

A Project Report on

Resume Match: Job Role Matching and Skill Assessment System

Submitted in partial fulfillment of the requirements for the award of the degree of

BACHELOR OF TECHNOLOGY

In

COMPUTER SCIENCE AND ENGINEERING

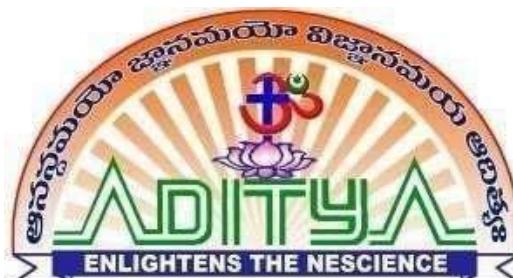
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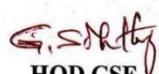
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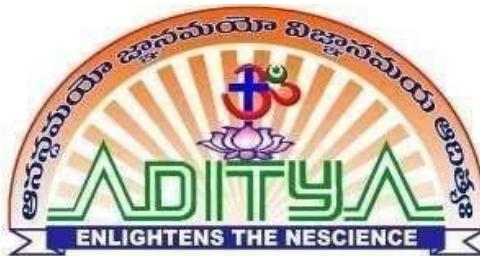
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CERTIFICATE

This is to certify the project report entitled **Resume Match: Job Role Matching and Skill Assessment System** is a bonafied work carried out by **Vangapandu Chandrika** bearing with Reg No: 20MH1A05C0, **Mallipudi Bhaskar Satya Pavan Kumar** bearing with Reg No: 20MH1A0594, **Vundavalli Bhargavi Devi** bearing with Reg No: 20MH1A05C8, **Kadavala Nikhil Kumar** bearing with Reg No: 20MH1A0585, at the college for the award of Bachelor of Technology in COMPUTER SCIENCE AND ENGINEERING from ADITYA COLLEGE OF ENGINEERING(A) during the academic year of 2020-2024.

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We hereby declare that this project entitled "**Resume Match: Job Role Matching and Skill Assessment System**" has been undertaken by us and this work has been submitted to **ADITYA COLLEGE OF ENGINEERING (A)**, Surampalem affiliated to JNTUK, Kakinada, in partial fulfillment of the requirements for the award of the degree of **BACHELOR OF TECHNOLOGY** in **COMPUTER SCIENCE AND ENGINEERING**.

We further declare that this project work has not been submitted in full or part to any other University or educational institute for the award of any degree or diploma.

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ABSTRACT

"Resume Match: Job Role Matching and Skill Assessment System" is a critical concept in today's rapidly evolving job market. Identifying the intersection between individuals' current skill sets and the skills that will be in demand in the future is crucial for long-term career success. This strategic approach not only enhances employability but also ensures resilience in the face of technological advancements and economic changes. As technological advancements continue to shape industries, the need for individuals to possess relevant and adaptable skills becomes increasingly important. This paper explores the concept of correlating existing skill sets with the evolving demands of future careers, emphasizing the significance of aligning one's competencies with emerging trends and job requirements. Resume screening is the process of analyzing the resumes where the candidates apply for the different types of jobs where the company feel the tedious job to find the appropriate candidate due to the complexity in resumes formats since it has different styles.

By understanding the correlation between current skills and future job prospects, individuals can proactively enhance their skill sets and remain competitive in the ever-changing workplace landscape. Through the utilization of tools such as skills assessments, training programs, and career development resources, individuals can identify areas for improvement and acquire new skills that are in demand by employers. Resume screening is the process of evaluating a candidate's suitability for a position based on factors such as credentials, education, work history, and other data from their CV. Ultimately, the goal is to equip individuals with the necessary skills and knowledge to thrive in future-proofed careers, ensuring their long-term employability and success in an increasingly dynamic job market.

LIST OF FIGURES

S.No.	NAME OF FIGURE	PAGE No.
1	System Architecture	13
2	Use Case Diagram	25
3	Activity diagram	26
4	Sequence diagram	28
5	State Chart Diagram	30
6	Class Diagram	31
7	Component Diagram	33
8	ER Diagram	34
9	Data Flow Diagram Level1	35
10	Data Flow Diagram Level2	36
11	Logo	41

LIST OF TABLES

S No.	NAME OF TABLE	PAGE No.
1	List of use cases and actors associated	24
2	Use cases and descriptions	24

INDEX

CHAPTER	PAGE NO
ABSTRACT	VI
Chapter 1: INTRODUCTION	
1.1 Introduction	1
1.2 Introduction to Machine Learning	2
1.2.1 Supervised Learning	2
1.2.2 Unsupervised Learning	3
1.2.3 Reinforcement Learning	4
1.2.4 Applications of Machine Learning	4
1.2.5 Advantages of Machine Learning	5
1.2.6 Disadvantages of Machine Learning	6
1.3 Introduction to Data mining	6
1.3.1 What is Correlation?	7
1.4 Motivation of the Work	8
Chapter 2: LITERATURE SURVEY	9
Chapter 3: PROBLEM STATEMENT AND METHODOLOGY	
3.1 Problem Definition	10
3.2 Existing System	11
3.2.1 Disadvantage	11
3.3 Proposed System	12
3.3.1 Advantage	12
3.3.2 System Architecture	12
3.4 Modules Division	13
3.4.1 Data Cleaning and Standardization	13
3.4.1.1 Data Cleaning and Standardization	13
3.4.1.2 Identifying Key Skills and Competencies	13
3.4.1.3 Establishing Correlation between Current and Future Skills	14
3.4.1.4 Matching Skills with Emerging Career Trends	14
3.4.1.5 Creating a Personalized Skills Development Plan	14
3.4.2 Model Improvisation	15
3.4.2.1 Importance of Model Improvisation in Career Development	15

3.4.2.2 Training Techniques for Enhancing Correlation of Skills	15
3.4.2.3 Future-Proofing Careers Through Skill Matching	15
3.4.2.4 Implementing a Model Improvisation Strategy for Career Success	16
3.5 Creating User Interface	16
3.5.1 Web User Interface	16
3.5.2 Database	16
3.5.3 Security	17

Chapter 4: SYSTEM STUDY

4.1 Feasibility Study	18
4.1.1 Economic feasibility	18
4.1.2 Technical feasibility	19
4.1.3 Operational feasibility	20
4.1.4 Social feasibility	21

Chapter 5: SYSTEM DESIGN

5.1 System Architecture	22
5.2 UML Diagrams	23
5.2.1 Behavior Diagram	23
5.2.1.1 Use Case Diagram	23
5.2.1.2 Activity Diagram	26
5.2.1.3 Sequence Diagram	28
5.2.1.4 State Chart Diagram	30
5.2.2 Structure Diagram	31
5.2.2.1 Class Diagram	31
5.2.2.2 Component Diagram	33
5.3 ER Diagram	34
5.4 Data Flow Diagram	35

Chapter 6: REQUIREMENT ANALYSIS

6.1 Introduction to Requirement Analysis	37
6.2 System Requirements	37
6.3 Functional Requirements	37
6.4 Non-Functional Requirements	37
6.4.1 User Interface and Human Factors	38
6.4.2 Software Requirements	38
6.4.3 Hardware Requirements	38
6.4.4 Usability	38
6.4.5 Reliability	39
6.4.6 Performance	39

6.4.7 Supportability	39
6.4.8 Physical Environment	39
6.4.9 Security Requirements	39
6.4.9.1 Access requirement	39
6.4.9.2 Integrity requirements	40
6.4.9.3 Private requirements	40
6.4.10 Resource Requirements	40
Chapter 7: IMPLEMENTATION	
7.1 Software Used	41
7.1.1 Python	41
7.1.2 Introduction to Streamlit frame work	52
7.1.3 Python Libraries	52
7.1.4 Technology/Algorithm Used	55
7.1.5 Visual Studio	55
7.2 Source Code	56
7.2.1 Python code	56
7.2.2 Data.json	71
Chapter 8: Testing	
8.1 Testing Levels	74
8.1.1 Unit Testing	74
8.1.2 integration Testing	75
8.1.3 Functional Testing	75
8.1.4 Py Test	76
8.2 Testing Methods	77
8.2.1 Black Box Testing	77
8.2.2 White Box Testing	77
Chapter 9: OUTPUT SCREENS	
9.1 Sign Up	79
9.2 Login Page	80
9.3 Dashboard	81
9.4 Resume Analysis	82
9.5 Apply for a job	85
9.6 Generated Questions	86
9.7 Candidate Evolution	86
9.8 Log Out	87
9.9 Test Cases & Result	88
CONCLUSION	90
FUTURE SCOPE	91
PUBLICATION WORK	92
BIBLIOGRAPHY	103

CHAPTER 1

INTRODUCTION

1.1 Introduction to Resume Match

- In today's rapidly changing job market, the quest for sustainable career success demands more than just securing a job—it requires a strategic alignment of skills with future-proofed career paths. As industries evolve and technologies advance, individuals must navigate this dynamic landscape with foresight and adaptability.
- Understanding one's own strengths and interests serves as the compass in this journey. By introspectively assessing their skill sets, individuals can identify areas of expertise that resonate with the evolving demands of the workforce. This self-awareness forms the bedrock upon which strategic career planning is built, mitigating the risk of skill obsolescence and ensuring long-term relevance.
- Strategic planning isn't merely a theoretical exercise—it's a proactive endeavor rooted in continuous education and development. By embracing lifelong learning, individuals can stay ahead of the curve, acquiring new skills and knowledge to remain competitive in an ever-changing job market. This commitment to growth not only enhances employability but also opens doors to new career opportunities aligned with personal aspirations.
- Enterprises in today's landscape require efficient tools to sift through the vast pool of talent and identify the best fit for their organizational needs. Herein lies the significance of a robust Job Role Matching and Skill Assessment System. By leveraging technology, such systems streamline the hiring process, matching resumes with job roles and assessing skills with precision. This not only saves time and resources but also ensures that candidates are evaluated objectively, fostering fairness and transparency in recruitment practices.
- By focusing on the correlation and matching of skills for future-proofed careers, individuals not only enhance their employability but also position themselves as valuable assets in an ever-evolving job landscape. In the pages that follow, we'll delve deeper into the mechanisms and benefits of such systems, exploring how they facilitate the seamless alignment of talent with opportunity, driving mutual success for both individuals and organizations alike.

1.2 Introduction to Machine Learning:

Machine Learning may be a sub-area of AI, whereby the term refers to the power of IT systems to independently find solutions to problems by recognizing patterns in databases. In other words: Machine Learning enables IT systems to acknowledge patterns in the idea of existing algorithms and data sets and to develop adequate solution concepts. Therefore, in Machine Learning, artificial knowledge is generated on the idea of experience. In order to enable the software to independently generate solutions, the prior action of people is important. For example, the required algorithms and data must be fed into the systems in advance and the respective analysis rules for the recognition of patterns in the data stock must be defined. Once these two steps have been completed, the system can perform the following tasks by Machine Learning:

- Finding, extracting and summarizing relevant data
- Making predictions based on the analysis data
- Calculating probabilities for specific results

1.2.1 Supervised learning:

Basically, algorithms play a crucial role in Machine Learning: On the one hand, they're liable for recognizing patterns and on the opposite hand, they will generate solutions.

Algorithms can be divided into different categories:

In the course of monitored learning, example models are defined beforehand. So as to make sure an adequate allocation of the knowledge to the respective model groups of the algorithms, these then need to be specified. In other words, the system learns on the idea of given input and output pairs. Within the course of monitored learning, a programmer, who acts as a sort of teacher, provides the acceptable values for specific input. The aim is to coach the system within the context of successive calculations with different inputs and outputs to determine connections. Supervised learning is where you've got input variables (X) and an output variable (Y) and you employ an algorithm to find out the mapping function from the input to the output. $Y = f(X)$ The goal is to approximate the mapping function so well that once you have a new input file (X) that you simply can predict the output variables (Y) for that data. It's called supervised learning because the method of an algorithm learning from the training dataset is often thought of as an educator supervising the training process. We all know the correct answers, the algorithm iteratively makes predictions on the training data and is corrected. Learning stops when the algorithm achieves a suitable level of performance. Techniques of Supervised Machine Learning algorithms include linear and logistic regression, multi-class classification, Decision Tree, and

Support Vector Machine.

Supervised Learning problems are a kind of machine learning technique often further grouped into Regression and Classification problems. The difference between these two is that the dependent attribute is numerical for regression and categorical for classification: **Regression:**

Linear regression could also be a linear model, e.g. a model that assumes a linear relationship between the input variables (x) and thus the only output variable (y). More specifically, that y is usually calculated from a linear combination of the input variables (x).

When there's one input variable (x), the tactic is mentioned as simple linear regression. When there are multiple input variables, literature from statistics often refers to the tactic as multiple linear regression.

Classification:

Classification could also be a process of categorizing a given set of data into classes, It is often performed on both structured or unstructured data. the tactic starts with predicting the category of given data points. The classes are often mentioned as target, label, or categories.

In short, classification either predicts categorical class labels or classification data supported the training set and thus the values (class labels) in classifying attributes and uses it in classifying new data.

There is a variety of classification models. Classification models include Logistic Regression, Decision Tree, Random Forest, Gradient Boosted Tree, One-vs.-One, and Naïve Bayes.

1.2.2 Unsupervised learning:

In unsupervised learning, AI learns without predefined target values and without rewards. It's mainly used for learning segmentation (clustering). The machine tries to structure and type the info entered consistent with certain characteristics. For instance, a machine could (very simply) learn that coins of various colors are often sorted consistent with the characteristic "color" so as to structure them. Unsupervised Machine Learning algorithms are used when the knowledge used to train is neither classified nor labeled. The system doesn't determine the right output but it explores the data and should draw inferences from datasets to elucidate hidden structures from unlabeled data. Unsupervised Learning is that the training of Machines using information that's neither classified nor labeled and allowing the algorithm to act thereon information without guidance.

Unsupervised Learning is accessed into two categories of algorithms:

- **Clustering:** A clustering problem is where you would like to get the inherent grouping in the data such as grouping customers by purchasing behavior. Association: An

Association rule learning problem is where you would wish to get rules that describe large portions of your data such as folks that buy X also tend to shop for Y.

1.2.3 Reinforcement learning:

Reinforcement machine learning trains machines through trial and error to take the best action by establishing a reward system. Reinforcement learning can train models to play games or train autonomous vehicles to drive by telling the machine when it made the right decisions, which helps it learn over time what actions it should take. Reinforcement learning is an area of machine learning concerned with how software agents ought to take actions in an environment so as to maximize some notion of cumulative reward. Due to its generality, the field is studied in many other disciplines, such as game theory, control theory, operations research, information theory, simulation-based optimization, multi-agent systems, swarm intelligence, statistics and genetic algorithms. In machine learning, the environment is typically represented as a Markov decision process (MDP). Many reinforcements learning algorithms use dynamic programming techniques. Reinforcement learning algorithms do not assume knowledge of an exact mathematical model of the MDP and are used when exact models are infeasible. Reinforcement learning algorithms are used in autonomous vehicles or in learning to play a game against a human opponent.

1.2.4 Applications of Machines Learning:

Machine Learning is the most rapidly growing technology and according to researchers we are in the golden year of AI and ML. It is used to solve many real-world complex problems which cannot be solved with traditional approach. Following are some real-world applications of ML-

- Emotion analysis
- Sentiment analysis
- Error detection and prevention
- Weather forecasting and prediction
- Stock market analysis and forecasting
- Speech synthesis
- Speech recognition
- Customer segmentation
- Object recognition
- Fraud detection
- Fraud prevention
- Recommendation of products to customer in online shopping

1.2.5 Advantages of Machine Learning:

1. Easily identifies trends and patterns

Machine Learning can review large volumes of data and discover specific trends and patterns that would not be apparent to humans. For instance, for an e-commerce website like Amazon, it serves to understand the browsing behaviors and purchase histories of its users to help cater to the right products, deals, and reminders relevant to them. It uses the results to reveal relevant advertisements to them

2. No human intervention needed (automation)

With ML, you don't need to babysit your project every step of the way. Since it means giving machines the ability to learn, it lets them make predictions and also improve the algorithms on their own. A common example of this is anti-virus software's they learn to filter new threats as they are recognized. ML is also good at recognizing spam.

3. Continuous Improvement

As ML algorithms gain experience, they keep improving in accuracy and efficiency. This lets them make better decisions. Say you need to make a weather forecast model. As the amount of data you have keeps growing, your algorithms learn to make more accurate predictions faster.

4. Handling multi-dimensional and multi-variety data

Machine Learning algorithms are good at handling data that are multi-dimensional and multi-variety, and they can do this in dynamic or uncertain environments.

5. Wide Applications

You could be an e-tailor or a healthcare provider and make ML work for you. Where it does apply, it holds the capability to help deliver a much more personal experience to customers while also targeting the right customers.

1.2.6 Disadvantages of Machine Learning:

1. Data Acquisition

Machine Learning requires massive data sets to train on, and these should be inclusive/unbiased, and of good quality. There can also be times where they must wait for new data to be generated.

2. Time and Resources

ML needs enough time to let the algorithms learn and develop enough to fulfill their purpose with a considerable amount of accuracy and relevancy. It also needs massive resources to

function. This can mean additional requirements of computer power for you.

3. Interpretation of Results

Another major challenge is the ability to accurately interpret results generated by the algorithms. You must also carefully choose the algorithms for your purpose.

4. High error-susceptibility

Machine Learning is autonomous but highly susceptible to errors. Suppose you train an algorithm with data sets small enough to not be inclusive. You end up with biased predictions coming from a biased training set. This leads to irrelevant advertisements being displayed to customers. In the case of ML, such blunders can set off a chain of errors that can go undetected for long periods of time. And when they do get noticed, it takes quite some time to recognize the source of the issue, and even longer to correct it.

1.3 Introduction to Data Mining:

Data mining is the process of discovering patterns, trends, correlations, or relationships within large datasets to extract useful information or insights. It involves analyzing vast amounts of data from various sources, such as databases, data warehouses, and the internet, to uncover previously unknown patterns or relationships.

The process typically involves several steps:

1. **Data Collection:** Gathering data from multiple sources, which can include databases, text files, spreadsheets, and other structured or unstructured sources.
2. **Data Preprocessing:** Cleaning and transforming the data to ensure its quality and compatibility with the analysis process. This may involve handling missing values, removing duplicates, and normalizing data.
3. **Exploratory Data Analysis:** Exploring the data to understand its characteristics and identify initial patterns or trends. This step often involves visualizing the data using charts, graphs, or statistical summaries.
4. **Model Building:** Applying various data mining techniques, such as classification, clustering, regression, or association rule mining, to extract patterns or relationships from the data.
5. **Evaluation:** Assessing the quality and effectiveness of the data mining models or patterns generated. This step helps ensure that the insights obtained are meaningful and reliable.
6. **Deployment:** Integrating the insights obtained from data mining into decision-making processes or operational systems to derive value from the discovered knowledge.

Data mining is widely used across various industries and applications, including marketing, finance, healthcare, retail, and telecommunications, to uncover valuable insights, make

predictions, and drive informed decision-making.

1.3.1 What is correlation?

In data mining, correlation refers to the statistical measure that quantifies the strength and direction of the relationship between two variables. It indicates how much one variable changes when another variable changes.

There are different types of correlation measures, but the most common one is Pearson correlation coefficient (r). It ranges from -1 to +1.

- A correlation of +1 indicates a perfect positive linear relationship, meaning that as one variable increases, the other variable also increases proportionally.
- A correlation of -1 indicates a perfect negative linear relationship, meaning that as one variable increases, the other variable decreases proportionally.
- A correlation close to 0 indicates no linear relationship between the variables.

Correlation analysis is crucial in data mining for various reasons:

1. **Identifying Relationships:** It helps identify potential relationships between variables, which can provide insights into how they interact with each other.
2. **Feature Selection:** Correlation analysis can assist in selecting the most relevant features (variables) for building predictive models. Highly correlated features might not provide additional information and could be redundant.
3. **Predictive Modeling:** Understanding the correlation between input variables and the target variable is essential for building accurate predictive models. It helps in selecting the most predictive variables and understanding their impact on the target variable.
4. **Data Exploration:** Correlation analysis aids in exploring relationships between different variables in the dataset, uncovering patterns, and gaining a deeper understanding of the data.

1.4 Motivation of the Work

For a resume match job role matching and skill assessment system, the motivation lies in bridging the gap between job seekers and employers by efficiently matching their respective needs and capabilities. Here are some key motivations that you can highlight:

- **Efficiency:** Streamlining the hiring process saves time and resources for both job seekers and employers. By leveraging technology to match resumes with job roles and assess skills accurately, the system facilitates faster and more precise hiring decisions.
- **Accuracy:** Traditional hiring processes often rely on manual screening, which can be prone to biases and errors. A robust matching and assessment system ensures that candidates are evaluated based on objective criteria, enhancing the fairness and accuracy of the hiring process.

