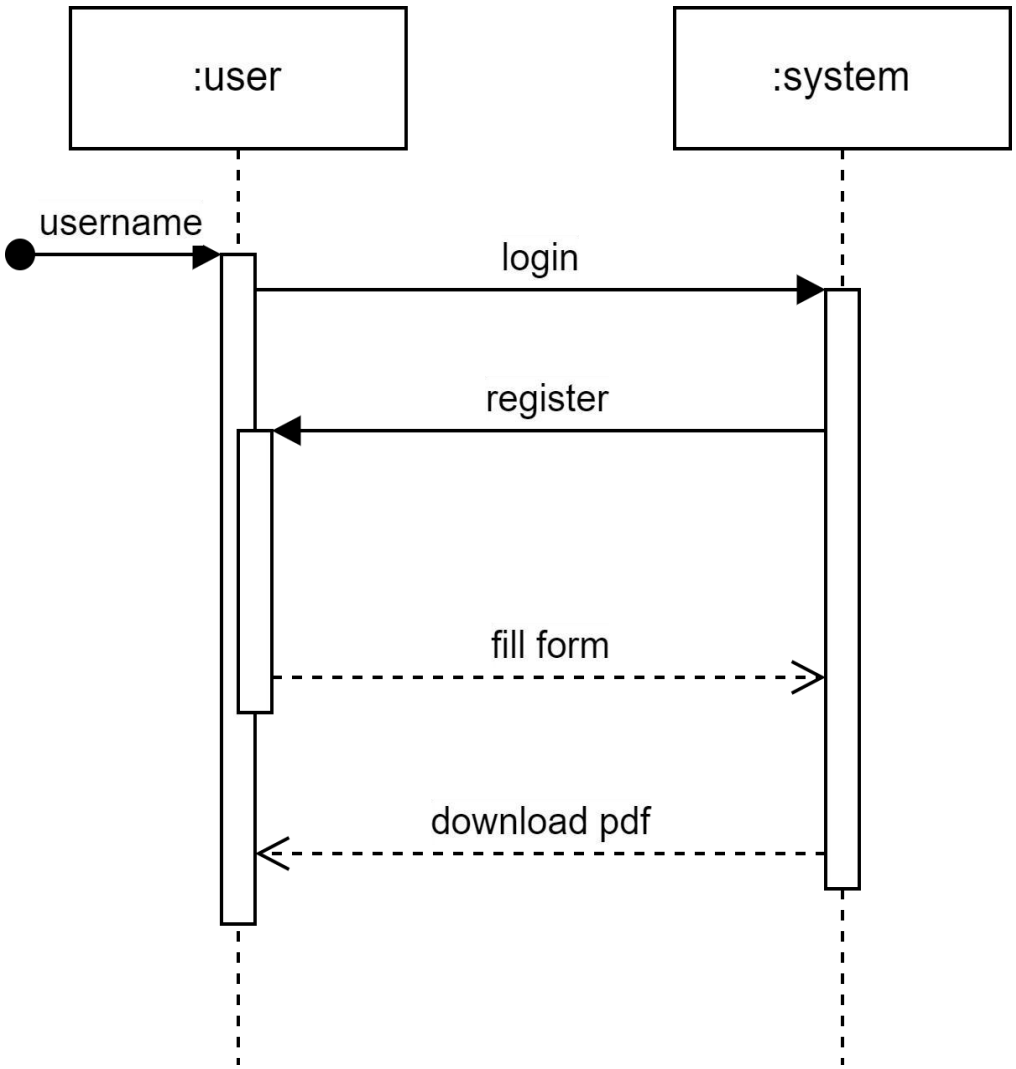

Figure 3.3 Sequence diagram

3.6.4 Activity Diagram

- Activity diagram is another important diagram in UML to describe dynamic aspects of the system.
- This diagram is basically a flowchart to represent the flow from one activity to another activity.
- The basic purposes of activity diagrams are similar to the other four diagrams.
- It captures the dynamic behavior of the system.
- Activity is the particular operation of the system.
- The activity can be described as an operation of the system.
- They can also describe the steps in a use case diagram.
- Activities modeled can be sequential and concurrent.
- Activity diagram is another important diagram in UML to describe the dynamic aspects of the system.
- Activity diagram is basically flowchart to represent the flow from one activity to another activity.

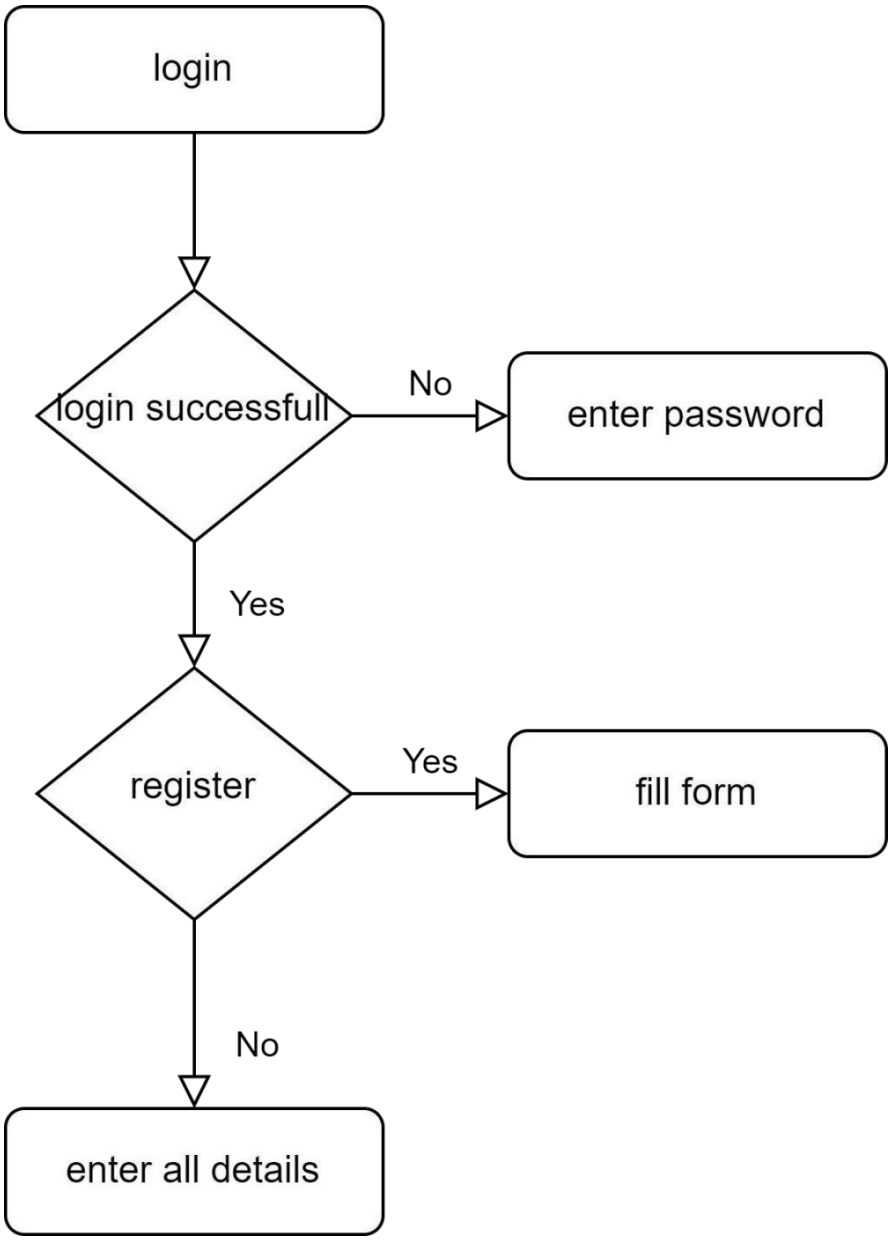

Figure 3.4 Activity diagram

- In an activity diagram,we must register by entering the valid email address and the password.
- After that we have to login using the correct email address and the correct password.

- If the login fails, then we have to again reenter the correct email address and the correct passwords.
- In an activity diagram, we also use swim lane for representing the flow of the activity from one state to the another state.
- Cost Structure: The cost structure for a resume builder system could include the cost of software development, server maintenance, marketing, and customer support.
- The development team would need to carefully estimate the cost of each of these components. Ensure that the revenue generated is sufficient to cove a profit margin. r these costs while also providing competition.
- The resume builder market is relatively competitive, with several established players in the market.
- Therefore, the proposed system would need to differentiate itself through unique features , superior user experience, or a lower price point.

CHAPTER 4

SYSTEM IMPLEMENTATION AND TESTING

4.1 MODULE DESCRIPTION

- There are mainly **2** modules in the project "**Resume Builder with Recommendation system**"
- They are:
  - ➔ User module.
  - ➔ Admin module.

4.1.1 USER MODULE:

- Here in this user module, we have three pages such as,
- REGISTER- here in this page the user should enter their email id and password to register .
- LOGIN -here in this page the user has to login using the registered email id and the password.
- DOWNLOAD PDF -after the user fills the required details and important credentials when he/she clicks the download pdf button the resume will be automatically generated.
- RECOMMENDATION SYSTEM - we also provide a recommendation system to recommend some features so that we could provide our best resumes.

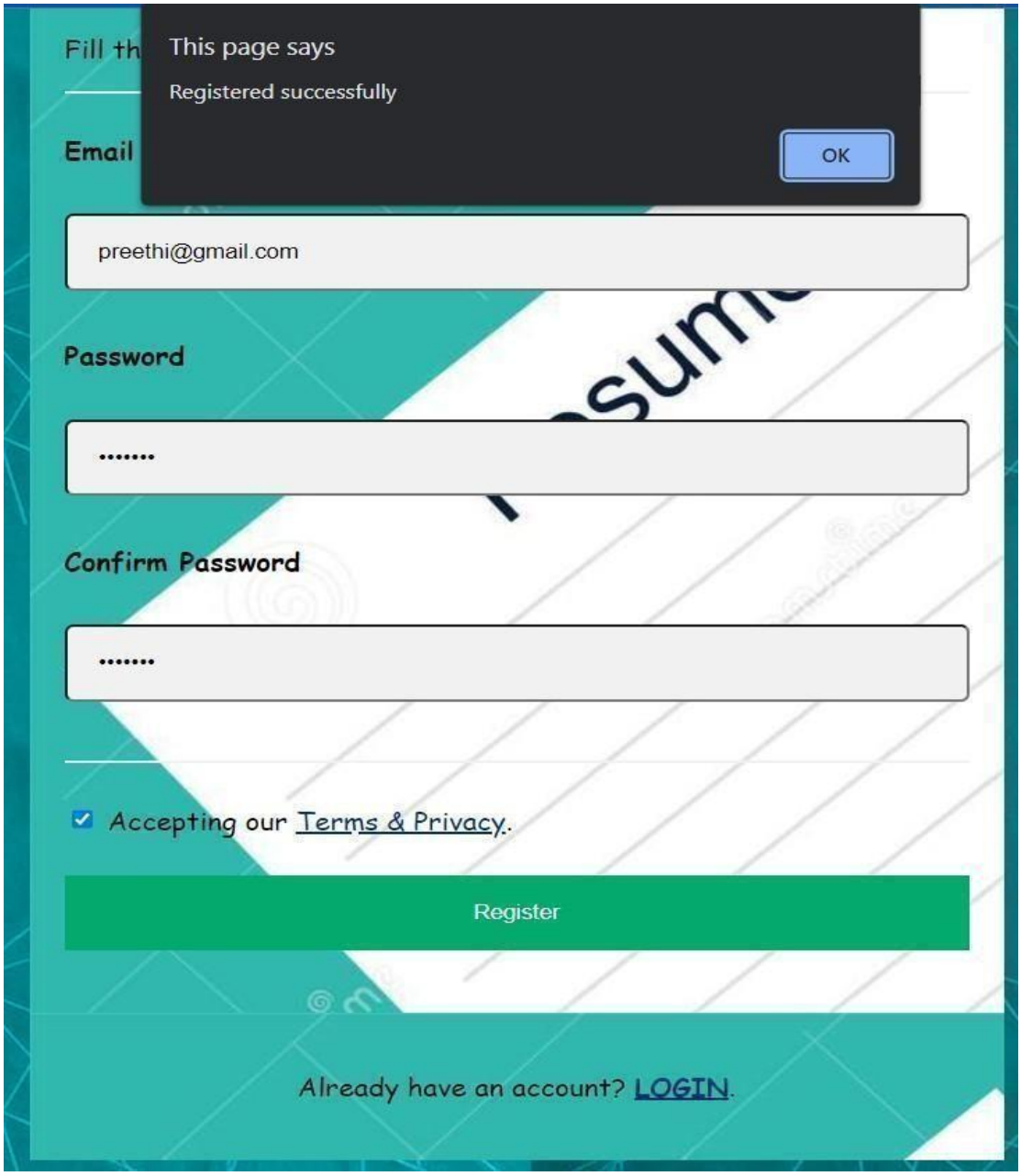

Figure 4.1 Registration Page

- We must register by entering the valid email address and the password.
- After that we have to login using the correct email address and the correct password.