- **Cost-Effectiveness:** Hiring the wrong candidate can be costly for organizations in terms of training expenses, decreased productivity, and potential turnover. By identifying the most suitable candidates upfront, the system helps reduce turnover rates and associated costs.
- **Enhanced Candidate Experience:** Job seekers appreciate a seamless and transparent hiring process. By providing personalized job recommendations and constructive feedback on skills assessment, the system enhances the overall candidate experience, fostering positive employer branding.
- **Data-Driven Insights:** Collecting and analyzing data on job roles, candidate profiles, and hiring outcomes can yield valuable insights for employers. By tracking key metrics such as time-to-hire, candidate quality, and diversity metrics, the system enables continuous improvement in recruitment strategies.
- **Scalability:** As businesses grow and evolve, their hiring needs also change. A scalable matching and assessment system can adapt to varying demands, whether it's scaling up recruitment efforts during periods of expansion or optimizing processes during leaner times. Highlighting these motivations in your resume demonstrates your understanding of the challenges in traditional hiring processes and your commitment to leveraging technology to address them effectively. It also showcases your ability to develop solutions that meet both employer and candidate need.

CHAPTER 2

LITERATURE SURVEY

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CHAPTER 3

PROBLEM STATEMENT AND METHODOLOGY

3.1 Problem Definition:

In today's dynamic job market, both job seekers and employers face challenges in effectively matching candidates to suitable job roles. Traditional recruitment processes often rely on keyword matching, which can overlook candidates with valuable skills or experiences not explicitly mentioned in their resumes. Furthermore, assessing a candidate's skills accurately can be time-consuming and subjective.

Challenges:

- **Keyword-Based Matching Limitations:** Existing systems primarily rely on keyword matching algorithms, which may fail to capture the nuances of a candidate's skills and experiences.
- **Subjectivity in Skill Assessment:** Assessing candidates' skills often relies on subjective evaluation methods, leading to inconsistencies and biases in the recruitment process.
- **Mismatch Between Job Requirements and Candidate Skills:** Candidates may possess relevant skills and experiences that are not adequately highlighted in their resumes, leading to mismatches between their capabilities and the job requirements.
- **Time-Intensive Recruitment Process:** Manual screening of resumes and skill assessments can be time-consuming for recruiters, delaying the hiring process and potentially resulting in missed opportunities.
- **Ineffective Utilization of Talent Pool:** Employers may overlook qualified candidates due to limitations in the recruitment system's ability to accurately assess their skills and suitability for a particular role.

The proposed system is to address the aforementioned challenges by developing an advanced job role matching and skill assessment system. This system aims to improve the efficiency and effectiveness of the recruitment process by leveraging machine learning algorithms, natural language processing techniques, and data analytics to accurately match candidates to job roles based on their skills, experiences, and preferences.

Solution Approach:

- **Advanced Matching Algorithms:** Develop advanced algorithms that go beyond keyword matching to analyze the semantic meaning of resumes and job descriptions, enabling more accurate and comprehensive candidate-job role matching.
- **Objective Skill Assessment:** Implement objective skill assessment methodologies, such as automated coding assessments, simulations, and competency-based evaluations, to ensure

fair and consistent evaluation of candidates' capabilities.

- **Skills Gap Analysis:** Provide insights to candidates and employers regarding skills gaps and development opportunities, facilitating proactive skill enhancement and talent management.
- **Personalized Recommendations:** Utilize machine learning models to personalize job recommendations for candidates based on their skills, preferences, and career aspirations, enhancing the overall candidate experience.
- **Efficient Talent Acquisition:** Streamline the recruitment process by automating repetitive tasks, such as resume screening and initial candidate assessments, to accelerate time-to-hire while maintaining the quality of candidate selection.

By addressing these challenges and implementing the proposed solution approach, the Resume Match system aims to revolutionize the recruitment process, making it more efficient, objective, and tailored to the needs of both candidates and employers.

3.2 Existing System

- The existing system for correlation and matching of skills for careers utilizes various tools and platforms to analyze job requirements and individual skill sets. These tools often encompass algorithms and AI technology to identify correlations between specific skills and career paths.
- Additionally, career advisors and counselors play a crucial role in helping individuals understand the necessary skills and training needed for future job opportunities. The system also relies on continuous data collection and analysis to stay updated with evolving job trends and skill demands in the market.

3.2.1 Disadvantages

- The existing system for correlating and matching skills for careers is often criticized for being rigid and outdated, relying too heavily on traditional academic qualifications and standardized tests.
- This approach fails to adequately capture and assess the full range of skills and competencies that are valuable in today's rapidly changing job market.
- Additionally, the emphasis on formal credentials can disadvantage individuals who have gained valuable experience and skills through non-traditional pathways.
- Moreover, the lack of emphasis on soft skills and emotional intelligence in the existing system can lead to gaps in preparing individuals for the dynamic and collaborative nature of modern work environments.

3.3 Proposed System

- The proposed system aims to match individuals with careers by correlating their skills and attributes.
- Through the use of advanced algorithms and machine learning technologies, the system will analyze a person's skill set and qualities to identify suitable career paths that align with their strengths and interests.
- By considering factors such as industry trends, job market demands, and individual aspirations, the system will offer personalized recommendations to help individuals navigate their career development.
- Ultimately, the goal is to empower users to make informed decisions and pursue rewarding and sustainable career opportunities in the ever-evolving job market.

3.3.1 Advantages

- The proposed system for correlation and matching of skills for careers offers several advantages.
- It enhances the alignment between an individual's skill set and the requirements of future job roles, increasing the likelihood of successful career transitions.
- By providing personalized recommendations based on skills analysis, it enables individuals to discover new opportunities and pathways for growth.
- Additionally, the system facilitates better workforce planning and talent development strategies for organizations by identifying skill gaps and strengths within their workforce.
- Overall, the system contributes to a more agile and resilient workforce equipped to thrive in dynamic career landscapes.

3.3.2 System Architecture

Machine learning has given computer systems the ability to automatically learn without being explicitly programmed. It represents the flow of execution and it involves the following five major steps:

- The architecture diagram is defined with the flow of the process which is used to refine the raw data and used for predicting the resumes data.
- The next step is preprocessing the collected raw data into an understandable format.
- Then we have to train the data by splitting the dataset into train data and test data.
- The resumes data is evaluated with the application of a machine learning algorithm that is NLP algorithm, and the classification accuracy of this model is found

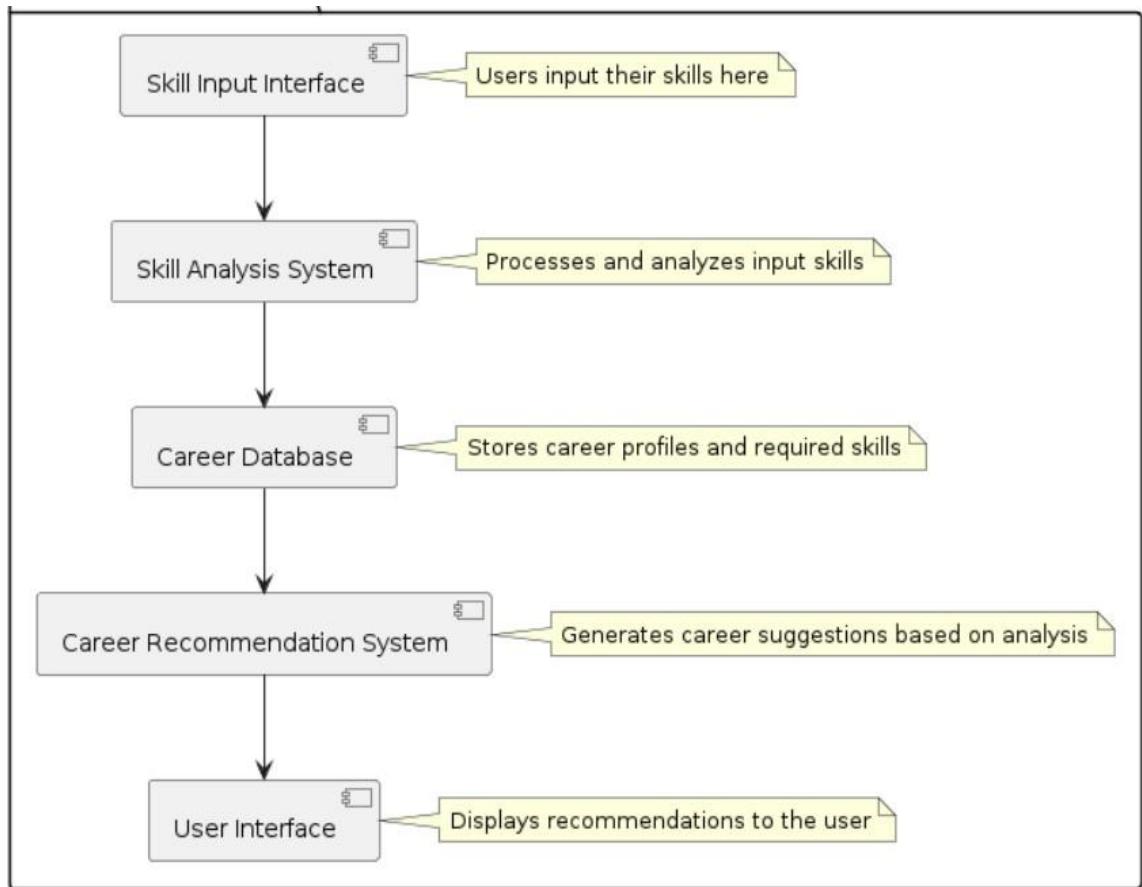


Fig3.1: System architecture

3.4 Modules Division

Let us discuss about the various modules in our proposed system and what each module contributes in achieving our goal.

3.4.1.1 Data Cleaning and Standardization

Data cleaning and standardization are crucial processes for ensuring accurate correlation and matching of skills in the context of future-proofed careers. By effectively cleaning and standardizing data, inconsistencies, errors, and duplication can be reduced, allowing for more reliable analysis and identification of relevant skill sets. This streamlined approach not only enhances the accuracy of correlations between different data points but also facilitates the matching of skills with emerging career trends, ultimately empowering individuals to stay relevant in a rapidly evolving job market.

3.4.1.2 Identifying Key Skills and Competencies

Identifying key skills and competencies for future-proofed careers involves a thorough assessment of current market trends and technological advancements. Critical thinking, problem-solving, adaptability, and technological proficiency are essential skills that professionals need to develop to stay relevant in a rapidly evolving job landscape. Additionally, communication, collaboration, and leadership abilities are crucial for effective teamwork and

innovation in a dynamic work environment. By correlating these key skills with emerging industry demands and job opportunities, individuals can better match their skill sets to potential career paths that are likely to withstand future disruptions and changes in the market. Continuous learning, flexibility, and a growth mindset are also vital for professionals seeking to future-proof their careers and remain competitive in the ever-evolving job market.

3.4.1.3 Establishing Correlations between Current and Future Skills

Establishing correlations between current skills and future skills is essential for individuals aiming to future-proof their careers. By identifying the overlap and gaps between the skills they possess now and those that will be in demand in the future, individuals can make informed decisions about acquiring new competencies. This correlation and matching process involves assessing the market trends, technological advancements, and industry demands to forecast the skills that will be most valuable. It also requires individuals to self-assess their current skill set and determine areas for improvement or development. By aligning current skills with future needs, individuals can strategically position themselves for career success and adaptability in a rapidly changing job market. This proactive approach to skill development can enhance job security, employability, and overall career satisfaction in the long term.

3.4.1.4 Matching Skills with Emerging Career Trends

Developing critical thinking, problem-solving, and adaptability skills are crucial for matching emerging career trends that require innovative solutions and flexibility in the face of constant change. As industries evolve towards digitization and automation, honing skills in data analytics, artificial intelligence, and machine learning can significantly enhance one's career prospects in fields such as data science and cybersecurity. Additionally, effective communication and collaboration skills are essential for thriving in a remote and globally connected work environment, aligning with the rising trend of remote work and virtual teams. Lastly, embracing continuous learning and upskilling ensures individuals can stay competitive in dynamic job markets and pivot to new opportunities, well-suited for evolving careers in areas like renewable energy, sustainable development, and digital marketing. By closely correlating these skills with emerging career trends, individuals can future-proof their careers and remain agile in an ever-changing professional landscape.

3.1.4.5 Creating a Personalized Skills Development Plan

To create a Personalized Skills Development Plan for correlation and matching of skills for future-proofed careers, start by assessing current skills and identifying strengths and areas for improvement. Utilize tools such as career aptitude tests and self-assessment exercises to gain insights into interests and abilities. Research future job trends and identify in-demand skills by industry. Develop a tailored learning path that includes acquiring new skills through online

courses, workshops, or certifications. Networking with professionals in desired fields can provide mentorship opportunities and valuable insights. Regularly review and update the skills development plan to stay relevant in a rapidly evolving job market. Continuously seeking feedback and adapting to changes in the industry will position you for success in future-proofed careers.

3.4.2 MODEL IMPROVISATION

3.4.2.1. Importance of Model Improvisation in Career Development

Model improvisation plays a crucial role in career development by enabling individuals to adapt and enhance their skills to align with the demands of future-proofed careers. As the job market continuously evolves, the ability to correlate and match one's skills with the changing needs of industries becomes essential for sustainable career growth. By embracing model improvisation, individuals not only stay relevant but also demonstrate agility and versatility in navigating dynamic professional landscapes. This proactive approach allows them to bridge skill gaps, explore new opportunities, and position themselves as valuable assets in competitive job markets. Therefore, incorporating model improvisation into career development strategies ensures that individuals can continuously refine and align their skill sets to meet the evolving requirements of future-proofed careers, ultimately enhancing their employability and long-term success.

3.4.2.2. Training Techniques for Enhancing Correlation of Skills

Two training techniques for enhancing correlation and matching of skills for future-proofed careers include skills mapping and personalized development plans. Skills mapping involves identifying existing skills, competencies, and strengths to understand how they align with the requirements of future job roles. This helps individuals prioritize skill development areas and make informed decisions about career paths. Personalized development plans involve creating individualized learning pathways tailored to enhance specific skills or competencies needed for future career success. By setting specific goals, creating actionable steps, and incorporating feedback mechanisms, individuals can systematically improve their skill set and increase their marketability in a rapidly changing job market. Both techniques aim to bridge the gap between current skills and future job requirements, leading to a more strategic and effective approach to career development.

3.4.2.3. Future-Proofing Careers Through Skill Matching

Future-proofing careers through skill matching is essential for ensuring individuals are equipped to thrive in the rapidly evolving job market. By establishing correlations and effectively matching skills required for future-proofed careers, individuals can enhance their employability and adaptability to changing industry demands. This process involves identifying

key skills that are in high demand across various sectors and aligning them with an individual's skillset through targeted training and development. By staying proactive in identifying emerging trends and acquiring relevant skills, individuals can position themselves for long-term success in their chosen career paths. Embracing a continuous learning mindset and actively seeking opportunities to upskill and reskill can further solidify one's competitive edge in the job market, ultimately fostering career sustainability and growth.

3.4.2.4. Implementing a Model Improvisation Strategy for Career Success

Implementing a model improvisation strategy involves continuously assessing and enhancing skills to adapt to the evolving job market for future-proofed careers. Begin by identifying current strengths and weaknesses, then correlate them with emerging industry trends to match and prioritize skill development. Engage in ongoing learning and training to stay ahead of technological advancements and market demands, while also seeking opportunities for practical application of new skills. Embrace flexibility and a growth mindset to navigate uncertainties and seize opportunities for career advancement. By consistently refining and adapting skill sets based on correlation and matching with market needs, individuals can position themselves for sustained success in their careers.

3.5 CREATING USER INTERFACE

3.5.1. Web User Interface

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3.5.2. Database

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3.5.3. Security

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CHAPTER 4

SYSTEM STUDY

4.1 Feasibility Study:

Job role matching and skill assessment system of Skills for Future-Proofed Careers is crucial for individuals navigating the rapidly evolving job market. Understanding the relationship between current skill sets and the demands of future job roles is essential for career sustainability. This entails identifying transferable skills that can be applied across different roles and industries, as well as upskilling or reskilling to meet the evolving demands of the labor market. Building a strong correlation between individual skills and the requirements of future-proofed careers involves continuous learning, adaptability, and a proactive approach to career development. Emphasizing soft skills such as critical thinking, problem-solving, and communication, alongside technical competencies, can enhance employability and resilience in the face of technological disruptions.

Additionally, leveraging resources such as career development programs, online learning platforms, and networking opportunities can aid in aligning skills with future job prospects. By staying attuned to industry trends, honing relevant skills, and embracing a growth mindset, individuals can position themselves for success in the ever-changing landscape of work.

4.1.1 ECONOMICAL FEASIBILITY

- Job role matching and skill assessment system for future-proofed careers is a critical aspect in today's rapidly evolving job market. As technology advances and industries transform, it is essential for individuals to develop skills that align with the changing demands of the workforce to ensure long-term career success and sustainability.
- One key consideration in correlating and matching skills for future-proofed careers is the identification of emerging trends and technologies in specific industries. By understanding the skills that will be in demand in the future, individuals can proactively develop and acquire the necessary capabilities to stay relevant and competitive in their field.
- Furthermore, it is crucial to assess one's existing skill set and identify areas for improvement or upskilling to meet the evolving requirements of the job market. Continuous learning and development of new skills, such as digital literacy, data analysis, and adaptability, are essential for staying ahead in a rapidly changing work environment.
- Collaborating with industry professionals, mentors, and career counselors can also help individuals gain insights into the skills and competencies that are highly valued in their desired career paths. Networking and seeking guidance from experienced professionals can provide valuable opportunities for skill development and career advancement.

- Moreover, embracing a growth mindset and being open to learning new skills and technologies is key to future-proofing one's career. Adapting to change, being flexible, and continuously seeking opportunities for professional growth can enhance one's employability and resilience in the face of industry disruptions. In conclusion, the correlation and matching of skills for future-proofed careers involve proactive skill development, continuous learning, networking, and adaptability. By staying informed about emerging trends, assessing and improving existing skills, and fostering a growth mindset, individuals can position themselves for success in a rapidly changing job market.

4.1.2 TECHNICAL FEASIBILITY

Ensuring a correlation and matching of skills for future-proofed careers is vital in today's rapidly evolving job market. The alignment between skill sets and the demands of the future job landscape can significantly impact an individual's career success and employability. Here are some key points to consider in this regard:

- 1. Continuous Learning and Adaptability:** Future-proofed careers require individuals to have a growth mindset and a commitment to continuous learning. It is crucial to stay updated on emerging technologies, industry trends, and skill requirements to remain competitive in the job market. Adaptability to changing environments and skill demands is essential for long-term career sustainability.
- 2. Interdisciplinary Skills:** As industries become more interconnected, professionals with a diverse set of skills and knowledge from multiple disciplines are highly sought after. The ability to work across different fields and apply a range of skills to solve complex problems is becoming increasingly valuable. Developing a mix of technical, analytical, creative, and communication skills can help individuals navigate diverse career paths.
- 3. Digital Literacy and Technology Skills:** With the rise of automation, artificial intelligence, and digital transformation, proficiency in technology-related skills is becoming non-negotiable. Individuals should focus on improving their digital literacy, mastering data analysis, programming languages, and understanding emerging technologies like blockchain and machine learning to stay relevant in future job roles.
- 4. Soft Skills and Emotional Intelligence:** While technical skills are essential, soft skills such as communication, collaboration, leadership, and emotional intelligence are equally crucial for career advancement. The ability to work well in teams, adapt to different work cultures, and communicate effectively can set individuals apart in a competitive job market.
- 5. Career Guidance and Mentorship:** Seeking guidance from industry experts, mentors, and career advisors can provide valuable insights into the skills and competencies needed for future-

proofed careers. Mentorship can help individuals set career goals, navigate career transitions, and acquire the necessary skills to thrive in a rapidly changing workplace. By aligning skill development initiatives with the demands of future job markets, individuals can enhance their career prospects, adapt to evolving industry needs, and build a resilient career path that is well-equipped to withstand technological disruptions and market changes.

4.1.3 OPERATIONAL FEASIBILITY

- Correlation and Matching of Skills for Future-Proofed Careers is a critical consideration for individuals looking to thrive in a rapidly evolving job market. This concept underscores the importance of aligning one's skillset with the demands of future job roles and industries to ensure long-term career success and adaptability. In the context of preparing for future-proofed careers, individuals need to focus on developing a versatile set of skills that are in high demand and have staying power in the face of technological advancements and market changes.
- One key aspect of this correlation and matching of skills is understanding current and emerging trends in various industries. By staying informed about advancements in technology, market demands, and job projections, individuals can identify areas where their skills align or where they need to upskill to remain competitive. Continuous learning and upskilling are essential components of future-proofing one's career, as they allow individuals to adapt to changing job requirements and industry dynamics.
- Another critical element is the ability to identify transferable skills that can be applied across different roles and industries. Soft skills such as communication, critical thinking, problem-solving, and adaptability are highly valued in today's job market and are likely to remain relevant in the future. By honing these transferable skills, individuals can position themselves for success in a wide range of career paths and navigate transitions between different roles more seamlessly.
- Furthermore, building a strong professional network and seeking mentorship can also enhance the correlation and matching of skills for future-proofed careers. Networking with industry professionals, participating in skill-sharing platforms, and connecting with mentors who have experience in the desired field can provide valuable insights, guidance, and opportunities for skill development and career advancement.
- Overall, by proactively correlating their skills with future job market trends, focusing on continuous learning and upskilling, identifying transferable skills, and leveraging professional networks, individuals can better position themselves for success in future-proofed careers. Embracing a growth mindset, being adaptable, and staying abreast of industry developments are key strategies for thriving in a rapidly changing work

environment and ensuring long-term career resilience.