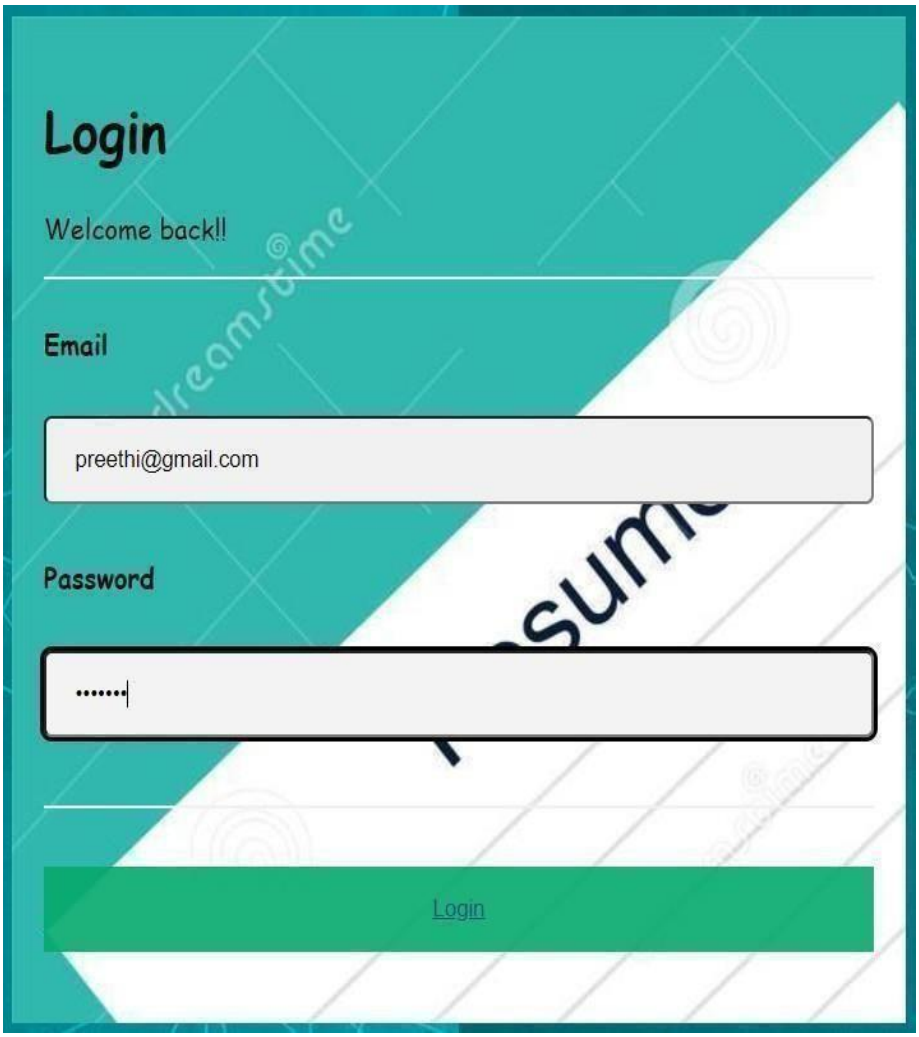

Figure 4.2 Login Page

- If the login fails, then we have to again reenter the correct email address and the correct passwords.
- After the user fills in the required details and important credentials .
- When he clicks the download pdf button the resume will be then it is automatically generated.

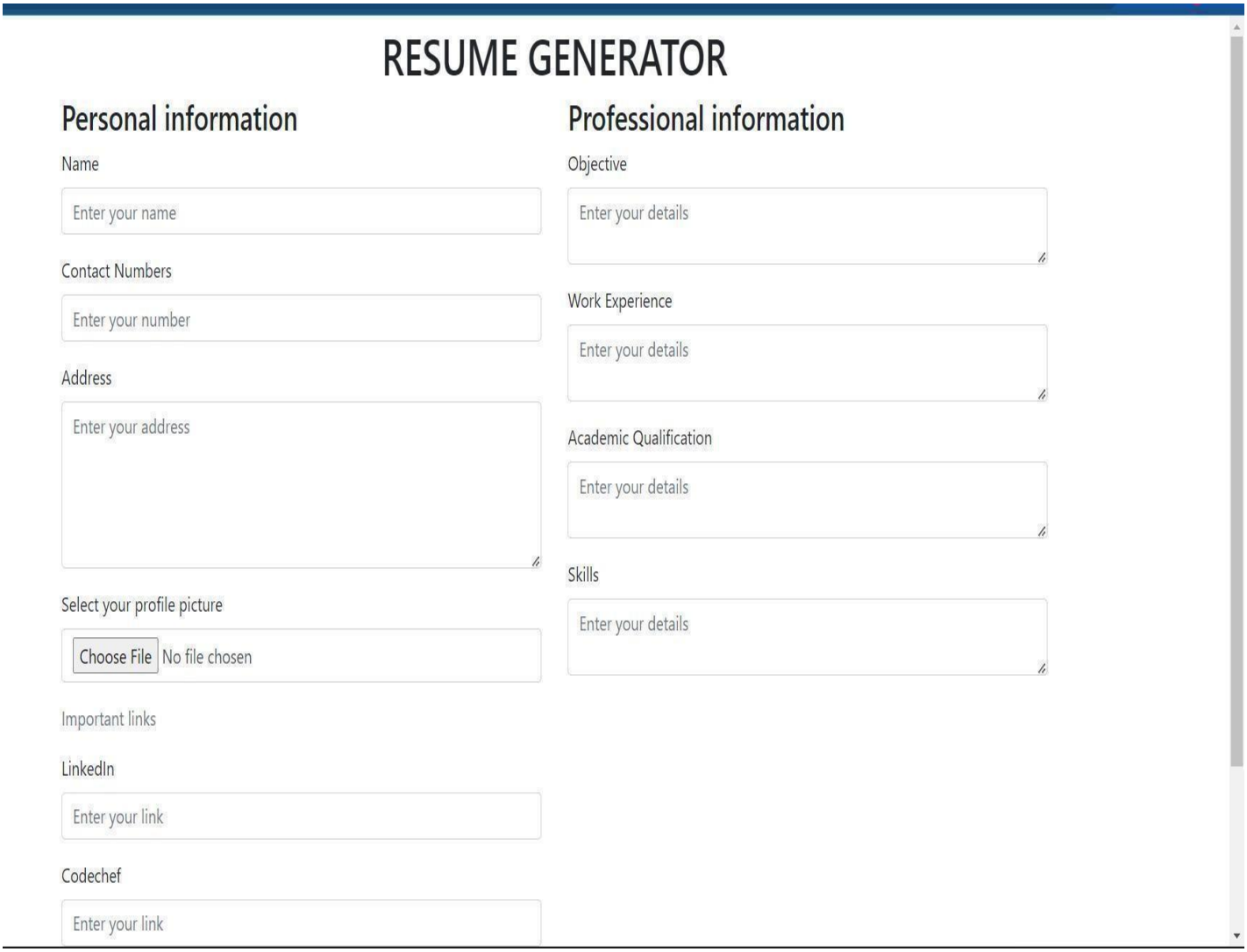

Figure 4.3 Details filling in the form Images

- Then the user wants to fill in the required details and important credentials.
- When he/she clicks the download pdf button the resume will be then automatically generated into the pdf format.

4.1.2 ADMIN MODULE :

- The admin module is the person who views the resume and changes ,editing resumes for free so that they can create their own resumes easily.
- To maintain the details like personal, education & skills.
- To maintain the three default resume formats.
- Select appropriate one and display the data in required format
- The existing system of some builders is prepared in the MS-Word Application software.
- The Format which was designed is manual.
- But creating a different resume format is not easy.
- To reduce the burden we have developed this software.

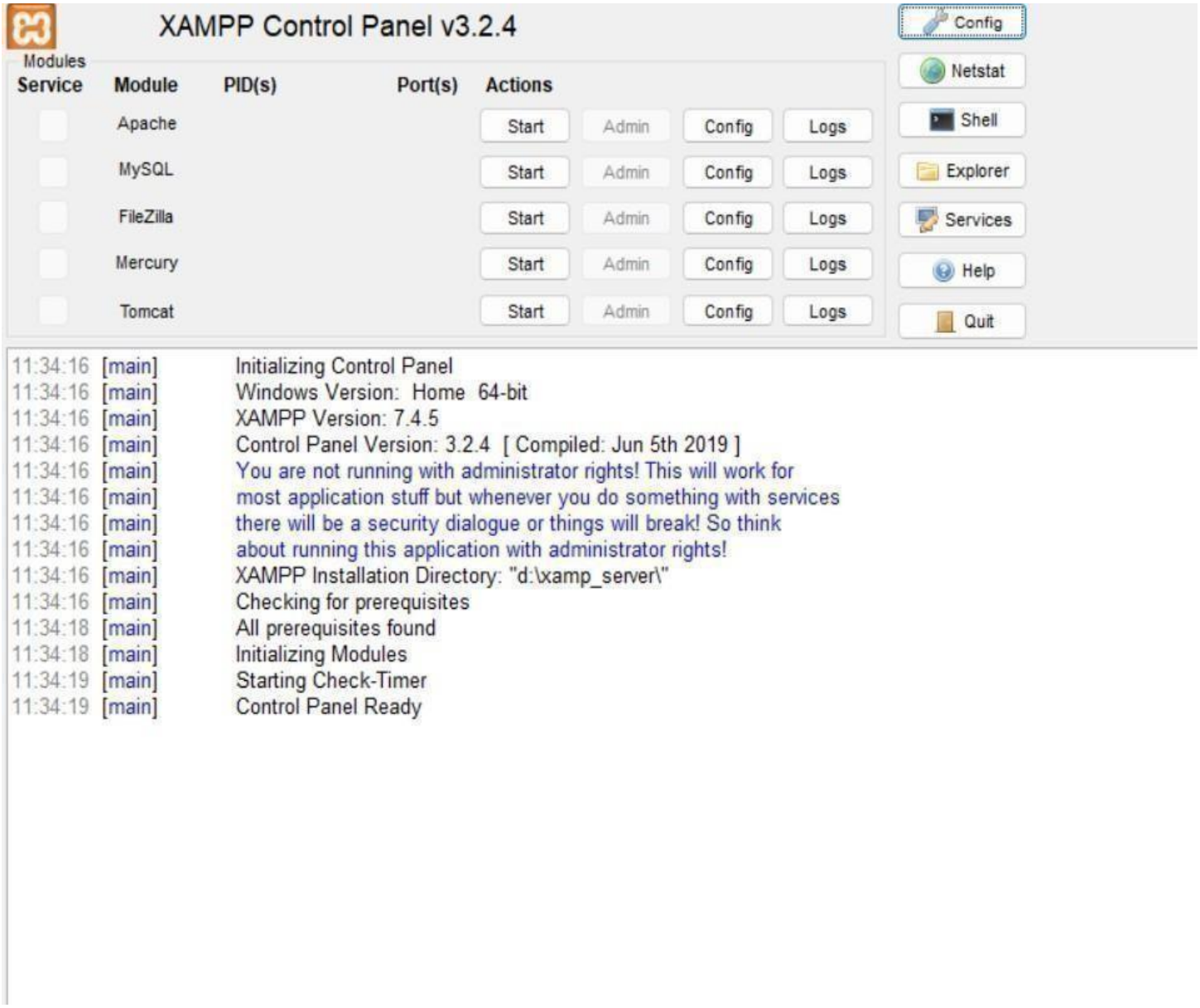

Figure 4.4 Database to connect PHP

- Database connection is used to check the username and the passwords in the login page.
- Here we use a database to help the users to again retrieve back the created resumes by login again to the web pages.

Figure 4.6 Output of resume after generating pdf

- The final output of the resume will be viewed as above attached resume, after generating the resume by filling all the credential details.