4.1.4 SOCIAL FEASIBILITY

- Correlation and Matching of Skills for Future-Proofed Careers is a crucial concept in today's rapidly evolving job market. As technology advances and industries undergo transformations, ensuring that individuals possess the necessary skills to thrive in future-proofed careers becomes essential. This involves aligning skill sets with the demands of emerging job roles to facilitate long-term professional success and adaptability.
- One key aspect of correlation and matching of skills is identifying the core competencies that will be in high demand across various industries in the future. Skills such as critical thinking, problem-solving, adaptability, and digital literacy are increasingly becoming essential for individuals to navigate the ever-changing job landscape. By acquiring and honing these skills, individuals can position themselves for success in future-proofed careers that require flexibility and continuous learning.
- Another consideration in correlation and matching of skills is the importance of upskilling and reskilling to remain competitive in the job market. As industries evolve and new technologies emerge, individuals need to invest in lifelong learning to acquire new skills and update existing ones. This continuous development of skills ensures that individuals stay relevant and marketable, enabling them to pursue opportunities in growth sectors and future-proofed professions.
- Additionally, fostering a growth mindset and a willingness to embrace change is crucial for effectively correlating skills to future-proofed careers. By being open to acquiring new knowledge, adapting to new technologies, and exploring different career paths, individuals can position themselves as valuable assets in a dynamic and unpredictable job market.
- In conclusion, correlation and matching of skills for future-proofed careers require individuals to proactively identify and cultivate the skills that will be in demand in the future, engage in ongoing learning and development, and maintain a flexible mindset to adapt to evolving industry trends. By aligning skill sets with emerging job roles and staying abreast of industry changes, individuals can increase their employability and thrive in careers that are resilient to technological disruptions and market shifts.

CHAPTER 5

SYSTEM DESIGN

Introduction

Systems analysis is "the process of studying a procedure or business to identify its goal and purposes and create systems and procedures that will efficiently achieve them". Another view sees system analysis as a problem-solving technique that breaks down a system into its component pieces, and how well those parts work and interact to accomplish their purpose. Performing an effective systems analysis often requires experts to have knowledge of a software product's or package's requirements so that they can approach their analysis effectively. There are several ways to analyze a system like constructing system usage patterns, performing feasibility analysis, etc. It is required as it-

- Improves the user experience
- Reduces errors or inefficiencies
- Identifies potential issues in code
- Helps businesses improve their systems time to time

5.1 System Architecture:

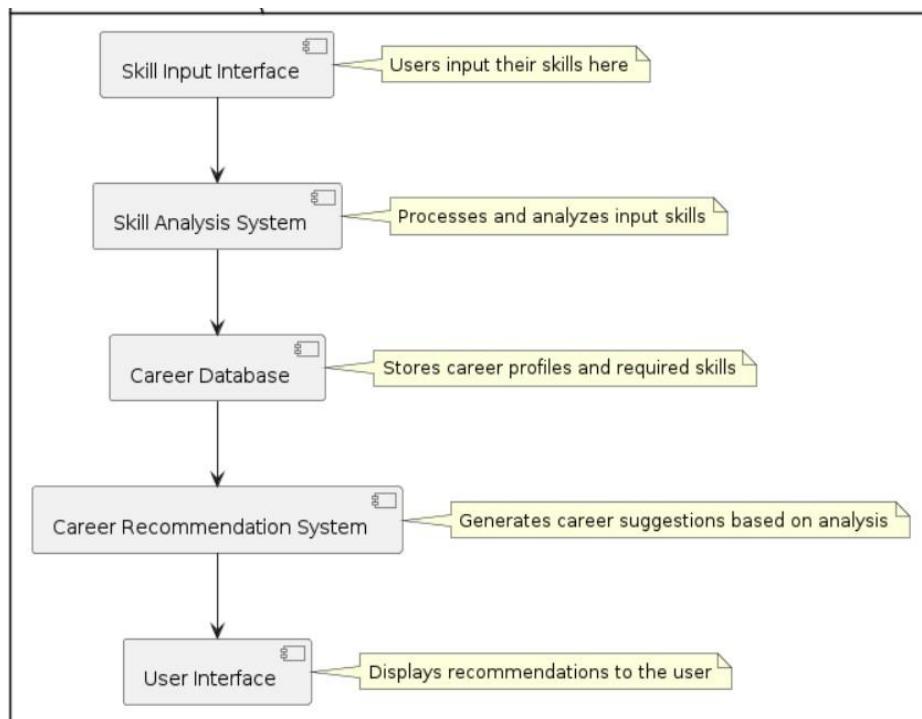


Fig1.1 System Architecture

5.2 UML Diagrams:

UML (Unified Modelling Language) is a standard language for specifying, visualizing, constructing, and documenting the artifacts of software systems.

Two types of UML diagrams:

1. Behavior Diagrams
2. Structure Diagrams

5.2.1 Behavior Diagrams

5.2.1.1 Use Case Diagram:

Use case diagrams are usually referred to as behavior diagrams used to describe a set of actions (use cases) that some system or systems (subject) should or can perform in collaboration with one or more external users of the system (actors). A use case is a methodology used in system analysis to identify, clarify, and organize system requirements.

The use case is made up of a set of possible sequences of interactions between systems and users in a particular environment and related to a particular goal. It consists of a group of elements (for example, classes and interfaces) that can be used together in a way that will have an effect larger than the sum of the separate elements combined.

The use case should contain all system activities that have significance to the users. A use case can be thought of as a collection of possible scenarios related to a particular goal, indeed, the use case and goal are sometimes considered to be synonymous. The main purpose of a use case diagram is to show what system functions are performed for which actor.

Actors

Actors represent roles which may include human users, external hardware, or other systems. Our proposed system is quite simple in terms of user interface. It is only two actor's user and the system.

Following are the actors in our project-

a) User:

User is the actor who can enter into the system by entering login details for testing the diseases of fruit using images.

b) System:

System is an actor that interacts with the user. The system will perform several actions

c) Admin:

Admin can do training, run machine learning algorithms and testing on the dataset.

List of use cases

Use case name	Actors
Login	User and Admin
Upload Dataset	Admin
Process Dataset Features	Admin
Run all Machine Learning Algorithms	Admin
Average ranking graph	Admin
Upload image and test	User
Display output	System

Use case name	Description
Login	The user can login into the system
Upload Dataset	The dataset is uploaded by the Admin
Process dataset features	Different features are extracted
Run all ML algorithms	After features extraction, the system should run the algorithms
Average ranking graph	A graph is produced based on classification
All train graph	The user can select the parking slot if it is available
Upload image and test	User is tests the resume score by uploading the image
Display output	The system displays the output

Use Case and Description

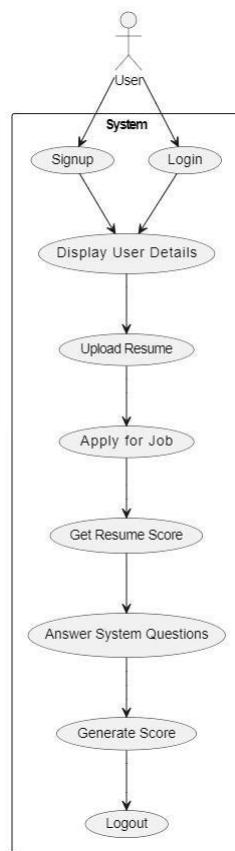
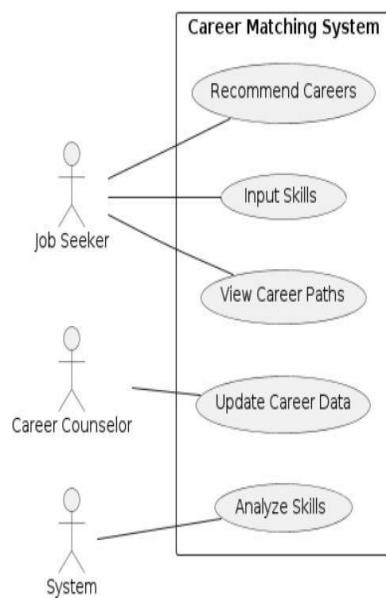


Fig 1.2:(a) Use Case Diagram



5.2.1.2 Activity diagram

An activity diagram is basically a flowchart to represent the flow from one activity to another activity. The activity can be described as an operation of the system. The control flow is drawn from one operation to another. This flow can be sequential, branched, or concurrent. The flow carries from the starting of an activity to end of an activity, it performs different types of operations through the flow that are shown.

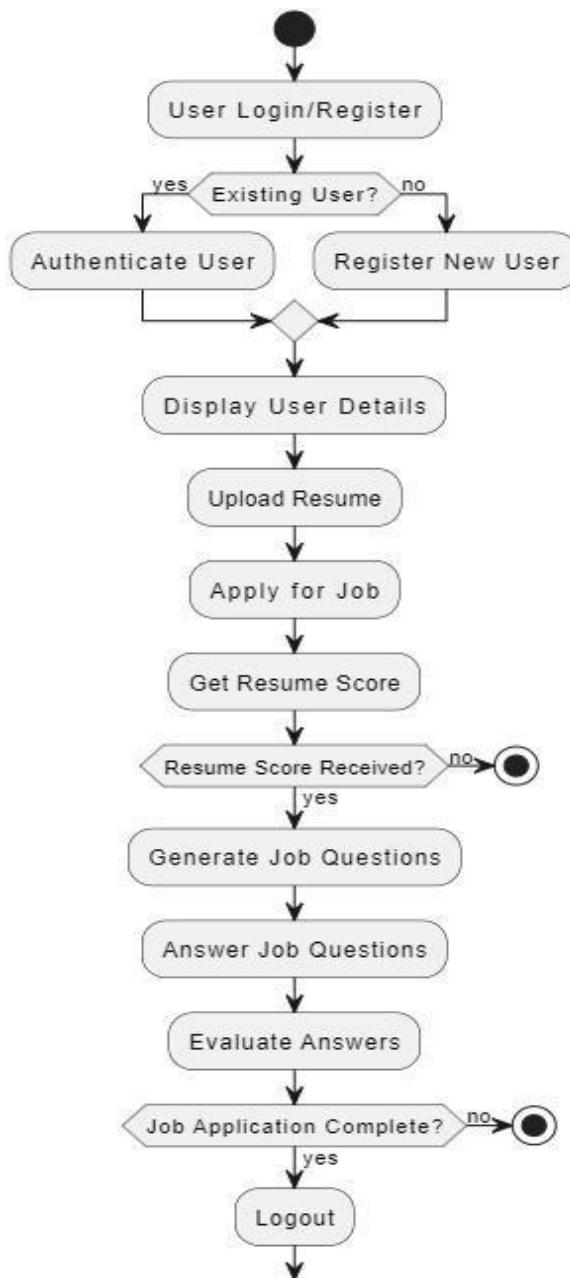


Fig1.3 (a)Activity Diagram

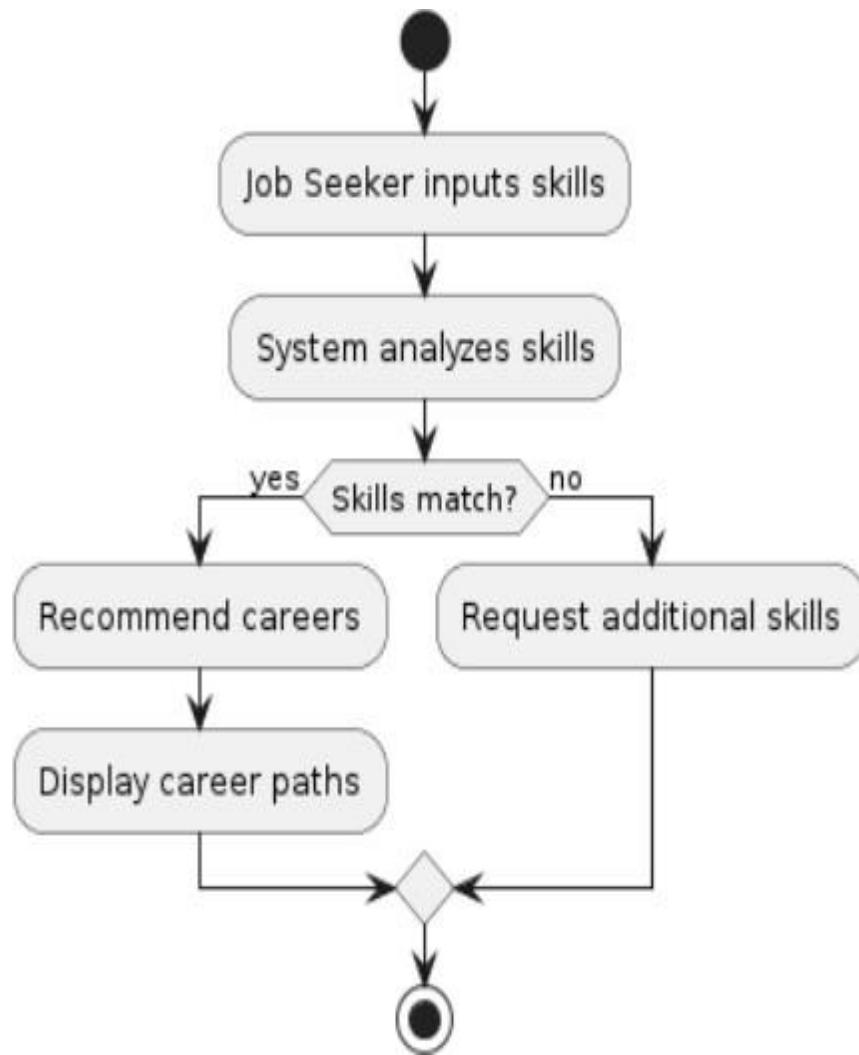


Fig1.3 (b)Activity Diagram

5.2.1.3 Sequence Diagram

Sequence diagrams are used to display the interaction between users, screens, objects, and entities within the system. It provides a sequential map of message passing between objects over time.

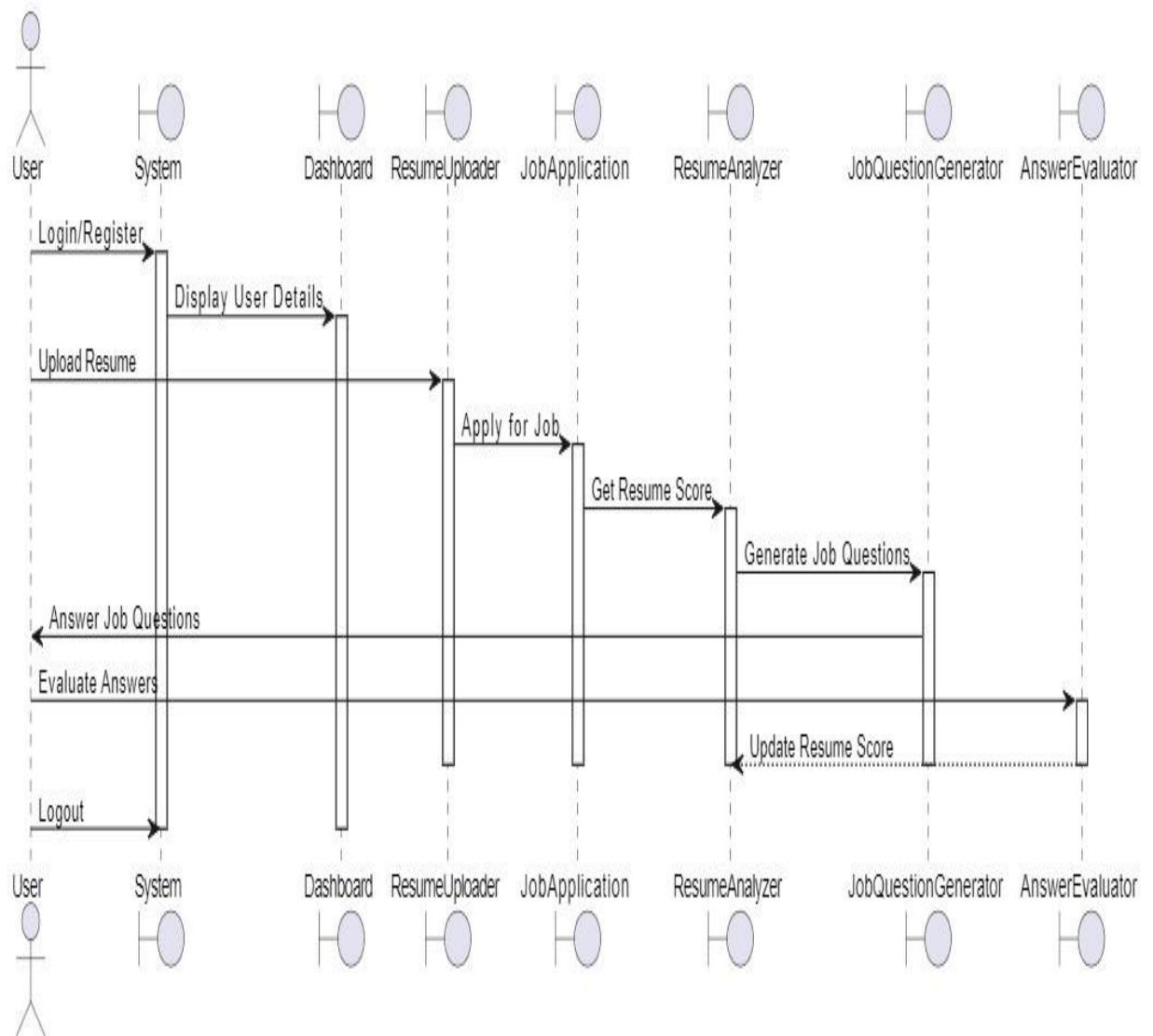


Fig1.4 (a) Sequence Diagram

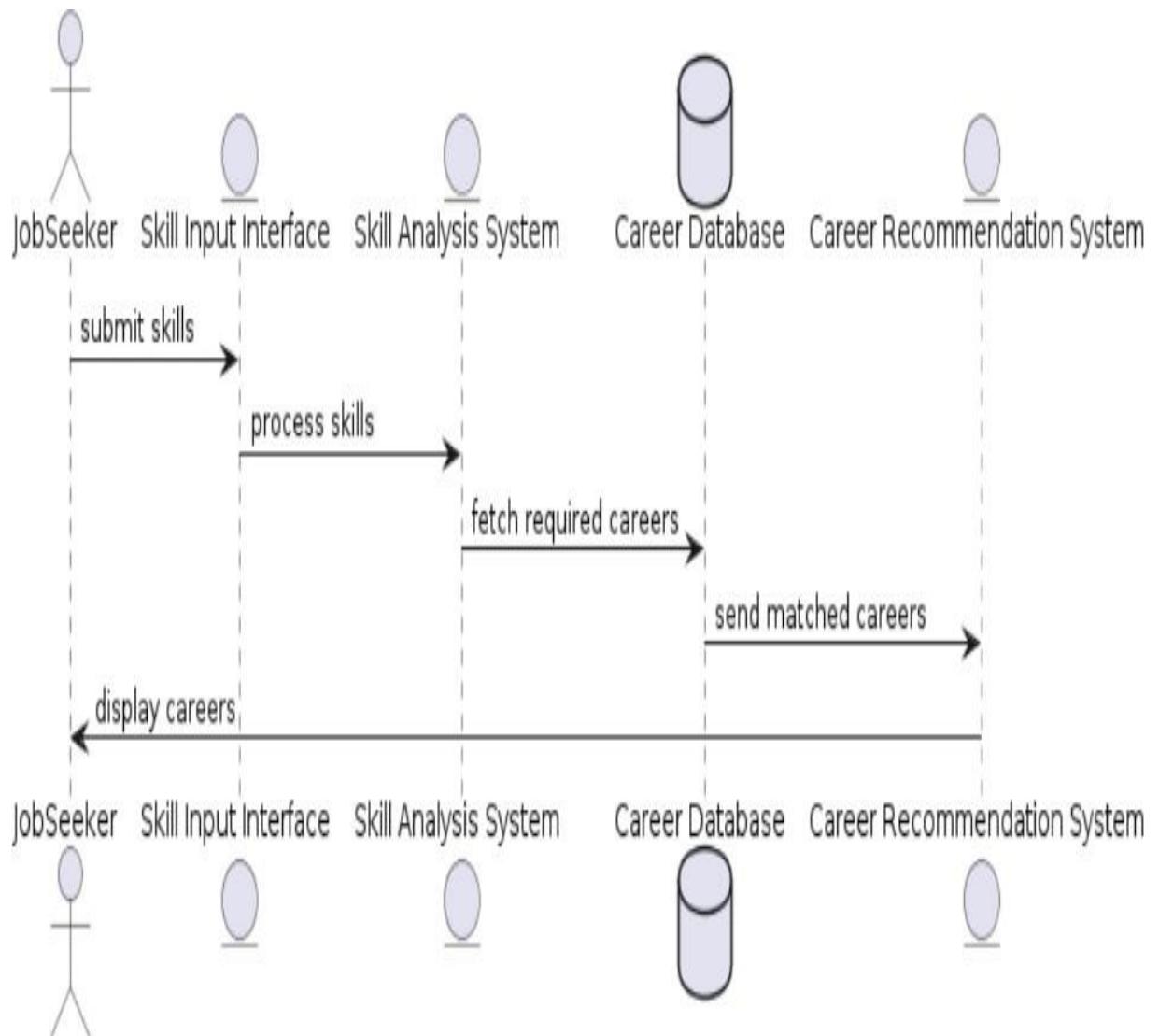


Fig1.4 (b) Sequence Diagram

5.2.1.4 State Chart Diagram:

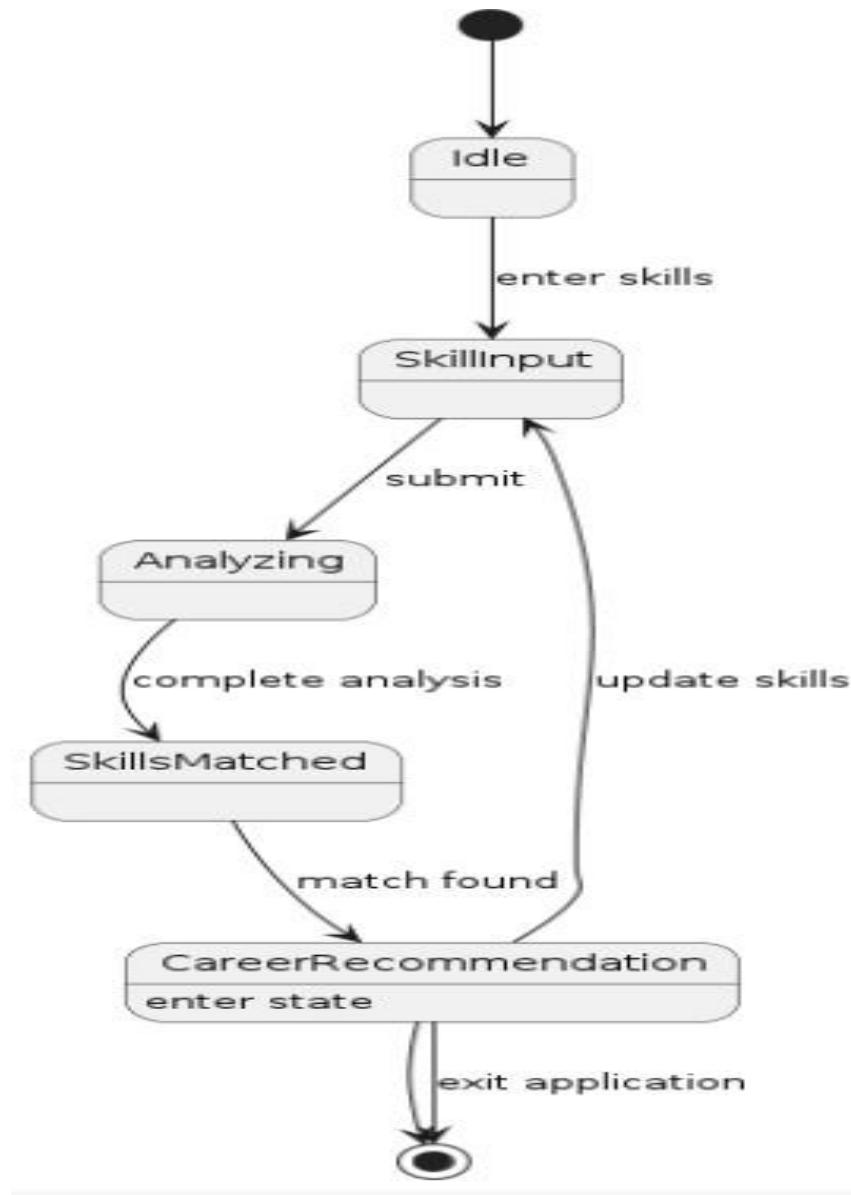


Fig5.8: State Chart Diagram

5.2.2 Structure Diagram

5.2.2.1 Class Diagram

Class diagram is a static diagram. It represents the static view of an application. Class diagram is not only used for visualizing, describing, and documenting different aspects of a system but also for constructing executable code of the software application. Class diagram describes the attributes and operations of a class and also the constraints imposed on the system. The class diagrams are widely used in the modelling of object-oriented systems because they are the only UML diagrams, which can be mapped directly with object-oriented languages.

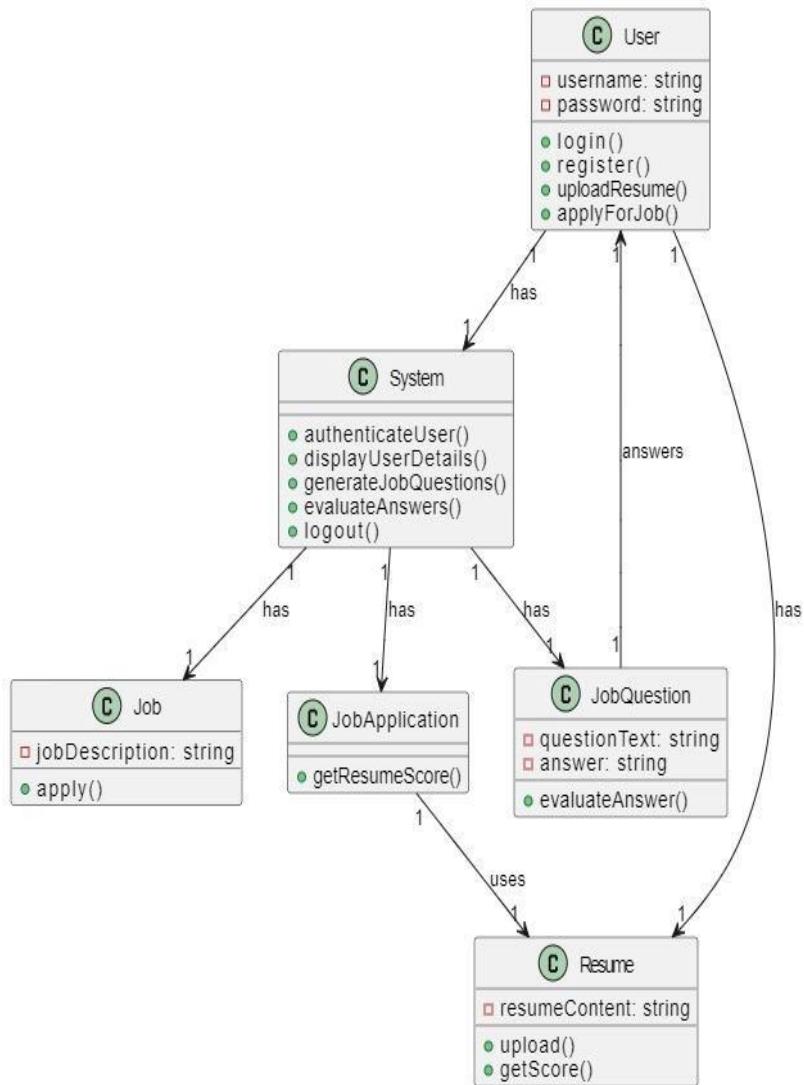


Fig5.9 (a) Class Diagram

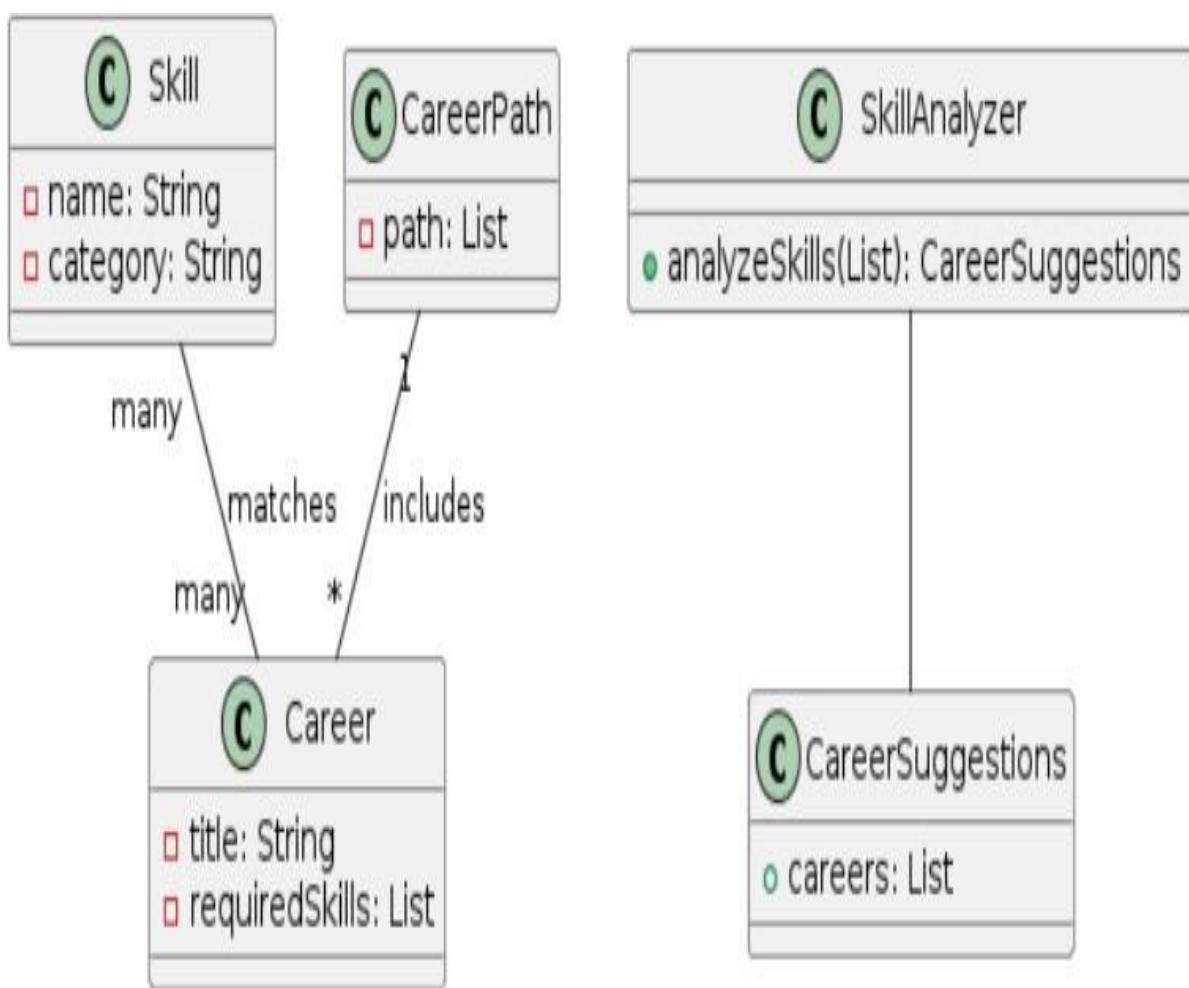


Fig5.10 (b) Class Diagram

5.2.2.2 Component Diagram

The component diagram for active liveness detection system is an illustration of how the system components work together to make the system operate correctly. It shows how the software's parts are organized and how they depend on each other. This diagram also gives a high level look at the parts of a system

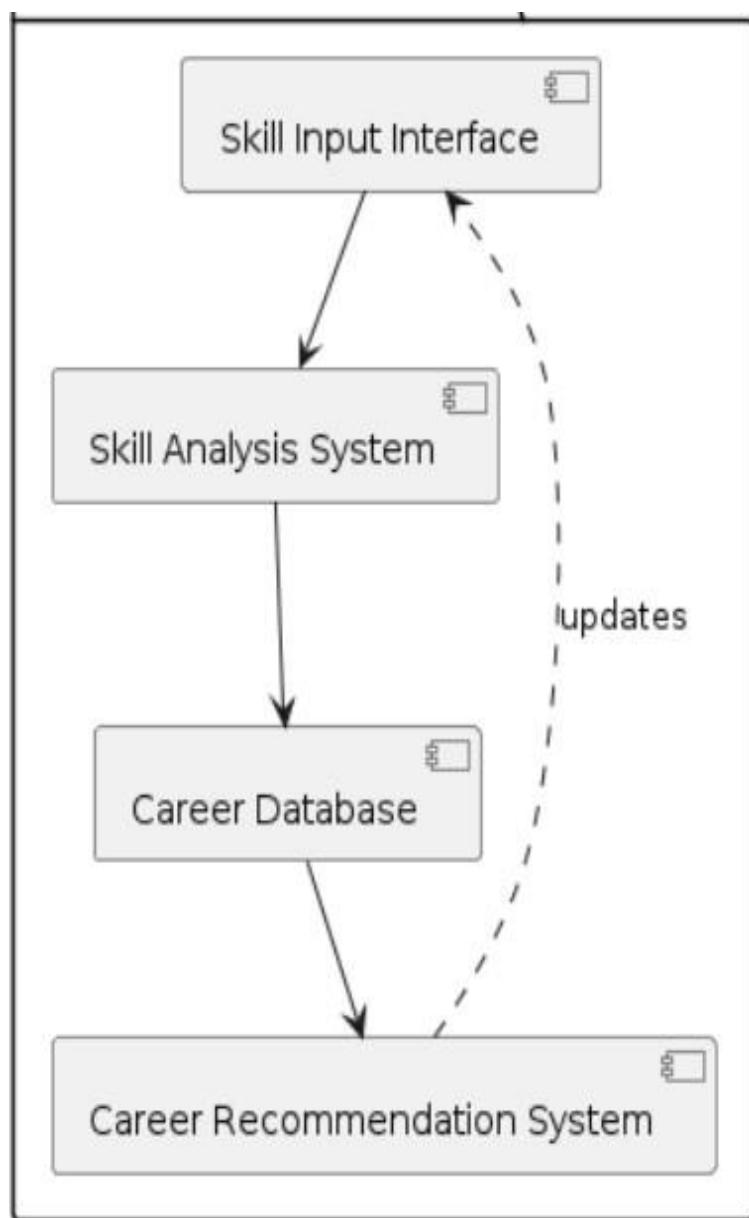


Fig5.11:Component Diagram

5.3 ER DIAGRAM

The Job Role Matching and Skill Assessment System for Future-Proofed Careers focuses on the alignment of individual skills with evolving job requirements in order to adapt to changing industry landscapes. The project aims to create a platform that analyzes the skills possessed by professionals and matches them with the in-demand skills needed for future-proofed careers. The ER diagram for this project would showcase entities like skills, job roles, industry trends, individual profiles, and skill assessments. Through cardinality indicators, the relationships between these entities would be illustrated to facilitate effective skill matching and career planning. This ER diagram serves as a road map for enhancing workforce readiness and ensuring relevance in the ever-changing job market.

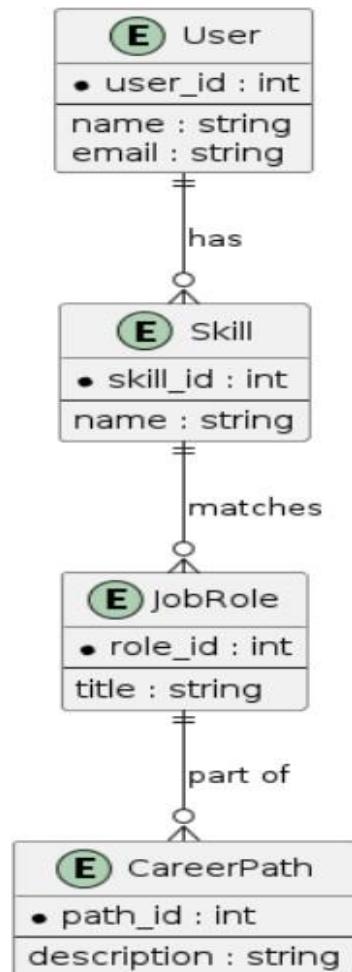


Fig5.12:ER Diagram

5.4 DATA FLOW DIAGRAM

A Data Flow Diagram (DFD) visually depicts how data moves through a system, detailing input, processing, and output stages in a structured manner. Utilizing symbols like circles, rectangles, arrows, and lines, DFDs represent data sources, processes, storage, and destinations. Vital in system analysis and design, DFDs enhance understanding of information flow, pinpoint inefficiencies, and facilitate effective system design. By providing clarity on data movement, identifying bottlenecks, and optimizing processing systems, DFDs play a crucial role in modeling and streamlining data flow within a system, making them a powerful tool for stakeholders in system development.

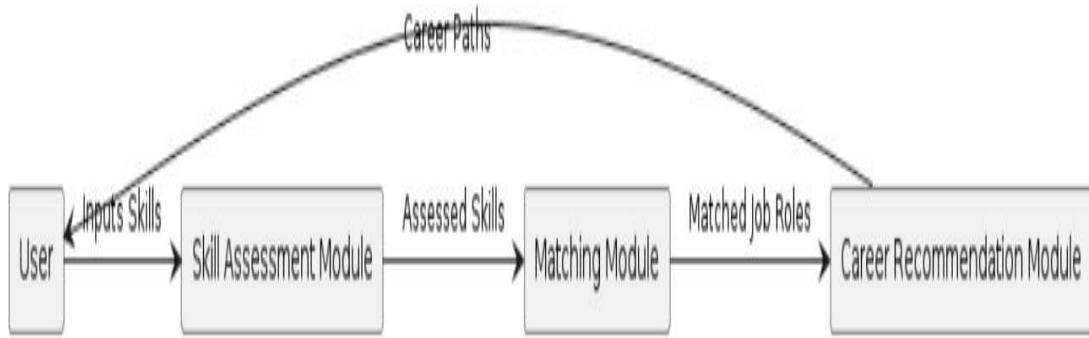


Fig 5.13 DATA FLOW DIAGRAM Level 1

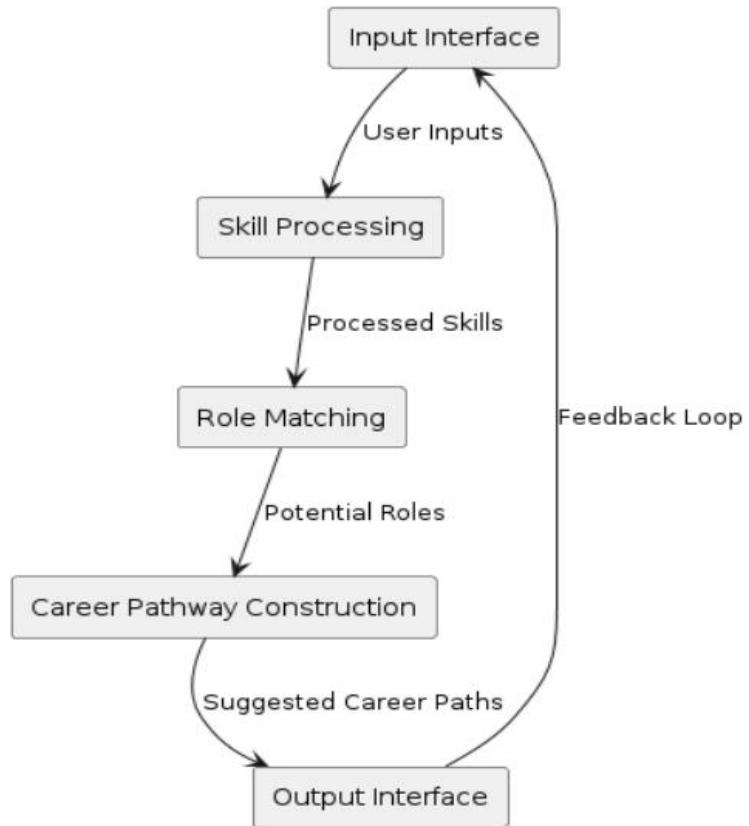


Fig5.14 DATA FLOW DIAGRAM Level 2

CHAPTER 6

REQUIREMENT ANALYSIS

6.1 Introduction to Requirement Analysis:

In the realm of career planning and skill development, understanding the correlation between skills and future job demands is paramount. Requirement analysis involves identifying the needs and objectives of individuals seeking to future-proof their careers. This entails assessing existing skill sets, career aspirations, and market trends to determine the most relevant skills for long-term success.

6.2 System Requirements

A requirement is a feature that the system must have or a constraint that it must to be accepted by the client. Requirement Engineering aims at defining the wants of the system under construction. Requirement Engineering include two main activities requirement elicitation which results in the specification of the system that the client understands and analysis which in analysis model that the developer can unambiguously interpret. A requirement may be a statement about what the proposed system will do. Requirements can be divide into two major categories:

Functional Requirements

Non-Functional Requirements

6.3 Functional Requirements

- **Skill Data Acquisition:** Retrieve skill-related data from various sources, including job descriptions, resumes, and educational qualifications.
- **Skill Correlation and Analysis:** Apply algorithms to analyze correlations between skills, occupations, and market trends.
- **Career Recommendation:** Develop recommendation systems to match individuals with suitable career paths based on their skill profiles and aspirations.
- **User Interface:** Design intuitive user interfaces for interacting with the system, including skill assessment tools and career planning dashboards

6.4 Non-Functional Requirements

Non-Functional Requirements specifies the standard attribute of a software. They judge the software supported Responsiveness, Usability, Security, Portability, and other non-functional standards that are critical to the success of the software. An example of a nonfunctional

requirement, “how fast does the website load?” Failing to satisfy non-functional requirements may result in systems that fail to satisfy user needs. Non-functional Requirements allow you to impose constraints or restrictions on the planning of the system across the varied agile backlogs.

6.4.1 User Interface and Human Factors

To insert the data set and to test and train the data we require human factor. Humans are required to give the reviews of our products. This is achieved through a user interface to interact with human factor for taking reviews for training and testing on the data.

6.4.2 software requirements

Operating Systems: Compatible with Windows, macOS, and Linux distributions.

Development Environments: Integrated Development Environments (IDEs) such as Jupyter Notebooks, or Visual Studio Code.