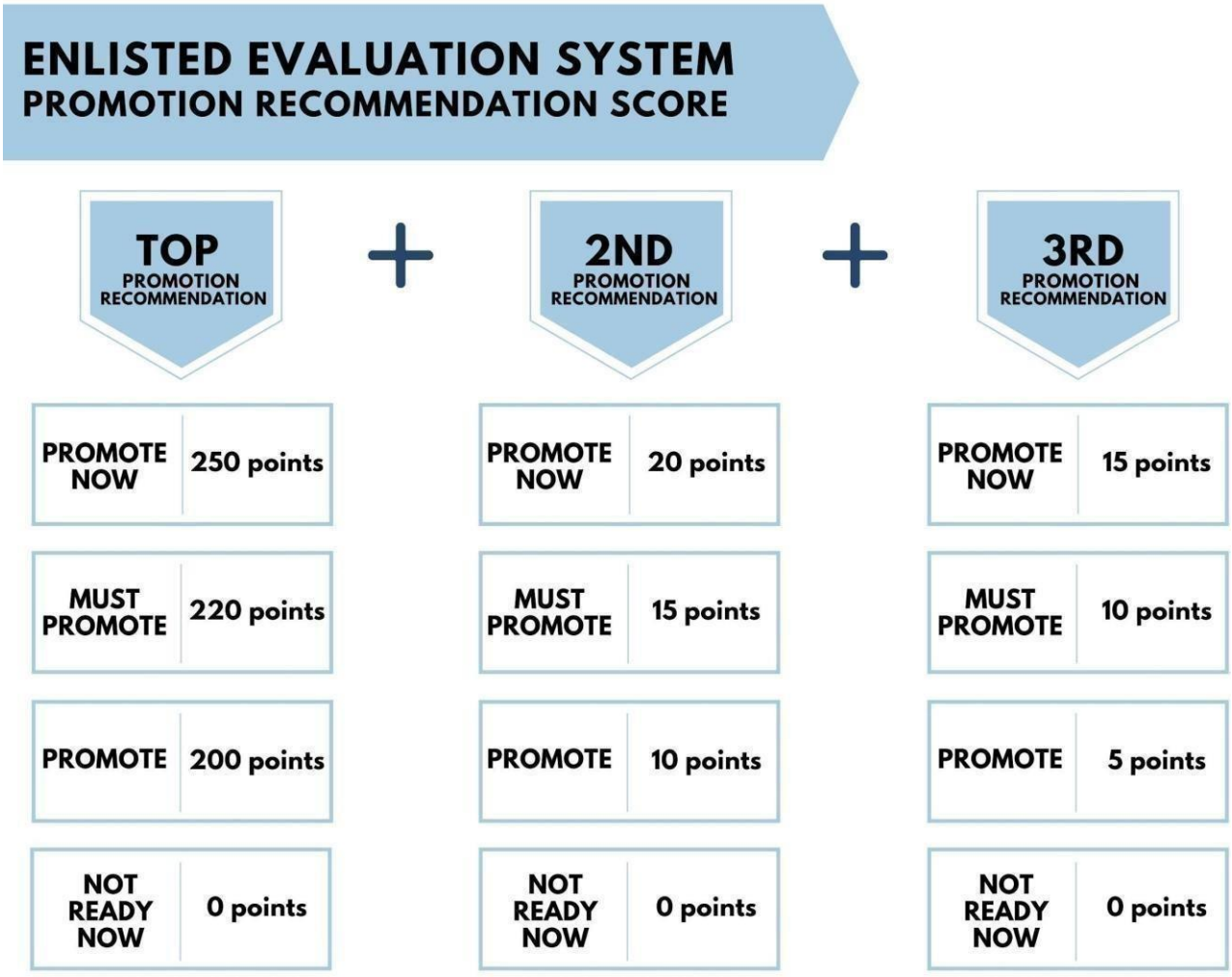

Figure 4.6 Accuracy of Trained and tested data Recommendation System

- Look for people who share the same rating patterns with the given user.
- Use the ratings from the people found in step 1 to calculate a prediction of a rating by the given user on a product.