Programming Language: Python for implementing algorithms and building software components.

Libraries and Frameworks: Utilization of machine learning libraries (e.g., TensorFlow, PyTorch), data processing frameworks (e.g., Pandas, NumPy), and natural language processing tools (e.g., NLTK, spaCy).

Collaboration Tools: Platforms for team collaboration and version control (e.g., GitHub, GitLab).

6.4.3 Hardware Requirements

- Standard computing hardware (laptops, desktops, servers) with adequate processing power and memory.
- Storage devices for managing large datasets and model parameters.
- Networking infrastructure to facilitate data exchange and communication between system components.

6.4.4 Usability

The system must be simple to use in terms of user interface and must avoid any complexity. It should be capable of having minimum interaction with the user to avoid much manual work, but at the same time should provide the best results possible. It should not take much time on

processing or should stuck at many moments. In simple terms it should satisfy user needs with simplicity in terms of usability.

6.4.5 Reliability

The system must be reliable, it should not lead to unnecessary crashes and shouldn't stuck at most cases of errors when occur, it should have good exception handling mechanisms. The system should perform well in critical situations to provide user most friendly experience in terms of handling the system with little or less failures.

6.4.6 Performance

The system or software designed should not slow down while performing. The system should be fast enough to produce results. Additionally, it should be able to perform well in case of more workloads. This attribute determines the overall functionality of the system in terms of resource consumption, response time and efficiency.

6.4.7 Supportability

This type of non-functional is concerned with characteristics such as maintainability, scalability of the solution. This includes considerations for the ability of the solution to be easily modified to accommodate enhancements and repairs.

6.4.8 Physical Environment

The environment includes external factors that impact how your system performs. For example, light condition, background, etc., may affect the speed or reliability of an application.

6.4.9 Security Requirements

6.4.9.1 Access Requirement

The system provides token base authentication system with proper user authorization. In this authorization system user must need to provide legal credential. Then our system provides an access token for the user. Without use the token no one can access the selected path. The token provides user details with user privilege logs.

6.4.9.2 Integrity Requirements

Our system provides token on demand data delivery process. Every post request must have provided a token for ensuring that each request to a server is accompanied by a signed token. As comfortably as the get, put and delete request carry an authorize token every time. By using this our system easily understand authenticated user are permitted for this data or not.

6.4.9.3 Privacy Requirements

Data integrity is the most significant part in the system. Along with that the access token is almost as significant. So, we store token on the data infrastructure. After verifying the request, it removes from the database. A fixed timer also set to validate the token. A refresh token must generate with every authentication. Each token has a limited life line. After breathing out the time the session of authenticated user must be nigh.

6.4.10 Resource Requirements

Resource Requirements should be defined by the Project manager to establish the resources needed to execute work on the project.

CHAPTER 7

IMPLEMENTATION

7.1 Software Used

7.1.1 Python

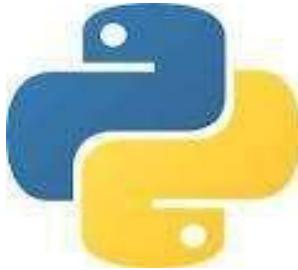


Fig7.1:Logo

Python is a high-level, interpreted, interactive and object-oriented scripting language. Python is designed to be highly readable. It uses English words frequently whereas other languages use punctuation, and it has fewer syntactic constructions than other languages.

- Python is Interpreted - Python is processed at runtime by the interpreter. You need to compile your program before executing it. This is similar to PERL and PHP.
- Python is Interactive - You can actually sit at a Python prompt and interact with the interpreter directly to write your programs.
- Python is Object-Oriented - Python supports Object-Oriented style or technique of programming that encapsulates code within objects.
- Python is a Beginner's Language - Python is a great language for the beginner level programmers and supports the development of a wide range of applications from simple text processing to WWW browsers to games.

Python language is being used by almost all tech-giant companies like – Google, Amazon, Facebook, Instagram, Dropbox, Uber... etc.

The biggest strength of Python is huge collection of standard libraries which can be used for the following –

- Machine Learning
- GUI Applications (like Kivy, Tkinter, PyQt etc.)
- Web frameworks like Django (used by YouTube, Instagram,Dropbox)
- Image processing (like OpenCV, Pillow)
- Web scraping (like Scrapy, BeautifulSoup, Selenium)
- Test frameworks
- Multimedia

History of Python

Python was developed by Guido van Rossum in the late eighties and early nineties at the National Research Institute for Mathematics and Computer Science in the Netherlands. Python is derived from many other languages, including ABC, Modula-3, C, C++, Algol-68,Small Talk, and Unix shell and other scripting languages. Python is copyrighted. Like Perl, Python source code is now available under the GNU General Public License (GPL) Python is now maintained by a core development team at the institute, although Guido van Rossum still holds a vital role in directing its progress. Python was conceived in the late 1980s by Guido van Rossum at Centrum Wiskunde & Informatica (CWI) in the Netherlands as a successor to ABC programming language, which was inspired by SETL, capable of exception handling and interfacing with the Amoeba operating. system. Its implementation began in December 1989.

Python Features

Python's features include-

- **Easy-to-learn-** Python has few keywords, simple structure, and a clearly defined syntax. This allows the student to pick up the language quickly.
- **Easy-to-read-** Python code is more clearly defined and visible to the eyes.
- **Easy-to-maintain-** Python's source code is fairly easy-to-maintain
- **A broad standard library-** Python's bulk of the library is very portable and cross platform compatible on UNIX, Windows, and Macintosh.
- **Interactive Mode-** Python has support for an interactive mode which allows interactive testing and debugging of snippets of code.
- **Portable-** Python can run on a wide variety of hardware platforms and has the same interface on all platforms.
- **Extendable-** You can add low-level modules to the Python interpreter. These modules enable programmers to add to or customize their tools to be more efficient.
- **Databases-** Python provides interfaces to all major commercial databases.
- **GUI Programming-** Python supports GUI applications that can be created and ported to

many system calls, libraries and windows systems, such as Windows MFC, Macintosh, and the X Window system of Unix.

- **Scalable-** Python provides a better structure and support for large programs than shell scripting.
- Apart from the above-mentioned features, Python has a big list of good features, few are listed below-
- It supports functional and structured programming methods as well as OOP.
- It can be used as a scripting language or can be compiled to byte-code for building large applications
- Python supports Object-Oriented style or technique of programming that encapsulates code within objects.
- It provides very high-level dynamic data types and supports dynamic type checking. It supports automatic garbage collection.
- It can be easily integrated with C, C++, COM, ActiveX, CORBA, and Java.

Advantages of Python:

1. Extensive Libraries

Python downloads with an extensive library and it contain code for various purposes like regular expressions, documentation-generation, unit-testing, web browsers, threading, databases, CGI, email, image manipulation, and more. So, we don't have to write the complete code for that manually.

2. Extensible

As we have seen earlier, Python can be extended to other languages. You can write some of your code in languages like C++ or C. This comes in handy, especially in projects.

3. Embeddable

Complimentary to extensibility, Python is embeddable as well. You can put your Python code in your source code of a different language, like C++. This lets us add scripting capabilities to our code in the other language.

4. Improved Productivity

The language's simplicity and extensive libraries render programmers more productive than languages like Java and C++ do. Also, the fact that you need to write less and get more things

done.

5.IOT Opportunities

Since Python forms the basis of new platforms like Raspberry Pi, it finds the futurebright for the Internet of Things. This is a way to connect the language with thereal world.

6.Simple and Easy

When working with Java, you may have to create a class to print ‘Hello World’. But in Python, just a print statement will do. It is also quite easy to learn, understand, and code. This is why when people pick up Python, they have a hard time adjusting to other more verbose languages like Java.

7.Readable

Because it is not such a verbose language, reading Python is much like reading English. This is the reason why it is so easy to learn, understand, and code. It also does not need curly braces to define blocks, and indentation is mandatory. These further aids the readability of the code.

8.Object-Oriented

This language supports both the procedural and object-oriented programming paradigms. While functions help us with code reusability, classes and objects let us model the real world. A class allows the encapsulation of data and functions into one.

9.Free and Open-Source

Like we said earlier, Python is freely available. But not only can you download Python for free, but you can also download its source code, make changes to it, andeven distribute it. It downloads with an extensive collection of libraries to help you with your tasks.

10.Portable

When you code your project in a language like C++, you may need to make some changes to it if you want to run it on another platform. But it isn’t the same with Python. Here, you need to code only once, and you can run it anywhere. This is called Write Once Run Anywhere (WORA). However, you need to be careful enough not to include any system-dependent features.

Advantages of Python over Other Languages

1.Less Coding

Almost all of the tasks done in Python requires less coding when the same task is done in

other languages. Python also has an awesome standard library support, so you don't have to search for any third-party libraries to get your job done. This is the reason that many people suggest learning Python to beginners.

2. Affordable

Python is free therefore individuals, small companies or big organizations can leverage the free available resources to build applications. Python is popular and widely used so it gives you better community support.

The 2019 GitHub annual survey showed us that Python has overtaken Java in the most popular programming language category.

3. Python is for Everyone

Python code can run on any machine whether it is Linux, Mac or Windows. Programmers need to learn different languages for different jobs but with Python, you can professionally build web apps, perform data analysis and machine learning, automate things, do web scraping and also build games and powerful visualizations. It is an all-rounder programming language.

Disadvantages of Python

Let's now see the downsides of choosing Python over another language.

1. Speed Limitations

We have seen that Python code is executed line by line. But since Python is interpreted, it often results in slow execution. This, however, isn't a problem unless speed is a focal point for the project. In other words, unless high speed is a requirement, the benefits offered by Python are enough to distract us from its speed limitations.

2. Weak in Mobile Computing and Browsers

While it serves as an excellent server-side language, Python is much rarely seen on the client-side. Besides that, it is rarely ever used to implement smartphone-based applications. One such application is called Carbon Nelle.

The reason it is not so famous despite the existence of Brython is that it isn't that secure.

3. Design Restrictions

As you know, Python is dynamically-typed. This means that you don't need to declare the type of variable while writing the code. It uses duck-typing. But wait, what's that? Well, it just means that if it looks like a duck, it must be a duck. While this is easy on the programmers during coding, it can raise run-time errors.

4.Underdeveloped Database Access Layers

Compared to more widely used technologies like JDBC (Java Database Connectivity) and ODBC (Open Database Connectivity), Python's database access layers are a bit underdeveloped. Consequently, it is less often applied in huge enterprises.

5.Simple

No, we're not kidding. Python's simplicity can indeed be a problem. Take my example. I don't do Java, I'm more of a Python person. To me, its syntax is so simple that the verbosity of Java code seems unnecessary.

How to Install Python on Windows and Mac:

There have been several updates in the Python version over the years. The question is how to install Python? It might be confusing for the beginner who is willing to start learning Python but this tutorial will solve your query. The latest or the newest version of Python is version 3.11.8 or in other words, it is Python 3.

Note: The python version 3.11.8 cannot be used on Windows XP or earlier devices.

Before you start with the installation process of Python. First, you need to know about your System Requirements. Based on your system type i.e. operating system and based processor, you must download the python version. My system type is a Windows 64-bit operating system. So the steps below are to install python version 3.11.8 on Windows 7 device or to install Python 3. Download the Python Cheat sheet here. The steps on how to install Python on Windows 11, 10 and 8 are divided into 4 parts to help understand better.

Download the Correct version into the system

Step 1: Go to the official site to download and install python using Google Chrome or any other web browser. OR Click on the following link: <https://www.python.org>.

The screenshot shows the Python 3.11.8 release page. At the top, there's a navigation bar with links for Python, PSF, Docs, PyPI, Jobs, and Community. Below the navigation bar is a main header with the Python logo, a 'Donate' button, a search bar, and a 'GO' button. A secondary navigation bar below the main one includes links for About, Downloads, Documentation, Community, Success Stories, News, and Events. The main content area features a large heading 'Python 3.11.8' and a sub-section for the 'Release Date: Feb. 6, 2024'. A note states 'Note that Python 3.11.8 cannot be used on Windows 7 or earlier.' followed by a list of download links for various Windows platforms.

Now, check for the latest and the correct version for your operating system.

Step 2: Click on the Download Tab.

- [Python 3.11.8 - Feb. 6, 2024](#)
Note that Python 3.11.8 cannot be used on Windows 7 or earlier.
 - Download [Windows installer \(64-bit\)](#)
 - Download [Windows installer \(ARM64\)](#)
 - Download [Windows embeddable package \(64-bit\)](#)
 - Download [Windows embeddable package \(32-bit\)](#)
 - Download [Windows embeddable package \(ARM64\)](#)
 - Download [Windows installer \(32-bit\)](#)

Step 3: You can either select the Download Python for windows 3.11.8 link in blue Color or you can scroll further down and click on download with respective to their version. Here, we are downloading the most recent python version for windows 3.11.8.

The screenshot shows a list of Python releases. The table has columns for 'Release version', 'Release date', 'Click for more', and 'Release Notes'. The releases listed are: Python 3.8.19 (March 19, 2024), Python 3.11.8 (Feb. 6, 2024), Python 3.12.2 (Feb. 6, 2024), Python 3.12.1 (Dec. 8, 2023), Python 3.11.7 (Dec. 4, 2023), Python 3.12.0 (Oct. 2, 2023), and Python 3.11.6 (Oct. 2, 2023). Each row contains a 'Download' link and a 'Release Notes' link.

Release version	Release date	Click for more	Release Notes
Python 3.8.19	March 19, 2024	Download	Release Notes
Python 3.11.8	Feb. 6, 2024	Download	Release Notes
Python 3.12.2	Feb. 6, 2024	Download	Release Notes
Python 3.12.1	Dec. 8, 2023	Download	Release Notes
Python 3.11.7	Dec. 4, 2023	Download	Release Notes
Python 3.12.0	Oct. 2, 2023	Download	Release Notes
Python 3.11.6	Oct. 2, 2023	Download	Release Notes

Step 4: Scroll down the page until you find the Files option.

Step 5: Here you see a different version of python along with the operating system.

Files

Version	Operating System	Description	MD5 Sum	File Size	GPG
Gzipped source tarball	Source release		68111671e5b2db4ae7fb9ab01bf0f5be	23817663	SIG
XZ compressed source tarball	Source release		d33e4aae66097051c2eca5ee3604803	17131432	SIG
macOS 64-bit/32-bit installer	Mac OS X	for Mac OS X 10.6 and later	6x28b4fa7533tafl3a442cbadceee0le6	34896416	SIG
macOS 64-bit installer	Mac OS X	for OS X 10.9 and later	5dd805c38217a45773bf5e4a036b243f	28082845	SIG
Windows help file	Windows		e63999573a2c062ac5cadedba7fc02	8131761	SIG
Windows x86-64 embeddable zip file	Windows	for AMD64/EM64T/x64	9b00c3cfcfbc0fbabe8318aa40728a2	7504391	SIG
Windows x86-64 executable installer	Windows	for AMD64/EM64T/x64	a702b4bfad7f3debf3041a583e5c3400	26680368	SIG
Windows x86-64 web-based installer	Windows	for AMD64/EM64T/x64	2fc01c80ffbd73ae8ef3a3bf351bb4bd2	1362904	SIG
Windows x86 embeddable zip file	Windows		96d3ba18861879fd0a94113374139d8	6741626	SIG
Windows x86 executable installer	Windows		31cc6029<2a54446a3d8451476394739	25663848	SIG
Windows x86 web-based installer	Windows		1b670cfad317df82c30983ea3f1d8fc	1324608	SIG

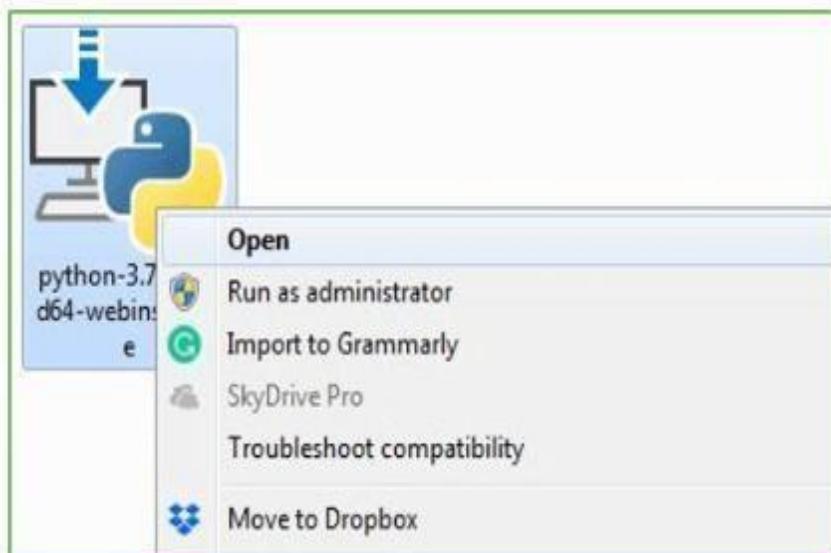
- To download **Windows 64-bit python**, you can select any one from the three options: Windows x86-64 embeddable zip file, Windows x86-64 executable installer or Windows x86-64 web-based installer.

Here we will install Windows x86-64 web-based installer. Here your first part regarding which version of python is to be downloaded is completed. Now we move ahead with the second part in installing python i.e. Installation

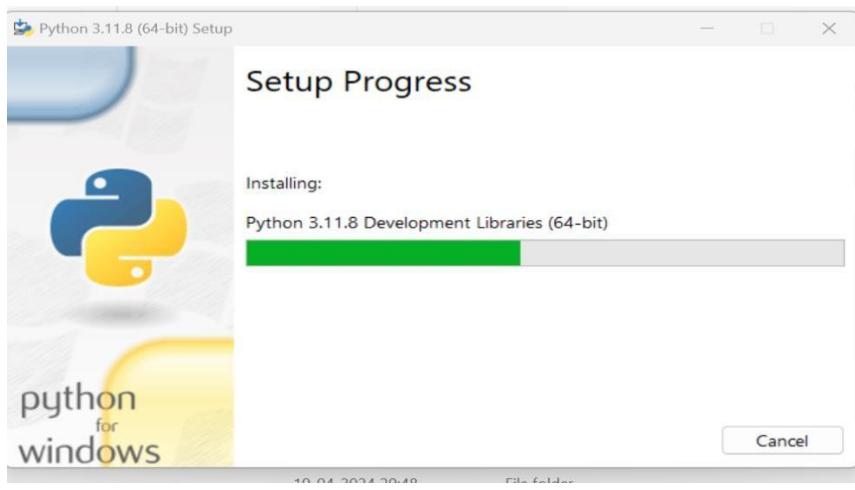
Note: To know the changes or updates that are made in the version you can click on the Release Note Option.

Installation of Python

Step 1: Go to Download and Open the downloaded python version to carry out the installation process.



Step 2: Before you click on Install Now, make sure to put a tick on Add Python 3.11.8 to PATH.



Step 3: Click on Install NOW After the installation is successful. Click on Close.

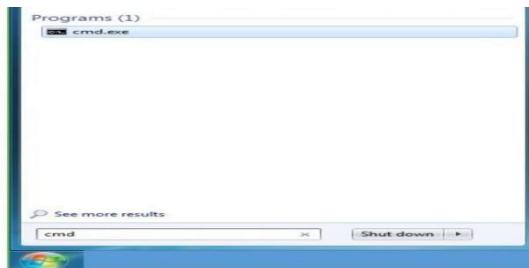


With these above three steps on python installation, you have successfully andcorrectly installed Python. Now is the time to verify the installation.

Verify the Python Installation

Step 1: Click on Start

Step 2: In the Windows Run Command, type “cmd”



Step 3: Open the Command prompt option.

Step 4: Let us test whether the python is correctly installed. Type **python -V** andpress Enter.

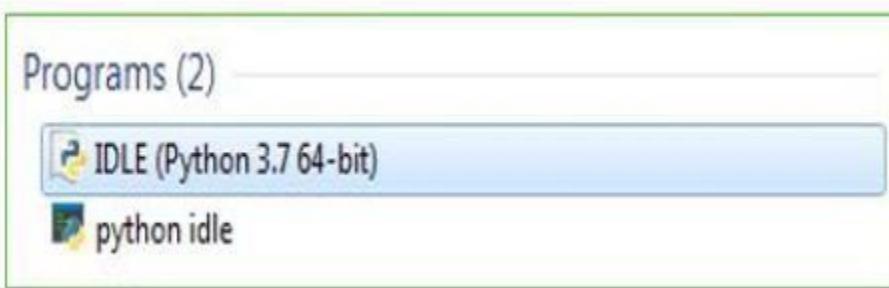
Step 5: You will get the answer as 3.11.8

Note: If you have any of the earlier versions of Python already installed. You mustfirst uninstall the earlier version and then install the new one

Check how the Python IDLE works

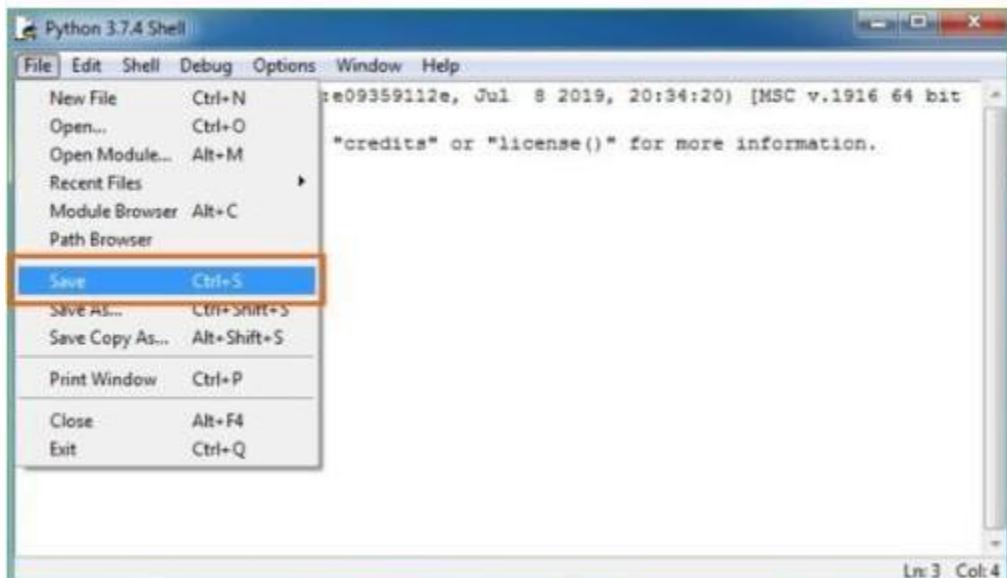
Step 1: Step 1: Click on Start

Step 2: In the Windows Run command, type “python idle”



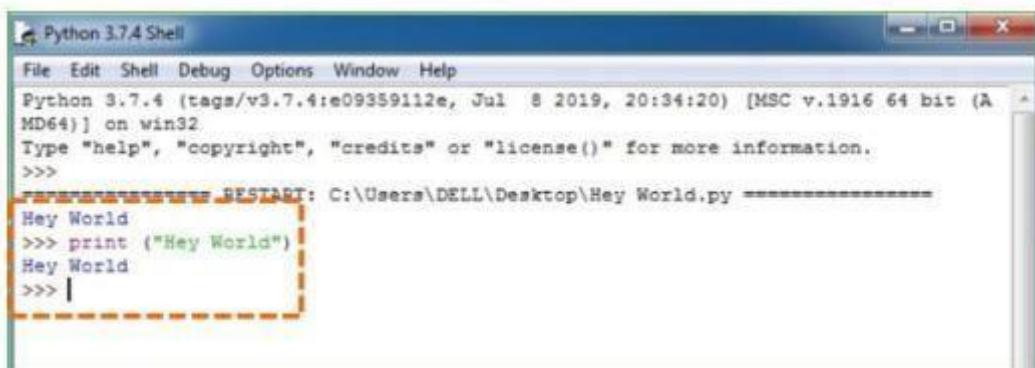
Step 3: Click on IDLE (Python 3.7 64-bit) and launch the program

Step 4: To go ahead with working in IDLE you must first save the file. **Click on File > Click on Save**



Step 5: Name the file and save as type should be Python files. Click on SAVE. Here I have named the files as Hey World.

Step 6: Now for e.g. enter print (“Hey World”) and Press Enter.



You will see that the command given is launched. With this, we end our tutorial on how to install Python. You have learned how to download python for windows into your respective operating system.

Note: Unlike Java, Python doesn't need semicolons at the end of the statements otherwise it won't work.

7.1.2 Introduction to Streamlit frame work

Streamlit is a free and open-source framework to rapidly build and share beautiful machine learning and data science web apps. It is a Python-based library specifically designed for machine learning engineers. Data scientists or machine learning engineers are not web developers and they're not interested in spending weeks learning to use these frameworks to build web apps. Instead, they want a tool that is easier to learn and to use, as long as it can display data and collect needed parameters for modeling. Streamlit allows you to create a stunning-looking application with only a few lines of code.

7.1.3 Python libraries:

Numpy

Numpy is a general-purpose array-processing package. It provides a high- performance

- A powerful N-dimensional array object
- Sophisticated (broadcasting) functions
- Tools for integrating C/C++ and Fortran code
- Useful linear algebra, Fourier transform, and random number

multidimensional array object, and tools for working with these arrays.

It is the fundamental package for scientific computing with Python. It contains various features including these important ones:

Besides its obvious scientific uses, Numpy can also be used as an efficient multi-dimensional container of generic data. Arbitrary data-types can be defined using Numpy which allows Numpy to seamlessly and speedily integrate with a wide variety of databases.

Pandas

Pandas is an open-source Python Library providing high-performance data manipulation and analysis tool using its powerful data structures. Python was majorly used for data mugging and preparation. It had very little contribution Towards data analysis. Pandas solved this problem. Using Pandas, we can accomplish five typical steps in the processing and analysis of data, regardless of the origin of data load, prepare, manipulate, model, and analyze. Python with

Pandas is used in a wide range of fields including academic and commercial domains including finance, bioinformatics, and data science.

Matplotlib

Matplotlib is a Python 2D plotting library which produces publication quality figures in a variety of hardcopy formats and interactive environments across platforms. Matplotlib can be used in Python scripts, the Python and IPython shells, the Jupyter Notebook, web application servers, and four graphical user interface toolkits. Matplotlib tries to make easy things easy and hard things possible. You can generate plots, histograms, power spectra, bar charts, error charts, scatter plots, etc., with just a few lines of code. For examples, see the sampleplots and thumbnail gallery.

For simple plotting the pyplot module provides a MATLAB-like interface, particularly when combined with IPython. For the power user, you have full control of line styles, font properties, axes properties, etc, via an object-oriented interface or via a set of functions familiar to MATLAB users.

Streamlit

Streamlit is an open-source Python library used to create web applications for machine learning, data science, and other data-intensive tasks. It simplifies the process of building interactive web apps by allowing developers to create them directly from Python scripts, without needing to write HTML, CSS, or JavaScript code. With Streamlit, you can easily visualize data, build dashboards, and share your projects with others.

Json

JSON stands for JavaScript Object Notation. It's a lightweight data interchange format that is easy for humans to read and write and easy for machines to parse and generate. It's commonly used for transmitting data between a server and a web application as an alternative to XML. JSON is built on two structures:

1. A collection of key/value pairs (similar to a dictionary in Python).
2. An ordered list of values (similar to an array in Python).

It's widely used in web development for sending data between a client and a server and is supported by most programming languages.

Os

The os module provides a way of using operating system-dependent functionality. It allows you to interact with the operating system in a platform-independent manner, such as accessing the file system, working with environment variables, and executing system commands.

Some common tasks you can accomplish using the os module include:

1. File and directory operations: Creating, deleting, renaming files or directories, checking file existence, etc.
2. Environment variables: Accessing and modifying environment variables.
3. Process management: Interacting with processes, executing system commands, etc.
4. Miscellaneous operating system-related functions.

Docx

The "docx" module is a third-party library used for creating, reading, and manipulating Microsoft Word .docx files. This module allows you to programmatically work with Word documents, including tasks such as extracting text, formatting, adding tables, images, and more. It's a useful tool for automating tasks involving Word documents, such as generating reports, updating templates, or extracting data from documents.

Pdfplumber

Pdfplumber is a Python library used for extracting text and metadata from PDF documents. It provides functionality to parse PDF files, extract text, and perform other operations such as extracting tables and images from PDFs. It's often used in data extraction tasks where the input data is stored in PDF format, such as in document processing, data mining, or data analysis projects. With pdfplumber, you can programmatically access and manipulate the content of PDF files using Python code.

matplotlib.colors

colors. A module for converting numbers or color arguments to RGB or RGBA. RGB and RGBA are sequences of, respectively, 3 or 4 floats in the range 0-1. This module includes functions and classes for color specification conversions, and for mapping numbers to colors in a 1-D array of colors called a colormap.

Operator

The operator module in Python provides functions that correspond to built-in operations, such as arithmetic or comparison. You can use it to write more concise and readable code, especially with functions like itemgetter and attrgetter for sorting or retrieving specific elements from data structures.

Nltk

NLTK stands for Natural Language Toolkit. It's a popular Python library for working with human language data, providing easy-to-use interfaces to over 50 corpora and lexical resources such as WordNet, along with a suite of text processing libraries for classification, tokenization, stemming, tagging, parsing, and more.

String

The string module in Python provides a collection of constants representing ASCII characters and common string operations. It includes constants like ascii_letters, digits, punctuation, and functions like capwords() for capitalizing words in a string, and Template for string templates.

Openai

OpenAI doesn't have an official Python module, but it provides APIs for accessing its various models and services. You can interact with OpenAI's APIs using libraries like OpenAI's Python library, which provides a convenient interface for accessing GPT models and other tools. You can install it via pip: pip install openai.

7.1.4 Technology/Algorithm Used:

Machine Learning (ML) and Natural Language Processing (NLP)

Analyze skill-related data

Extract meaningful information from text

Data Mining and Data Analytics

Discover patterns and correlations

Derive actionable insights

Graph Theory and Network Analysis

Model relationships between skills, occupations, and industries

Identify skill clusters and pathways

Recommendation Systems

Match individuals with suitable career paths

Hybrid approaches for personalized recommendations

7.1.5 Visual Studio

Introduction

Vscode is short for **Visual Studio Code**. It is a strong **code editor** that is **open-source** developed via **Microsoft**. **Visual Studio Code** contains **built-in support** for debugging, snippets, code refactoring, integrated terminal, code completion, syntax highlighting, and

embedded Git control. **Vscode** is cross-platform and available on **macOS**, **Linux**, and **Windows**.

We can install **vscode** as the **deb package** using **Microsoft repositories** or **snap package** using the **Snapcraft store**. Also, we can select the method of installation that is most convenient for our environment.

The recommended and easiest way for installing vscode On Ubuntu systems is to set up the repository of vscode and install the package of vscode using the command-line or terminal.

Visual Studio Code incorporates the power and simplicity of a classic code editor that supports a debugging experience and integrated navigation lacking the requirements of a fully featured Integrated Development Environment (or IDE) like the famous Visual Studio IDE. Vscode is established on the architecture that offers excellent code analysis support of our C# code.

The vision of Microsoft with vscode is to give a cross-platform, fast, and simple code editor for creating cloud and web applications. Vscode has every standard feature we would want a contemporary code editor (refactoring, code navigation, code assistance, etc.) to have with the best support for TypeScript, Node.js, and ASP.Net.

7.2 Source code:

7.2.1 Python Code:

```
import streamlit as st
import json
import os
import numpy as np
from docx import Document
import pdfplumber
import matplotlib.colors as mcolors
from operator import index
import pandas as pd
import plotly.express as px
import plotly.graph_objects as go
import nltk
from nltk.tokenize import word_tokenize
from nltk.corpus import stopwords
from nltk.probability import FreqDist
import string
from dotenv import load_dotenv
import docx
from PIL import Image
from openai import OpenAI
import os
```

```

import nltk
load_dotenv()

@st.cache_resource
def download_resource():
    nltk.download("punkt")
    nltk.download("stopwords")

session_state = st.session_state
if "user_index" not in st.session_state:
    st.session_state["user_index"] = 0

download_resource()

def signup(json_file_path="data.json"):
    st.title("Signup Page")
    with st.form("signup_form"):
        st.write("Fill in the details below to create an account:")
        name = st.text_input("Name:")
        username = st.text_input("username:")
        age = st.number_input("Age:", min_value=0, max_value=120)
        sex = st.radio("Sex:", ("Male", "Female", "Other"))
        password = st.text_input("Password:", type="password")
        confirm_password = st.text_input("Confirm Password:", type="password")

    if st.form_submit_button("Signup"):
        if password == confirm_password:
            user = create_account(
                name, username, age, sex, password, json_file_path
            )
            session_state["logged_in"] = True
            session_state["user_info"] = user
        else:
            st.error("Passwords do not match. Please try again.")

def check_login(username, password, json_file_path="data.json"):
    try:
        with open(json_file_path, "r") as json_file:
            data = json.load(json_file)

        for user in data["users"]:
            if user["username"] == username and user["password"] == password:
                session_state["logged_in"] = True
                session_state["user_info"] = user
                st.success("Login successful!")
                return user
    
```

```

        st.error("Invalid credentials. Please try again.")
        return None
    except Exception as e:
        st.error(f'Error checking login: {e}')
        return None

def initialize_database(json_file_path="data.json"):
    try:
        # Check if JSON file exists
        if not os.path.exists(json_file_path):
            # Create an empty JSON structure
            data = {"users": []}
            with open(json_file_path, "w") as json_file:
                json.dump(data, json_file)
    except Exception as e:
        print(f'Error initializing database: {e}')

def create_account(name, username, age, sex, password, json_file_path="data.json"):
    try:
        # Check if the JSON file exists or is empty
        if not os.path.exists(json_file_path) or os.stat(json_file_path).st_size == 0:
            data = {"users": []}
        else:
            with open(json_file_path, "r") as json_file:
                data = json.load(json_file)
                username = username.lower()

        # Append new user data to the JSON structure
        user_info = {
            "name": name,
            "username": username,
            "age": age,
            "sex": sex, "password": password, "resume": None,
            "job_description": None,
            "job_applied": None,
            "score": "0",
            "questions": None,
        }
        data["users"].append(user_info)

        # Save the updated data to JSON
        with open(json_file_path, "w") as json_file:
            json.dump(data, json_file, indent=4)

        st.success("Account created successfully! You can now login.")
    
```

```

        return user_info
    except json.JSONDecodeError as e:
        st.error(f"Error decoding JSON: {e}")
        return None
    except Exception as e:
        st.error(f"Error creating account: {e}")
        return None

def login(json_file_path="data.json"):
    st.title("Login Page")
    username = st.text_input("Username:")
    password = st.text_input("Password:", type="password")

    login_button = st.button("Login")

    if login_button:
        username = username.lower()
        user = check_login(username, password, json_file_path)
        if user is not None:
            session_state["logged_in"] = True
            session_state["user_info"] = user
        else:
            st.error("Invalid credentials. Please try again.")

def get_user_info(username, json_file_path="data.json"):
    try:
        with open(json_file_path, "r") as json_file:
            data = json.load(json_file)
            for user in data["users"]:
                if user["username"] == username:
                    return user
    return None
    except Exception as e:
        st.error(f"Error getting user information: {e}")
        return None

def render_dashboard(user_info, json_file_path="data.json"):
    try:
        st.title(f"Welcome to the Dashboard, {user_info['name']}!")
        st.subheader("User Information:")
        st.write(f"Name: {user_info['name']}")
        st.write(f"Sex: {user_info['sex']}")
        st.write(f"Age: {user_info['age']}")

        if user_info["resume"] is not None:
            st.subheader("Resume:")
            st.write(user_info["resume"])
    
```

```

if user_info["job_description"] is not None:
    st.subheader("Job Applied:")
    st.write(user_info["job_description"])

except Exception as e:
    st.error(f'Error rendering dashboard: {e}')

def extract_text(file) -> str:
    if isinstance(file, str):
        file_extension = os.path.splitext(file)[1].lower()
    else:
        file_extension = os.path.splitext(file.name)[1].lower()

    if file_extension == ".pdf":
        if isinstance(file, str):
            with pdfplumber.open(file) as pdf:
                text = "\n".join(
                    page.extract_text() for page in pdf.pages if page.extract_text()
                )
        else:
            with pdfplumber.open(file) as pdf:
                text = "\n".join(
                    page.extract_text() for page in pdf.pages if page.extract_text()
                )
    elif file_extension == ".docx":
        if isinstance(file, str):
            doc = docx.Document(file)
        else:
            doc = docx.Document(file)
        text = "\n".join([para.text for para in doc.paragraphs])
    else:
        if isinstance(file, str):
            with open(file, "r", encoding="utf-8", errors="ignore") as f:
                text = f.read()
        else:
            with file as f:
                text = f.read()
    return text

def process_text(text):
    tokens = word_tokenize(text)
    tokens = [word.lower() for word in tokens if word.isalpha()]
    stop_words = set(stopwords.words("english"))
    tokens = [word for word in tokens if word not in stop_words]
    return tokens

```

```

def calculate_score(job_description_tokens, resume_tokens):
    job_description_freq = FreqDist(job_description_tokens)
    total_tokens_in_job_description = len(job_description_tokens)
    resume_tokens = list(set(resume_tokens))
    score = sum(job_description_freq[token] for token in resume_tokens)
    score_percentage = (score / total_tokens_in_job_description) * 100
    return score_percentage

def extract_keywords_from_resume(resume_text):
    resume_text = resume_text.lower()
    resume_tokens = word_tokenize(resume_text)
    resume_tokens = [
        token for token in resume_tokens if token not in string.punctuation
    ]
    stop_words = set(stopwords.words("english"))
    resume_tokens = [token for token in resume_tokens if token not in stop_words]
    processed_resume_text = " ".join(resume_tokens)
    client =
        OpenAI( api_key=os.environ.get("OPENAI_API_KEY"),
    )
    prompt = f'Extract top most important skill keywords from the given resume text. Separate the skills with comma.\n{processed_resume_text}\nKeywords:'
    messages = [{"role": "system", "content": prompt}]
    response = client.chat.completions.create(
        messages=messages,
        model="gpt-3.5-turbo",
    )
    return response.choices[0].message.content.split(",")

def suggested_skills(resume_text):
    client = OpenAI(
        api_key=os.environ.get("OPENAI_API_KEY"),
    )
    prompt = f"""Extract top skills that are not mentioned in the resume but are relevant to tech jobs.
\n{resume_text}\nMissing Keywords:"""
    messages = [{"role": "system", "content": prompt}]
    response = client.chat.completions.create(
        messages=messages,
        model="gpt-3.5-turbo",
    )
    return response.choices[0].message.content.split(",")

def resume_score(resume_text):
    client = OpenAI(api_key=os.environ.get("OPENAI_API_KEY"))
    prompt = f"""Analyze the provided resume text to generate a score reflecting the candidate's skills and experience, rated out of 100. Only return the score as an integer. Do not include any other information in the response. Only return the score as an integer."""

```

```

Resume Text:
\n{resume_text}"""
messages = [{"role": "system", "content": prompt}]
response = client.chat.completions.create(
    messages=messages,
    model="gpt-3.5-turbo",
)
return response.choices[0].message.content

def suggestions(resume_text):
    client = OpenAI(api_key=os.environ.get("OPENAI_API_KEY"))
    prompt = f"""Analyze the provided resume text. Highlight the candidate's skills and experience, and suggest improvements to make the resume more appealing to potential employers.

Task:
1. Analyze the resume text to identify the candidate's skills and experience and provide a brief summary.
2. Suggest improvements to make the resume more appealing to potential employers.
For each skill or experience mentioned in the resume, provide a brief explanation or example to demonstrate the candidate's proficiency or relevance to the job.

Resume Text:
\n{resume_text}"""
    messages = [{"role": "system", "content": prompt}]
    response = client.chat.completions.create(
        messages=messages,
        model="gpt-3.5-turbo",
    )
    return response.choices[0].message.content

def evaluate_interview(resume_text, job_description_text, candidate_name, questions, responses):
    client = OpenAI(api_key=os.environ.get("OPENAI_API_KEY"))
    question_responses = "\n".join(
        f"Q: {question}\nA: {response}\n" for question, response in zip(questions, responses)
    )
    prompt = f"""Evaluate the candidate's responses to the interview questions based on the provided resume and job description. Rate the candidate's performance on a scale of 0 to 100, with 0 being the lowest and 100 being the highest. Provide feedback on the candidate's strengths and areas for improvement.

Format: Score: Score \n Feedback: Feedback (Detailed feedback on the candidate's performance and areas for improvement)

```

Resume: {resume_text}

Job Description: {job_description_text}

Candidate Name: {candidate_name}

Interview Questions:

{question_responses}

.....

```
messages = [{"role": "system", "content": prompt}]
response = client.chat.completions.create(
    messages=messages,
    model="gpt-3.5-turbo",
)
result = response.choices[0].message.content
score = result.split("Score: ")[1].split("Feedback: ")[0].strip()
feedback = result.split("Feedback: ")[1].strip()
return int(score), feedback

def generate_question(resume_text,
                     job_description_text,
                     candidate_name,
                     previous_response=None,
                     previous_question=None,
                     ):
    prompt = f'Resume Text: {resume_text}\nJob Description: {job_description_text}\nCandidate Name: {candidate_name}\n'
    if previous_response and previous_question:
        prompt += f'Previous Response: {previous_response}\nPrevious Question: {previous_question}\n'
    client = OpenAI(
        api_key=os.environ.get("OPENAI_API_KEY"),
    )
    messages = [
        {"role": "system", "content": "You are the interviewer."},
        {
            "role": "system",
            "content": "You are interviewing a candidate. Ask a question based on the resume and job description. If the candidate has already answered a question, you can ask a follow-up question based on their response.",
        },
        {"role": "user", "content": prompt},
    ]
    response =
        client.chat.completions.create( message
s=messages,
model="gpt-3.5-turbo",
```

```

)
return response.choices[0].message.content

def main(json_file_path="data.json"):
    st.sidebar.title("Resume Screening system")
    page = st.sidebar.selectbox(
        "Go to",
        (
            "Signup/Login",
            "Dashboard",
            "Resume Analysis",
            "Apply for a job",
            "Generate Questions",
            "Candidate Evaluation",
            "Logout",
        ),
        key="GET YOUR RESUME ANALYZED AND COMPARED",
    )

if page == "Signup/Login":
    st.title("Signup/Login Page")
    login_or_signup = st.radio(
        "Select an option", ("Login", "Signup"), key="login_signup"
    )
    if login_or_signup == "Login":
        login(json_file_path)
    else:
        signup(json_file_path)

elif page == "Dashboard":
    if session_state.get("logged_in"):
        user_info = session_state["user_info"]
        render_dashboard(user_info, json_file_path)
    else:
        st.warning("Please login/signup to view the dashboard.")

elif page == "Resume Analysis":
    if session_state.get("logged_in"):
        st.title("Upload resume for analysis")
        uploaded_file = st.file_uploader("Choose a file", type=None)
        if uploaded_file is not None:
            resume_text = extract_text(uploaded_file)
            st.write("File name: ", uploaded_file.name)
            st.success("File uploaded successfully!")
            # st.image(Image.open("Images/logo.png"), use_column_width=True)
            with open(json_file_path, "r+") as json_file:
                data = json.load(json_file)
                user_index = next(
                    (
                        i
                    )
                )