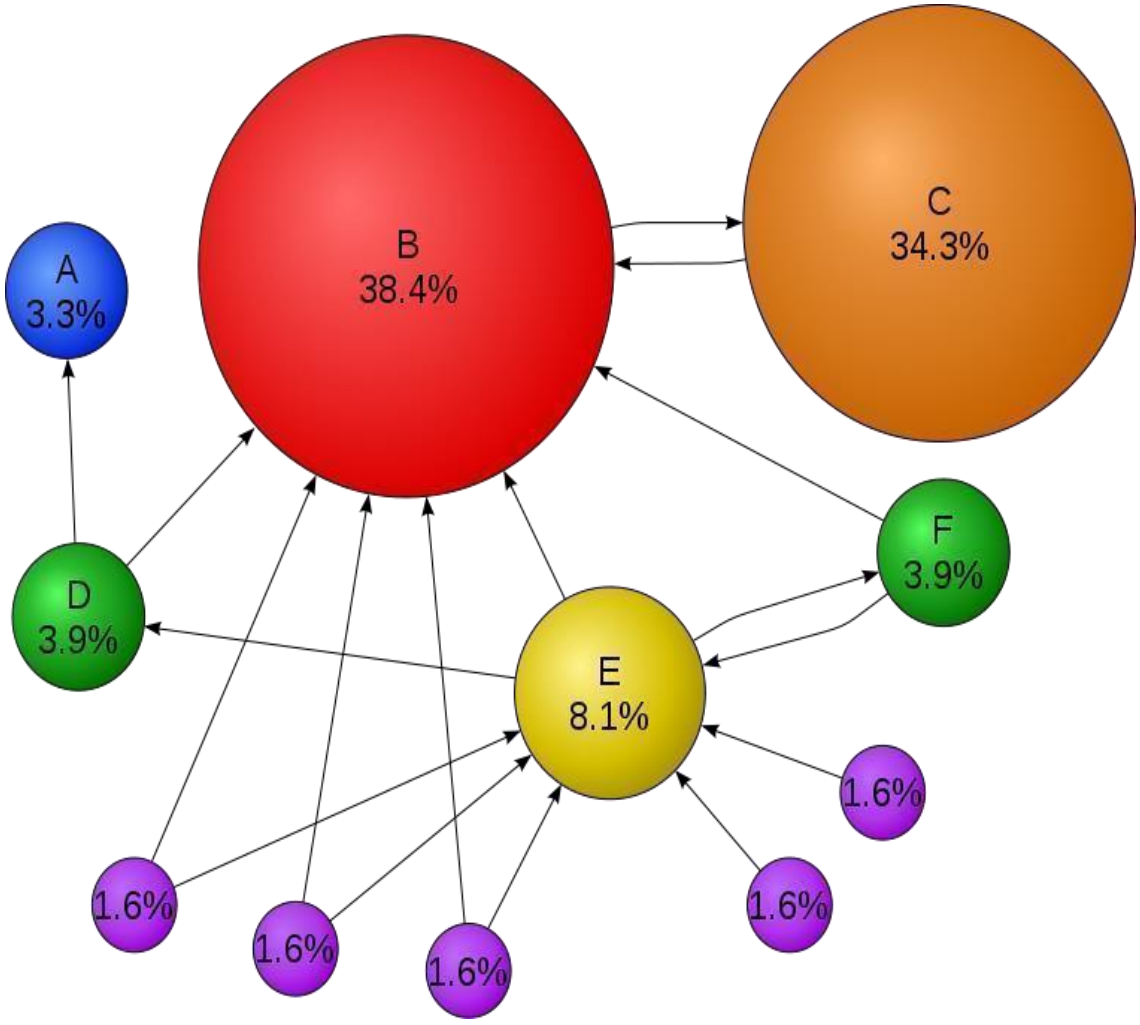

Figure 4.7 Prediction Label of Recommendation System

- A recommendation system (or recommend system) is a class of machine learning that uses data to help predict, narrow down, and find what people are looking for among an exponentially growing number of options.
- Recommendation systems are trained to understand the preferences, previous decisions, and characteristics of people and products using data gathered about their interactions.
- Collaborative filtering algorithms recommend items (this is the filtering part) based on preference information from many users (this is the collaborative part).

- This approach uses similarity of user preference behavior.

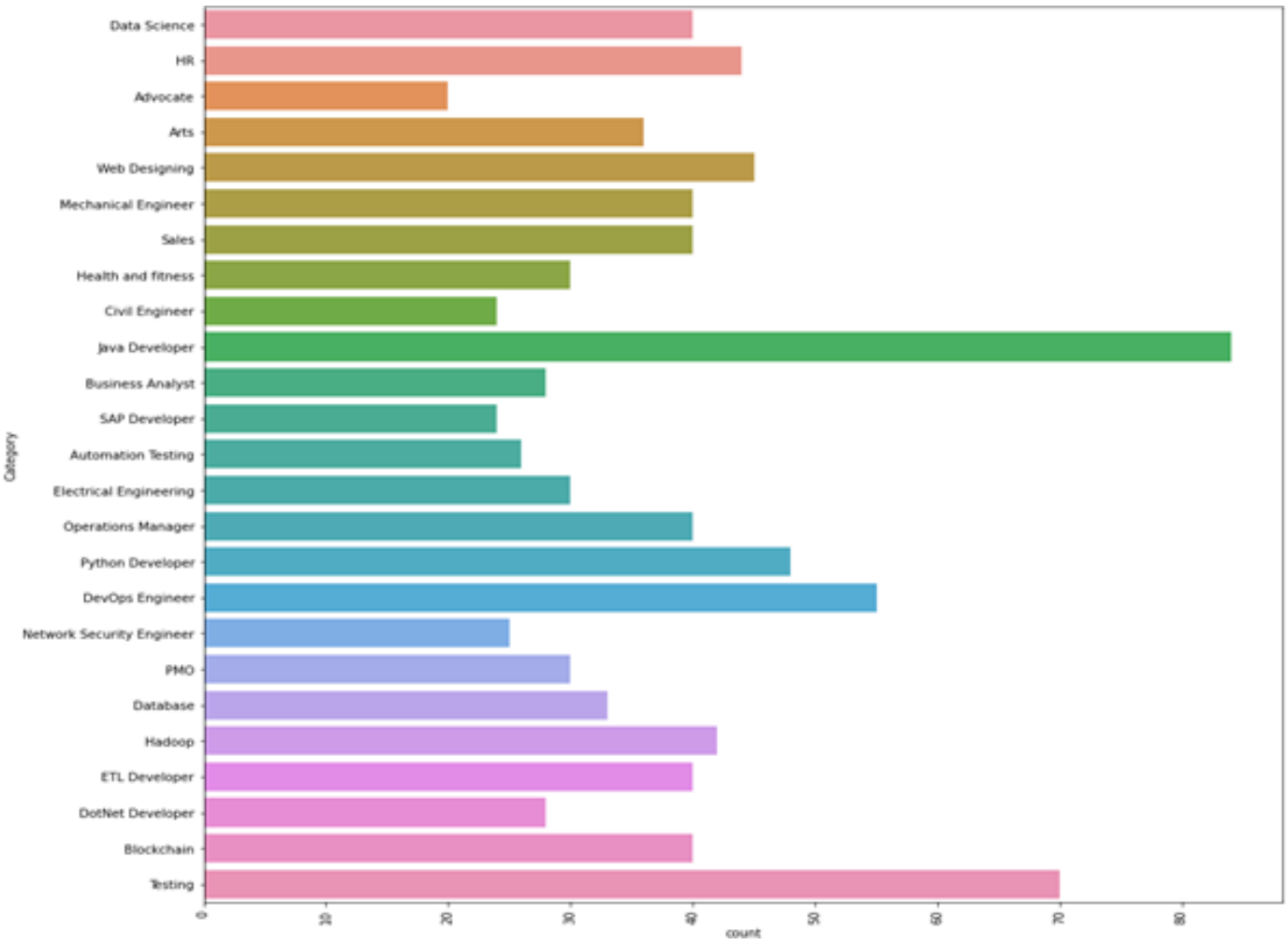

Figure 4.8 Distribution of various areas of records based on count

- Given previous interactions between users and items, recommendation algorithms learn to predict future interaction.
- These recommendation systems build a model from a user's past behavior, such as items purchased previously or ratings given to those items and similar decisions by other users.
- The idea is that if some if some people have made similar decisions and purchases

in the past, like a movie choice.

- Then there is a high probability they will agree on additional future selections.