```

```

        for i, user in enumerate(data["users"])
            if user["username"]
                == session_state["user_info"]["username"]
            ),
            None,
        )
        if user_index is not None:
            user_info = data["users"][user_index]
            user_info["resume"] = resume_text
            session_state["user_info"] = user_info
            json_file.seek(0)
            json.dump(data, json_file, indent=4)
            json_file.truncate()
        else:
            st.error("User not found.")
        resume_keywords = extract_keywords_from_resume(resume_text)
        st.subheader("Skills of the candidate:")
        # use st.multiselect to display the keywords
        skills = st.multiselect("Candidate Skills", resume_keywords, resume_keywords)
        score = resume_score(resume_text)
        suggestions_improvements = suggestions(resume_text)
        st.subheader("Resume Score")
        if score >= 60:
            st.success(
                f"Congratulations! Your resume score is {score}. Your resume is well-matched
for technical roles"
            )
        elif score >= 20:
            st.warning(
                f"Your resume score is {score}. Your resume is not well-matched for technical
roles. Consider improvements."
            )
        else:
            st.error(
                f"Your resume score is {score}. Your resume is not well-matched for technical
roles. Consider significant improvements."
            )
        percentage_score = score / 100
        percentage_remainder = 1 - percentage_score

        # Create a Plotly figure for the pie chart
        fig = go.Figure(
            data=[
                go.Pie(
                    labels=["Matched", "Unmatched"],
                    values=[percentage_score, percentage_remainder],
                    hole=0.3,
                    marker_colors=["rgba(0, 128, 0, 0.7)", "rgba(255, 0, 0, 0.7)"],
                )
            ]
        )
    
```

```

)
fig.update_layout(title_text="Resume Score")

# Display the chart
st.plotly_chart(fig)
st.subheader("Skills and Experience:")
st.write(suggestions_improvements)
skills_not_mentioned = suggested_skills(resume_text)
st.subheader("Top recommended skills:")
skills = st.multiselect("Recommended Skills", skills_not_mentioned,
skills_not_mentioned)
st.subheader("How does your resume compare with other candidates?")
scores = [
    int(user["score"])
    for user in data["users"]
]
# Plot an interactive graph
fig = go.Figure()
fig.add_trace(
    go.Histogram( x=score
        s,
        histnorm="percent",
        marker_color="rgba(0, 0, 255, 0.7)",
        opacity=0.75,
    )
)

fig.update_layout( title_text=f"Distributio
n of Scores", xaxis_title="Resume
Score", yaxis_title="Percentage of
Candidates", bargap=0.05,
)
st.plotly_chart(fig)

else:
    st.warning("Please login/signup to view the dashboard.")

elif page == "Apply for a job":
    if session_state.get("logged_in"):
        st.title("Apply for a job")
        st.subheader("Select a role to you want to apply for:")

        BASE_DIR = "Data\\JobDesc\\"
        job_description = st.selectbox(
            "Select a role",
            [
                "-Select-",

```

```

    "Backend Developer",
    "Billing cum Logistics Manager",
    "Data Scientist",
    "Director of Engineering",
    "Global Industry Content Manager",
    "HTML Developer",
    "IT Project Manager",
    "Lead Technical Program Manager",
    "Primary English Teacher",
    "Revenue Reporting Data Analyst",
    "Senior Product Manager",
    "Senior Software Developer",
    "Web Developer",
    "Web_dev_job",
],
key="job_description",
)
if job_description and job_description != "-Select-":
    file_path = os.path.join(BASE_DIR, f'{job_description}.docx')
    job_description_text = extract_text(file_path)
    st.subheader("Job Description:")
    st.write(job_description_text)
    if st.button("Apply"):
        with open(json_file_path, "r+") as json_file:
            data = json.load(json_file)
            user_index = next((i for i, user in enumerate(data["users"]) if user["username"] == session_state["user_info"]["username"]), None)
            if user_index is not None:
                user_info = data["users"][user_index]
                user_info["job_description"] = job_description_text
                user_info["job_applied"] = job_description
                session_state["user_info"] = user_info
                json_file.seek(0)
                json.dump(data, json_file, indent=4)
                json_file.truncate()
            else:
                st.error("User not found.")
        st.success("Job application submitted successfully!")
    else:
        st.warning("Please login/signup to view the dashboard.")
elif page == "Generate Questions":
    if session_state.get("logged_in"):
        user_info = session_state["user_info"]
        st.title("Give your interview")
        st.write("Answer the questions below to complete the interview.")
        with open(json_file_path, "r") as json_file:
            data = json.load(json_file)
            user_index = next(
                (
                    i

```

```

        for i, user in enumerate(data["users"])
            if user["username"] == session_state["user_info"]["username"]
),
None,
)
if(
    session_state["user_info"]["resume"] is None
    or session_state["user_info"]["job_description"] is None
):
    st.warning(
        "Please upload your resume and apply for a job to generate interview questions."
    )
    return
st.markdown("### Interview Questions")

if "messages" not in st.session_state:
    st.session_state.messages = []

if user_info["questions"] is None:
    previous_response = None
    previous_question = None
else:
    previous_response = user_info["questions"][-1]["response"]
    previous_question = user_info["questions"][-1]["question"]
if user_info["questions"] is not None and len(user_info["questions"]) > 0:
    for questions in user_info["questions"]:
        st.chat_message("Interviewer", avatar="🧑‍💻").write(questions["question"])
        st.chat_message("Applicant", avatar="👤").write(questions["response"])

question =
    generate_question( session_state["user_info"]["resu
    me"], session_state["user_info"]["job_description"],
    session_state["user_info"]["name"],
    previous_response,
    previous_question,
)
with st.chat_message("Interviewer", avatar="  "):
    st.markdown(question)

if prompt := st.chat_input("Enter your response here", key="response"):
    with st.chat_message("Applicant", avatar="👤"):
        st.markdown(prompt)

    with open(json_file_path, "r") as json_file:
        data = json.load(json_file)
        user_index =
            next((
                i
                for i, user in enumerate(data["users"]))

```

```

        if user["username"] == session_state["user_info"]["username"]
    ),
    None,
)
if user_index is not None:
    user_info = data["users"][user_index]
    if user_info["questions"] is None:
        user_info["questions"] = []
    user_info["questions"].append(
        {"question": question, "response": prompt}
    )
    session_state["user_info"] = user_info
    json_file.seek(0)
    json.dump(data, json_file, indent=4)
    json_file.truncate()
else:
    st.error("User not found.")

st.rerun()

if st.button("Finish Interview"):
    with open(json_file_path, "r+") as json_file:
        data = json.load(json_file)
        user_index =
            next(
                i
                for i, user in enumerate(data["users"])
                if user["username"]
                == session_state["user_info"]["username"]
            ),
            None,
)
    if user_index is not None:
        user_info = data["users"][user_index]
        session_state["user_info"] = user_info
        json_file.seek(0)
        json.dump(data, json_file, indent=4)
        json_file.truncate()
    else:
        st.error("User not found.")
    st.success("Interview questions completed successfully!")
    return

else:
    st.warning("Please login/signup to give your interview.")

elif page == "Candidate Evaluation":
    if session_state.get("logged_in"):
        user_info = session_state["user_info"]
        st.title("Candidate Evaluation based on Resume and Interview")

```

```

st.write("Evaluate the candidate's responses to the interview questions.")
questions = [user_info["questions"][i]["question"] for i in
range(len(user_info["questions"]))]
responses = [user_info["questions"][i]["response"] for i in
range(len(user_info["questions"]))]
score, feedback =
    evaluate_interview( user_info["resume"],
user_info["job_description"],
user_info["name"],
questions,
responses,
)
st.write(f"Score: {score}")
percentage_score = score / 100
percentage_remainder = 1 - percentage_score

# Create a Plotly figure for the pie chart
fig = go.Figure(
    data=[
        go.Pie(
            labels=["Matched", "Unmatched"],
            values=[percentage_score, percentage_remainder],
            hole=0.3,
            marker_colors=["rgba(0, 128, 0, 0.7)", "rgba(255, 0, 0, 0.7)"],
        )
    ]
)
fig.update_layout(title_text="Resume Score")

# Display the chart
st.plotly_chart(fig)

for (question, response) in zip(questions, responses):
    st.markdown(f"##### Question:")
    st.write(question)
    st.markdown(f"##### Response:")
    st.write(response)
    st.subheader("Feedback:")
    st.markdown(f"{{feedback}}")

elif page == "Logout":
    st.title("Logout")
    if st.button("Logout"):
        session_state["logged_in"] = False
        session_state["user_info"] = None
        st.success("You have been logged out successfully.")
        st.image("Images\logo.png", use_column_width=True)

if __name__ == "__main__":
    initialize_database()
    main()