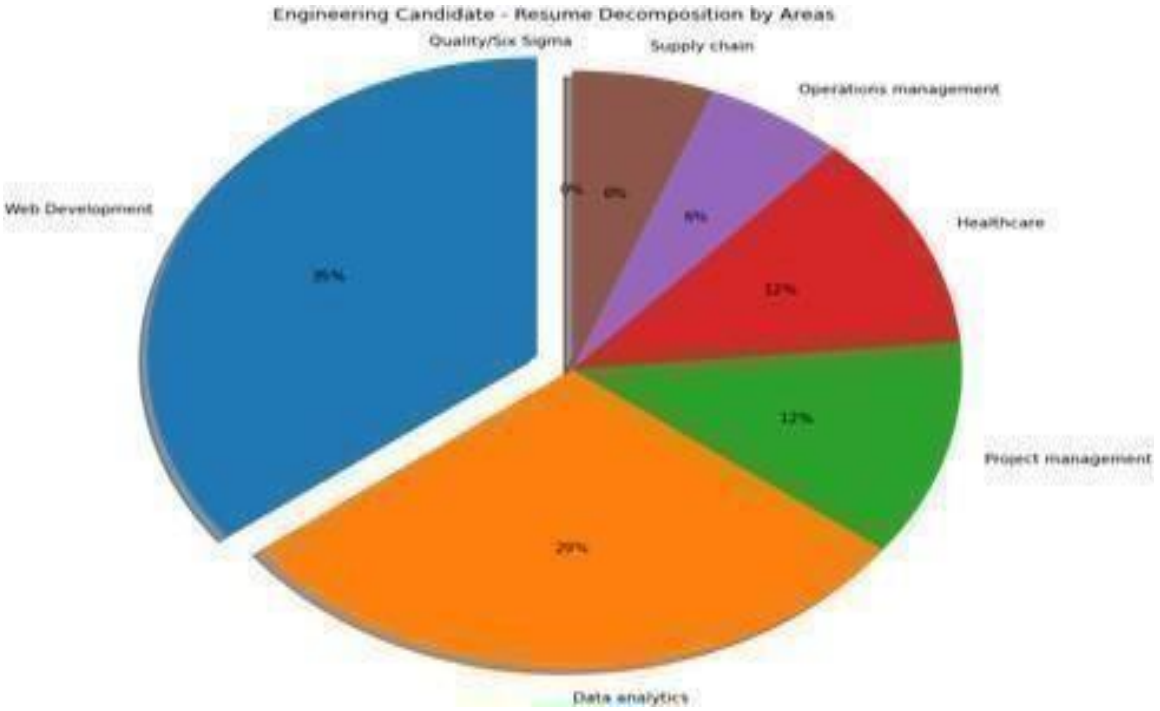

Figure 4.9 Decomposition by areas of resume A of an engineering candidate

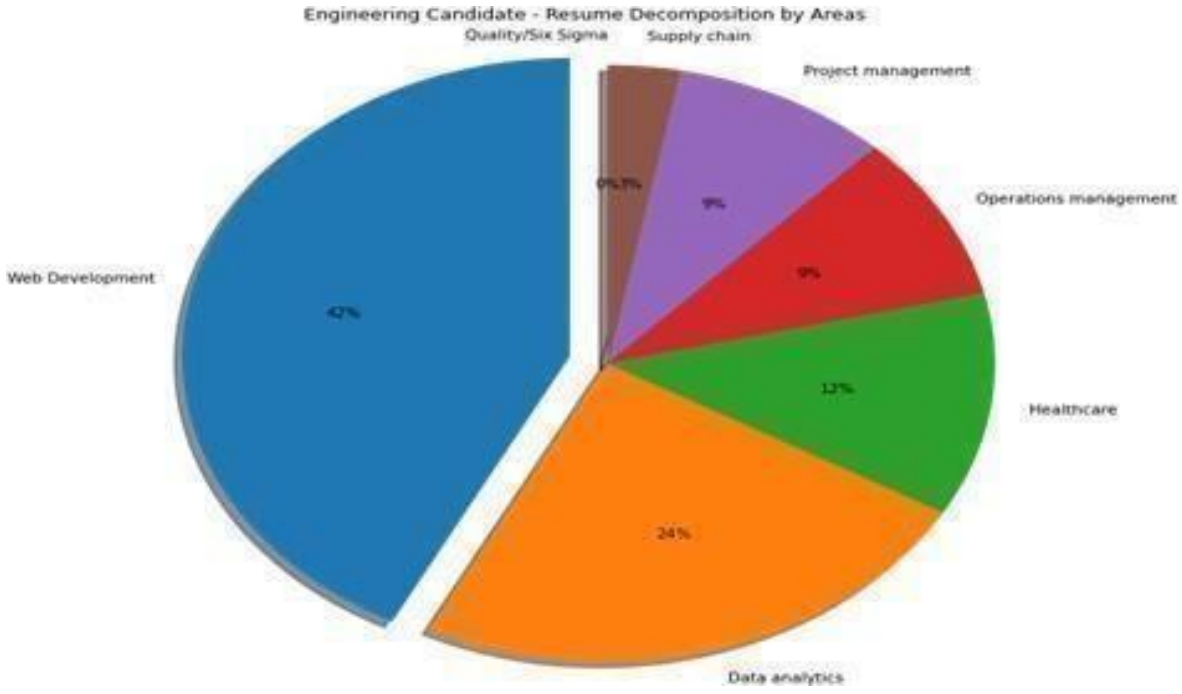

Figure 4.10 Decomposition by areas of resume B of an engineering candidate

- It shows the results of the recommended resume, where each resume is mapped with the terms mentioned in the dictionary and then later on computation is done based on the dictionary terms of the individual resume.
- Finally the resumes are compared with each other which inhibits the result of the cosine similarity found between the skills of the individual resumes.

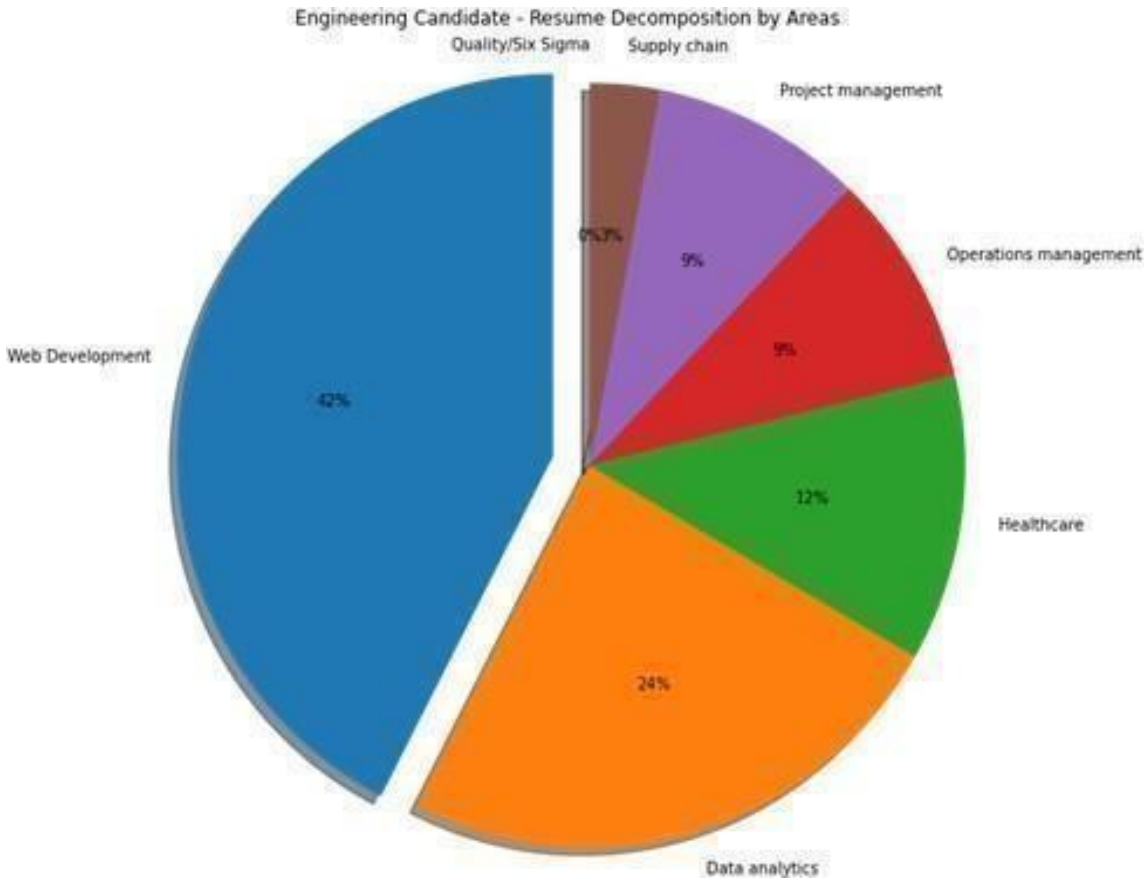

Figure 4.11 Recommends the appropriate resume

- For example, if a collaborative filtering recommendation knows you and another user share similar tastes in movies, it might recommend a movie to you that it knows this other user already likes.

4.2 TESTING

- Since the error in the software can be injured at any stage.
- So, we have carried out the testing process at different levels during the development.
- The basic levels of testing are,
    - Unit Testing
    - Integration Testing
    - Validation Testing
    - Functional Testing
    - Structural Testing

4.2.1 Unit Testing

- Unit testing was used to test individual units in the system and ensure that they operate correctly.
- Alternate logic analysis and screen validations were tested in this to ensure optimum efficiency in the system.
- The procedures and functions used and their association with data were tested.
- The purpose is to validate that each unit of the software code performs as expected.
- Unit Testing is done during the development (coding phase) of an application by the developers.

4.2.2 Integration Testing

- This testing process focuses on identifying the interfaces between components and their functionality.
- The bottom up approach was adopted during this testing.
- Low-level modules are integrated and combined as a cluster before testing.
- This allowed identifying any wrong link ages or parameters passing early in the development process as it just can be passed in the set of data and checked if the result

returned is an accepted one.

- For example the fuel system may be tested in collaboration with an exhaust system, and later, these two module's workings are tested in collaboration with the working of an engine. Now, this is integration testing.
- Big Bang Testing is an Integration testing approach in which all the components or modules are integrated together at once and then tested as a unit.
- This combined set of components is considered as an entity while testing.

4.2.3 Validation Testing

- Software testing and validation is achieved through a series of block box tests that demonstrate conformity with requirements.
- A test procedure defines specific test cases that will be used to demonstrate conformity with requirements.
- Both the plan and the procedure are designed to ensure that all functional requirements are achieved, documentation is correct and other requirements are met.
- After each validation test case has been conducted, one of the two possible conditions exists that its performance matches consumer needs.
- Product development teams might perform validation testing to learn about the integrity of the product itself and its performance in different environments.

4.2.4 Functional Testing

- Functional testing, also known as block box or closed box testing, is normally applied to HDL (High-Level Data Link) code that operates concurrently and concentrates on checking the interaction between modules, blocks or functional boundaries.
- The objective here is to ensure that ”correct results” are obtained when ”good inputs” are applied and operated in a predictable manner.

- Functional testing can therefore be considered as concentrating on checking that the data paths operate correctly.
- The coverage measurements that fall into this category are toggle, triggering, and signal trace coverage.
- Functional testing is a type of testing that seeks to establish whether each application feature works as per the software requirements.
- Each function is compared to the corresponding requirement to ascertain whether its output is consistent with the end user's expectations.

4.2.5 Structural Testing

- Structural testing, known as white box or open box testing, is normally applied to sequential HDL(High-Level Data Link) code.
- It concentrates on checking that all executable statements within each module have been exercised and the corresponding branches .
- paths through that module havebeen covered. If there is a section of HDL code that has never been exercised then there is ahigh possibility that it could contain an error that will remain undetected.
- After each validation test case has be conducted, one of the two possible conditions exists that its performance matches consumer needs.
- Product development teams may perform validation test to learn about integrity ofthe product itself and its performance in different environments.

CHAPTER 6

CONCLUSION AND FUTURE WORK

5.1 CONCLUSION

Finally we completed our project as a resume builder with a recommendation system. Required resumes are recommended to their desired job according to their skills.The purpose of an online resume builder is to automate the existing manual system using computerized equipment and full-featured computer software to meet their needs, so that their valuable data/information may be stored for a longer amount of time with easy access and manipulation. The necessary software and hardware are readily available and simple to use. This project explains how to manage for high performance and better client service.

5.2 FUTURE WORK

- The web application developed is a simple prototype to explain the basic functionalities of the upcoming application, because the improvement of the webpage is very important.
- Resumes can also be classified according to different branches and for specific companies.
- Obtain company data on job description, candidate resume and additional internal information .
- ATS - Applicant Tracking System , is used in future work. This is used to track their skills and experience and give them a job according to their position.

- Resumes can also be classified according to different branches and for specific companies.
- Obtain company data on job description, candidate resume and additional internal information .
- For example:-

  If someone has more practical experience and less CGPA/Percentage and to resume should emphasize on the project of the person more.
- The various research work that have been done are:
    - Conversion of current web page content into PDF format.
    - Encrypting password for user privacy.
    - Login and Logout system in PHP.
    - Making a website compatible to use on other devices.

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