```

7.2.2 data.json:

```
{  
  "users": [  
    {  
      "name": "Vangapandu Chandrika",  
      "username": "chandrika",  
      "age": 12,  
      "sex": "Female",  
      "password": "12345",  
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portal\nDelivering company orientation training to the new joinees.\nExecutive and gather all the employees attendance and leaves by coordinating with all the\ndeptments manager and leaders.\nPreparing & Updating company policies and notice as per the company requirements by\nbalancing benefits to the employer and employees.\nCoordinating with the admin for accomplishing employee motivation & employee\nengagement tasks.\nPreparing statutory payroll sheet for the employee salaries & incentive payouts.\nActively enrollment and completely PF and ESI generating challan payment of all the\nemployees and submitting to finance departments for final payment.\n \n Butler Technical Services as Process Associate\nFeb 2014 to Aug 2015\nRole & Responsibilities:\n\n Collection & updating all the necessary documents information in I-Search ERP (PeopleSoft) of the colleagues & associates.\n(Time cards, benefits, garnishments withholdings, W4 withheld, Social security number ID proof etc.)\n Issuing the W2's tax forms to the employees.\n Audit & validating the time sheets and time cards of the employees with effective observation & calculating the regular, overtime and double overtime work hours with appropriate instructions by the supervisors.\n \n^ Back to Top\n \nEducation\nUG: B.A (Economics) from Kakatiya University in 2010\nPG: MBA/PGDM (HR/Industrial Relations) from Kakatiya University in 2013\n \n \n^ Back to Top\n \nIT Skills\nSkill Name\tVersion\tLast Used\tExperience\nM.S OFFICE",

"job_description": "Data Scientist/ ML Engineer\nGame Change Solutions\n-\nGurgaon, Haryana\nTemporarily remote\n\u20b920,00,000 - \u20b925,00,000 a year\nWe are looking for a data scientist that will help us discover the information hidden in vast amounts of data and help us make smarter decisions to deliver even better products. Your primary focus will be in applying data mining techniques, doing statistical analysis, and building high quality prediction systems integrated with our products. Data Scientist at GameChange must be an energetic self-starter who can quickly grasp the company\u2019s vision, develop specific tactical plans, and begin implementation upon appropriate approvals. The candidate must be resourceful and able to deliver on a plan defined.\nResponsibilities\nData Crunching and data massaging on structured and unstructured data including Numerical, Text,\nAudio and Video data\nImplementation/fine-tuning of machine learning algorithms\nConducting Data science/machine learning experiments and presenting insights\nBuilding innovative data products using cutting edge tools and technologies\nConduct data analysis independently or with limited supervision to generate business insights\nConduct diagnostic on the data to identify the improvement opportunities, design data-backed\nperformance improvement strategy, liaise with internal teams\nRecord keeping and data warehousing to enable Advanced Analytics operations for generating\nmeaningful business insights\nDevelop high quality client deliverables such as R models, Python scripts etc.\nSkills required\nExcellent understanding of machine learning techniques and algorithms, such as k-NN, Naive Bayes,\nSVM, Decision Forests, CNN, RNN, LSTM etc.\nExperience with common data science toolkits, such as R, Weka, NumPy, OpenCV, MatLab, etc.\nGreat communication skills\nExperience with data visualisation tools, such as D3.js, GGplot, etc.\nProficiency in using query languages such as SQL, Hive, Pig\nExperience with NoSQL databases, such as MongoDB, Cassandra, HBase\nGood applied statistics skills, such as distributions, statistical testing, regression, etc.\nGood scripting and programming skills\nJob Type: Full-time\nSalary: \u20b920,00,000.00 - \u20b925,00,000.00 per year\nExperience:\nData Science: 2 years (Preferred)\nWork: 1 year (Preferred)\nEducation:\nBachelor's (Preferred)\n",

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"score": "0",

"questions": [

{

 "question": "Can you walk me through a specific example of how you handled employee grievances in your role as an HR Manager at Bhavithasri Group Of Companies?",

"response": "Situation: An employee in a large corporation feels they have been passed over for promotion unfairly. They believe the decision was influenced by favoritism rather than merit."

},

{

"question": "Can you provide an example of a time when you successfully handled a challenging recruitment situation at Vivo Camera & Music as an HR Manager?",

"response": "Understand Organizational Goals: Begin by having a clear understanding of the company's strategic goals and objectives. This involves regular communication with senior management and other department heads.\nEmployee Involvement: Involve employees in the goal-setting process. This can be done through surveys, focus groups, or town hall meetings. When employees contribute to goal setting, they are more likely to be engaged and work towards those goals.\nTailored Initiatives: Design engagement initiatives that are directly linked to organizational goals. For example, if a goal is to improve customer satisfaction, an engagement initiative could be to provide customer service training to employees.\nCommunication: Clearly communicate how each engagement initiative supports the organizational goals. Employees should understand the 'why' behind each program and how their participation contributes to the bigger picture.\nFeedback Mechanisms: Implement feedback mechanisms to gauge the effectiveness of engagement initiatives. Use surveys, suggestion boxes, or regular check-ins to collect employee feedback."

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CHAPTER 8

TESTING

Discovering and fixing such problems is what testing is all about. The purpose of testing is to find and correct any problems with the final product. It's a method for evaluating the quality of the operation of anything from a whole product to a single component. The goal of stress testing software is to verify that it retains its original functionality under extreme circumstances. There are several different tests from which to pick. Many tests are available since there is such a vast range of assessment options.

Who Performs the Testing: All individuals who play an integral role in the software development process are responsible for performing the testing. Testing the software is the responsibility of a wide variety of specialists, including the End Users, Project Manager, Software Tester, and Software Developer.

When it is recommended that testing begin: Testing the software is the initial step in the process. begins with the phase of requirement collecting, also known as the Planning phase, and ends with the stage known as the Deployment phase. In the waterfall model, the phase of testing is where testing is explicitly arranged and carried out. Testing in the incremental model is carried out at the conclusion of each increment or iteration, and the entire application is examined in the final test.

When it is appropriate to halt testing: Testing the program is an ongoing activity that will never end. Without first putting the software through its paces, it is impossible for anyone to guarantee that it is completely devoid of errors. Because the domain to which the input belongs is so expansive, we are unable to check every single input.

8.1 TESTING LEVELS

8.1.1 UNIT TESTING

The Job Role Matching and Skill Assessment System for Future-Proofed Careers is essential in the rapidly evolving job market. It involves identifying the skills required for sustainable career growth and aligning them with personal strengths and interests. By leveraging unit testing practices, developers can ensure the effectiveness of tools and platforms designed to facilitate this skill correlation process.

Testcase1: Input a diverse skill set profile into the skill matching tool and verify that it accurately identifies areas of expertise and suggests relevant career paths.

Testcase2: Input a combination of hard and soft skills with varying levels of proficiency and confirm that the tool provides personalized recommendations tailored to individual skill gaps.

Testcase3: Introduce a new skill category not originally included in the tool's database and assess how it handles the addition, ensuring that it seamlessly integrates the new skill for accurate matching.

Through meticulous unit testing, developers can enhance the functionality and user experience of skill correlation tools, ultimately empowering individuals to navigate their career paths effectively and stay competitive in a rapidly changing employment landscape.

8.1.2 INTEGRATION TESTING

To ensure Job Role Matching and Skill Assessment System for future-proofed careers, the integration testing approach focuses on verifying the seamless interaction between different components of the system.

Testcase1: Skills Profiling Integration - Verify that the skills profiling process accurately identifies and assesses the skills of individuals based on designated criteria. This test ensures that data collected for skills evaluation is correctly processed and utilized for career matching.

Testcase2: Career Path Mapping Integration - Ensure that the career path mapping algorithm effectively matches individuals' skills with future-proofed career options. This test validates the accurate alignment of skills profiles with corresponding career trajectories, considering factors like industry trends and job market demands.

Testcase3: Skill Development Integration - Validate the integration of skill development resources and recommendations into the system to assist individuals in bridging any skill gaps identified during the profiling process. This test confirms that the system provides personalized and actionable insights for continuous skill enhancement and career advancement.

8.1.3 FUNCTIONAL TESTING

The Job Role Matching and Skill Assessment System for Future-Proofed Careers is essential in navigating the constantly evolving job market. This concept highlights the importance of aligning one's skillset with the demands of future careers to maintain relevance and competitiveness. In this context, it is crucial to conduct thorough functional testing to ensure the efficacy of skill matching systems.

Testcase1: Input a set of technical skills related to data analysis and ensure that the skill matching system accurately identifies job roles requiring these skills.

Testcase2: Input soft skills like communication and teamwork and verify that the system can correlate them with positions emphasizing these qualities.

Testcase3: Input a combination of emerging technologies such as AI and blockchain expertise and confirm that the system recommends roles that utilize these innovative skills effectively.

By executing these test cases and similar functional tests, developers can validate the precision and effectiveness of skill correlation systems, thus aiding individuals in pursuing future-proofed careers.

8.1.4 PYTEST

Pytest is a Python testing framework that originated from the PyPy project. It can be used to write various types of software tests, including unit tests, integration tests, end-to-end tests, and functional tests. Its features include parametrized testing, fixtures, and assert re-writing. Pytest fixtures provide the contexts for tests by passing in parameter names in test cases; its parametrization eliminates duplicate code for testing multiple sets of input and output; and its rewritten assert statements provide detailed output for causes of failures.

Pytest was developed as part of an effort by third-party packages to address Python's built-in module unit test's shortcomings. It originated as part of PyPy, an alternative implementation of Python to the standard CPython. Since its creation in early 2003, PyPy has had a heavy emphasis on testing. PyPy had unit tests for newly written code, regression tests for bugs, and integration tests using CPython's test suite. In mid-2004, a testing framework called utest emerged and contributors to PyPy began converting existing test cases to utest. Meanwhile, at Euro Python 2004 a complementary standard library for testing, named std, was invented. This package laid out the principles, such as assert rewriting, of what would later become pytest. In late 2004, the std project was renamed to py, std.utest became py.test, and the py library was separated from PyPy. In November 2010, pytest 2.0.0 was released as a package separate from py. It was still called py.test until August 2016, but following pytest 3.0.0 the recommended command line entry point became pytest. Pytest has been classified by developer security platform Snyk as one of the key ecosystem projects in Python due to its popularity. Some well-known projects who switched to pytest from unit test and nose (another testing package) include those of Mozilla and Dropbox.

Parametrized testing:

It is a common pattern in software testing to send values through test and check for correct output. In many cases, in order to thoroughly test functionalities, one needs to test multiple sets of input/output, and writing such cases separately would cause duplicate code as most of the actions would remain the same, only differing in input/output values. Pytest's parametrized testing feature eliminates such duplicate code by combining different iterations into one test case, then running these iterations and displaying each test's result separately.

Parametrized tests in pytest are marked @pytest.mark.parametrize(argnames, argvalues)Decorator, where the first parameter ,argnames, is a string of comma-separated names, and argvalues is a list of values to pass into argnames. When there are multiple names inArgnames, argvalues would be a list of tuples where values in each tuple corresponds to the names in argnames by index. The names in argnames are then passed into the test function marked by the decorator as parameters. When pytest runs such decorated tests, each pair of argnames and argvalues would constitute a separate run with its own test output and unique identifier. The identifier can then be used to run individual data pairs.

8.2 TESTING METHODS

8.2.1 BLACK BOX TESTING

The Job Role Matching and Skill Assessment System for future-proofed careers are vital in today's rapidly evolving job market. To ensure the accuracy and effectiveness of a system designed for this purpose, black box testing is essential.

Testcase1: Input-output testing - Provide the system with a variety of skill sets and career preferences as input and verify that it accurately matches individuals with suitable future-proofed careers based on the generated output.

Testcase2: Boundary value testing - Test the system's capability to handle extreme cases, such as individuals with rare or unconventional skill sets, and ensure that it still provides relevant and accurate career recommendations.

Testcase3: Equivalence partitioning - Categorize input data into different groups based on skill levels or career interests and validate that the system can appropriately match individuals to suitable career paths within each category.

By conducting these test cases, the black box testing will help ensure that the system for correlating and matching skills for future-proofed careers functions correctly and provides valuable recommendations to users.

8.2.2 WHITE BOX TESTING

The Job Role Matching and Skill Assessment System for future-proofed careers involve evaluating skills in demand with those possessed by individuals to guide career choices. White box testing can be applied to assess the accuracy and efficiency of such a system.

Testcase1: Verify that the algorithm used for correlating skills accurately matches the relevant skills based on input data and criteria provided by the user.

Testcase2: Ensure that the system can identify transferable skills and suggest potential future-proofed career paths that align with an individual's current skill set and market demands.

Testcase3: Validate that the system can adapt to changing industry trends and continuously update its recommendations to ensure relevance and accuracy for long-term career planning.

By thoroughly testing the correlation and matching skills system using white box testing, one can ensure its robustness and reliability in assisting individuals in making informed decisions for future-proofed careers.

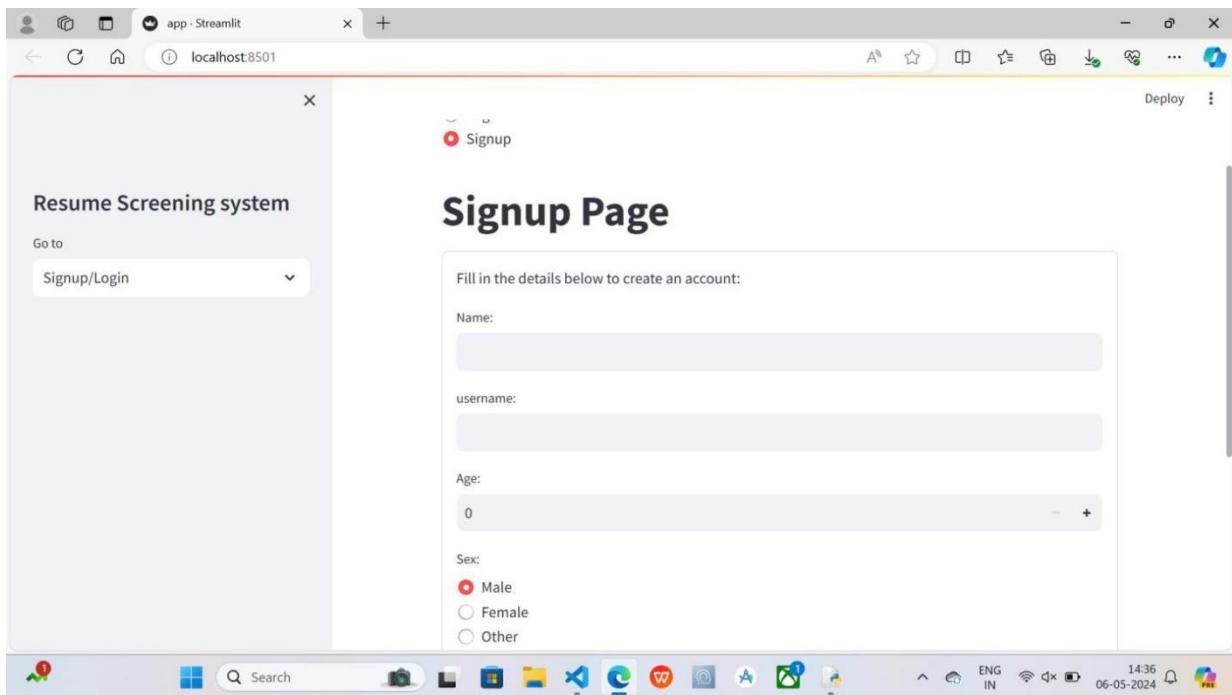
CHAPTER 9

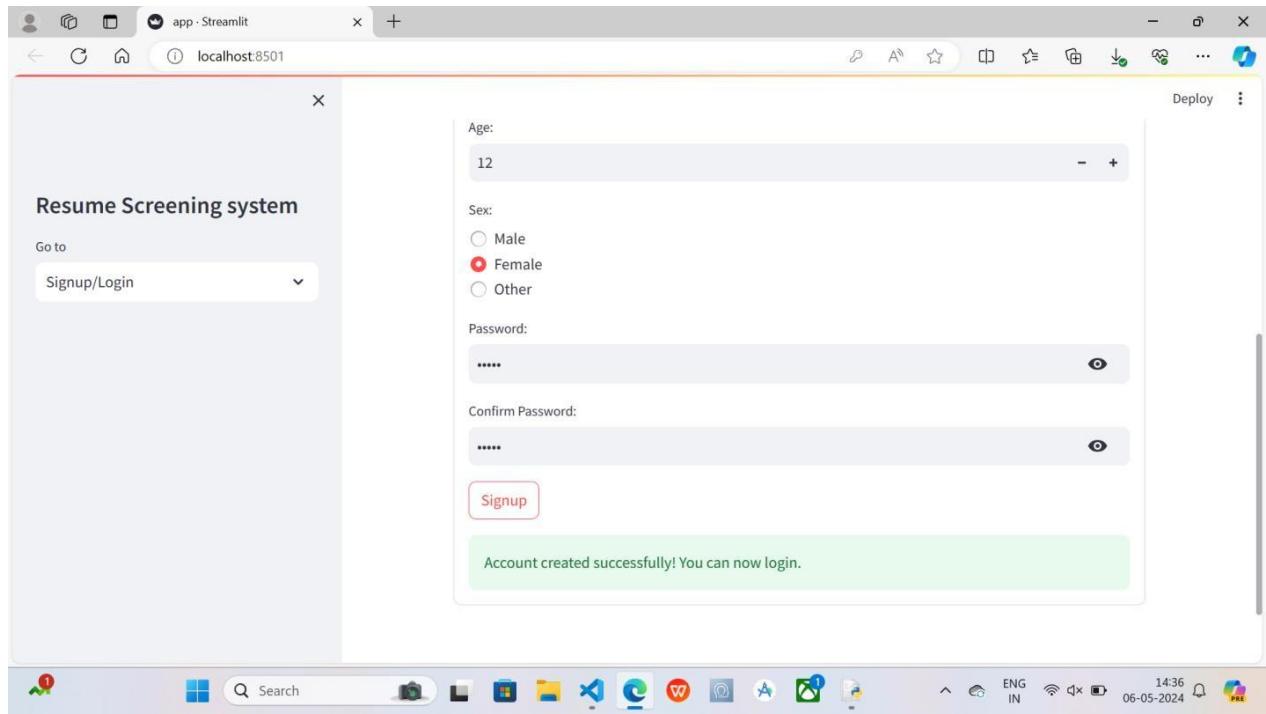
OUTPUT SCREENS

Introduction:

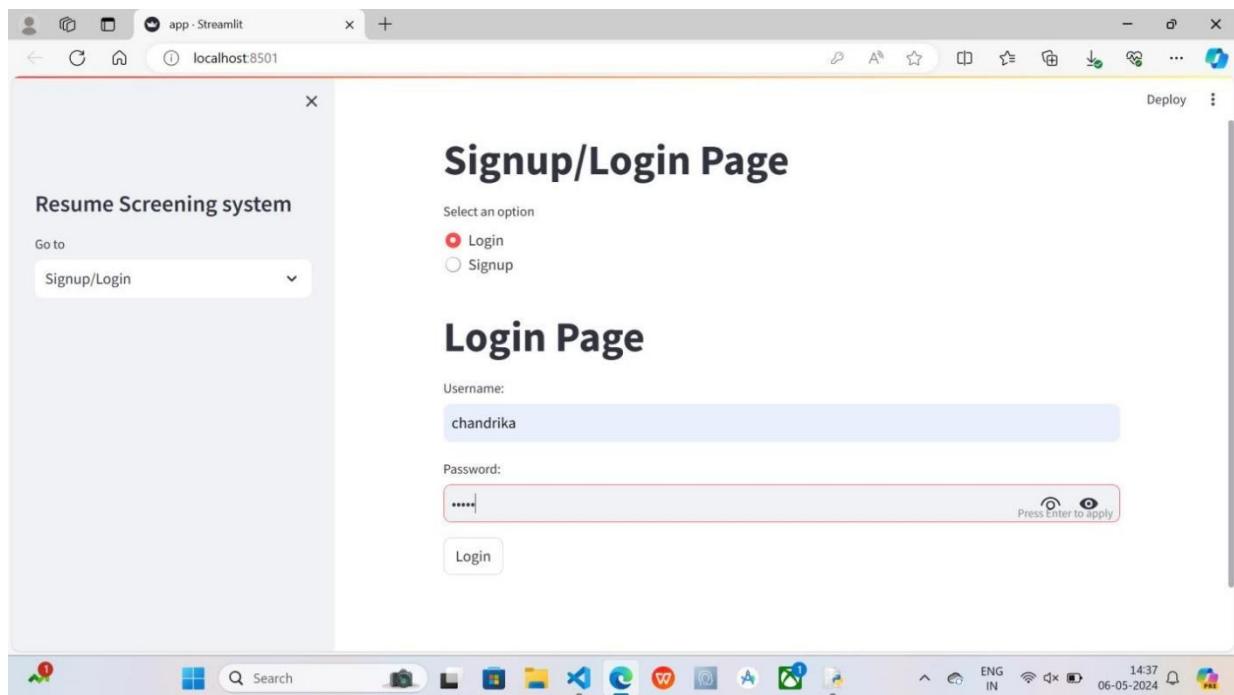
The Job Role Matching and Skill Assessment System of skills for future-proofed careers represent a crucial endeavor in today's rapidly evolving job market. This initiative aims to empower individuals with the insights and tools necessary to navigate their career paths strategically. By analyzing the correlation between skills and emerging job trends, individuals can make informed decisions about skill development and career transitions, ensuring their long-term relevance and employability. This introduction sets the stage for exploring the system's functionalities, user interface, and performance evaluation through screenshots and test cases.

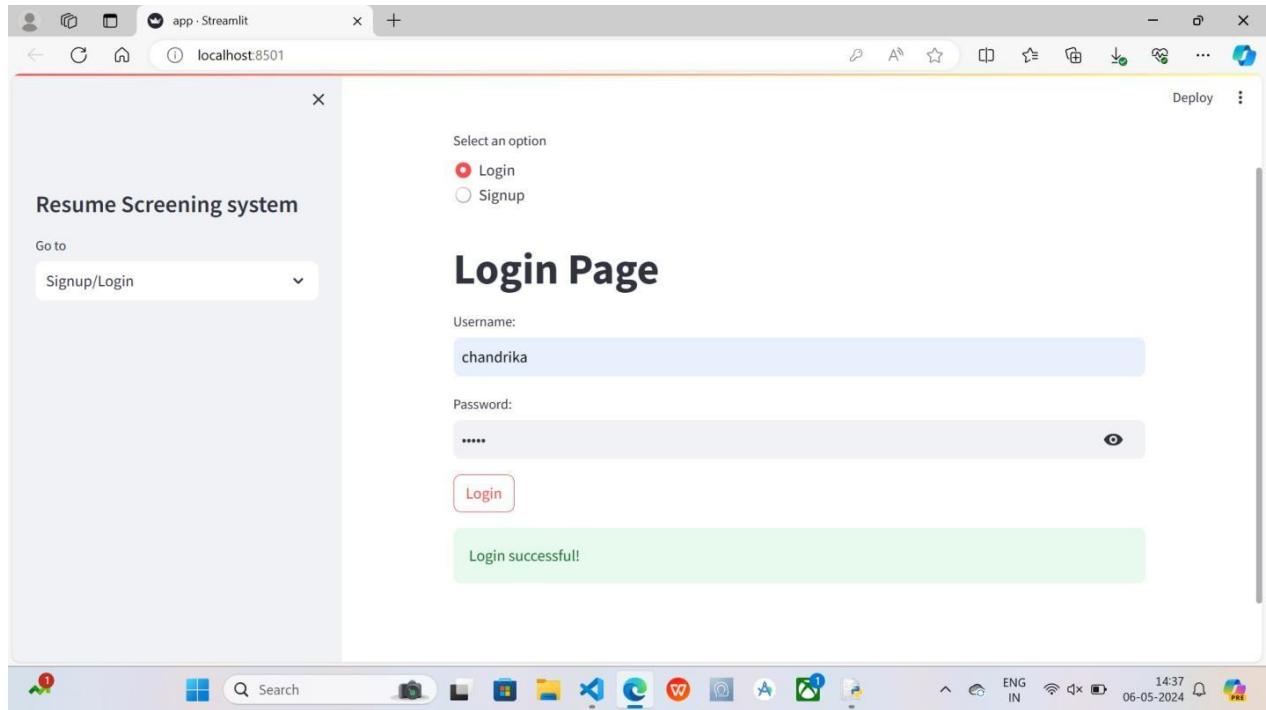
9.1 Signup



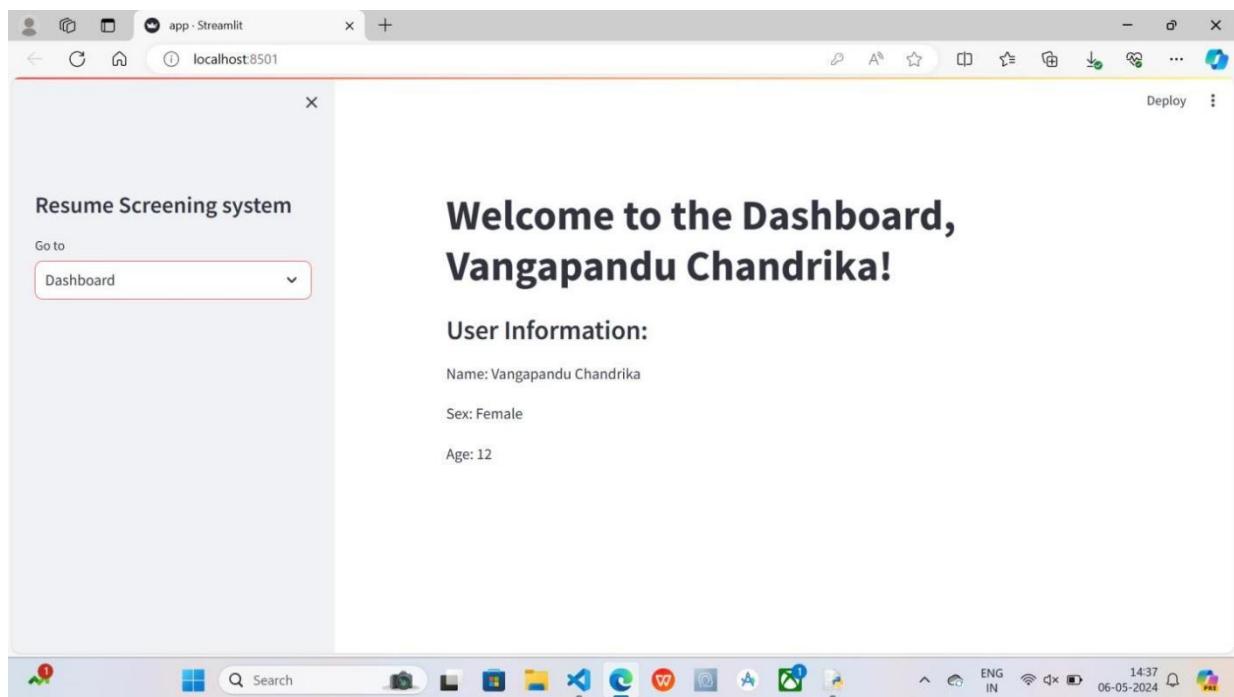


9.2 Login page

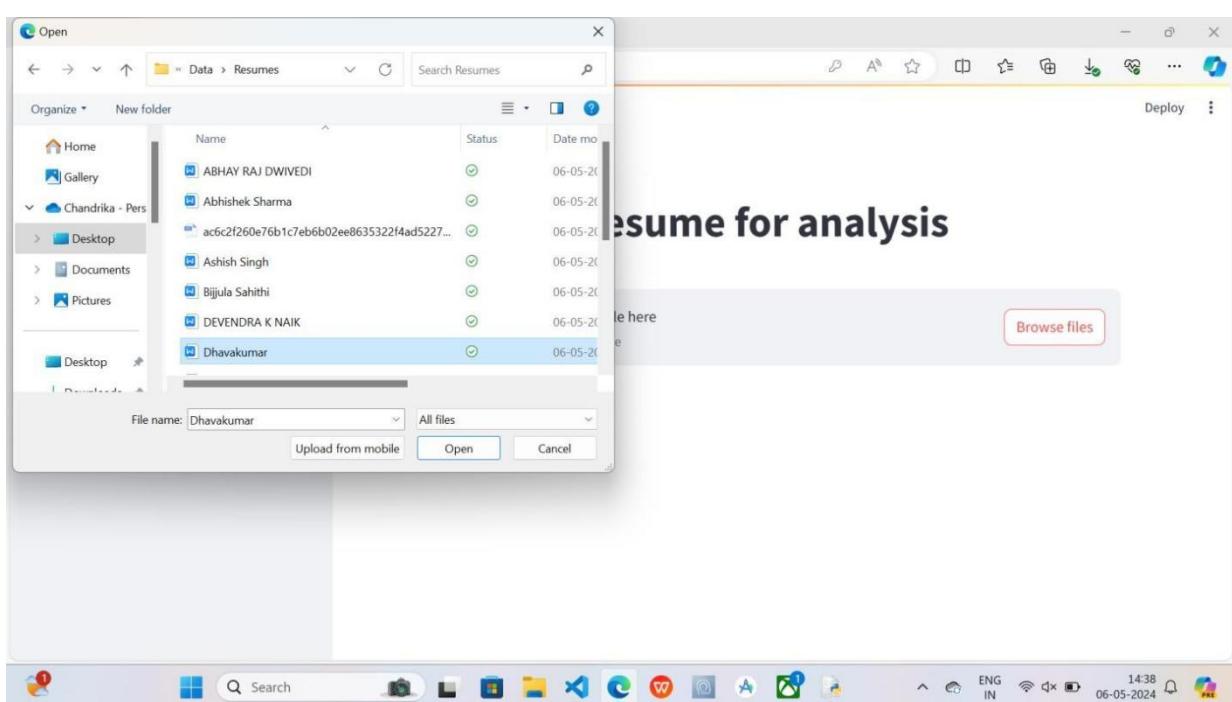
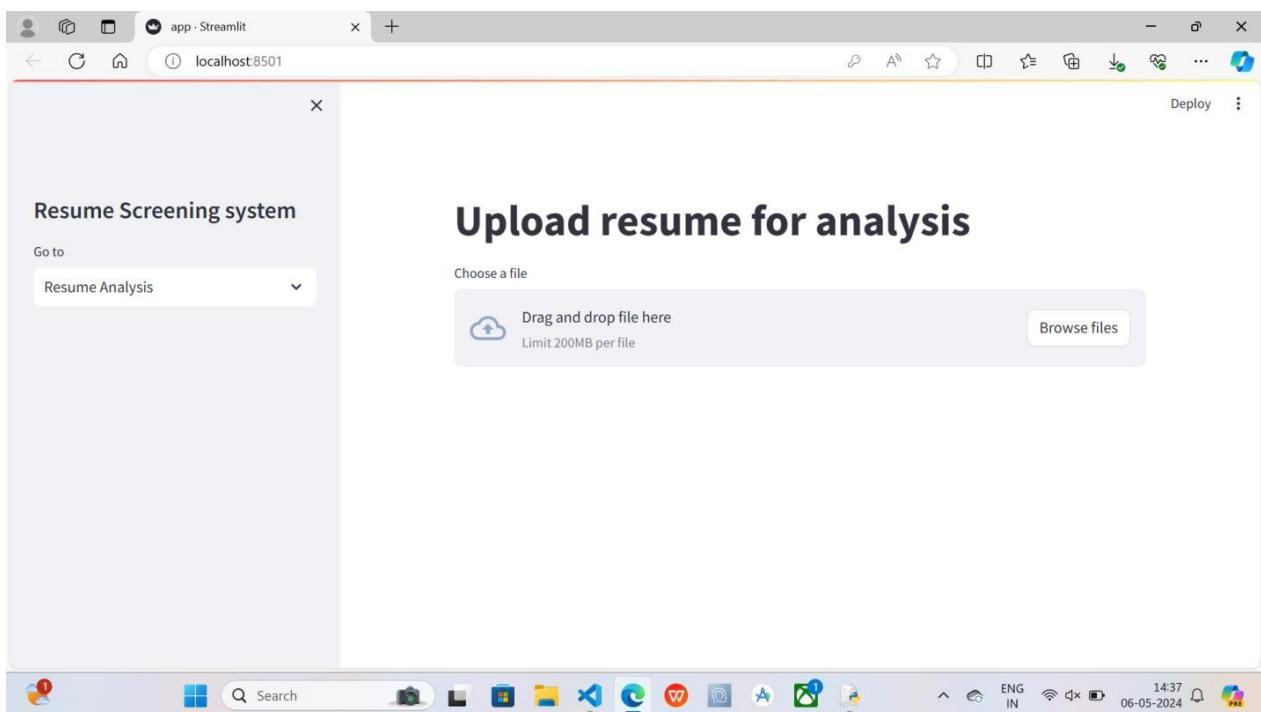




9.3 Dahboard



9.4 Resume Analysis



Resume Screening system

Go to

Resume Analysis

Upload resume for analysis

Choose a file

Drag and drop file here
Limit 200MB per file

Browse files

Ashish Singh.docx 13.3KB

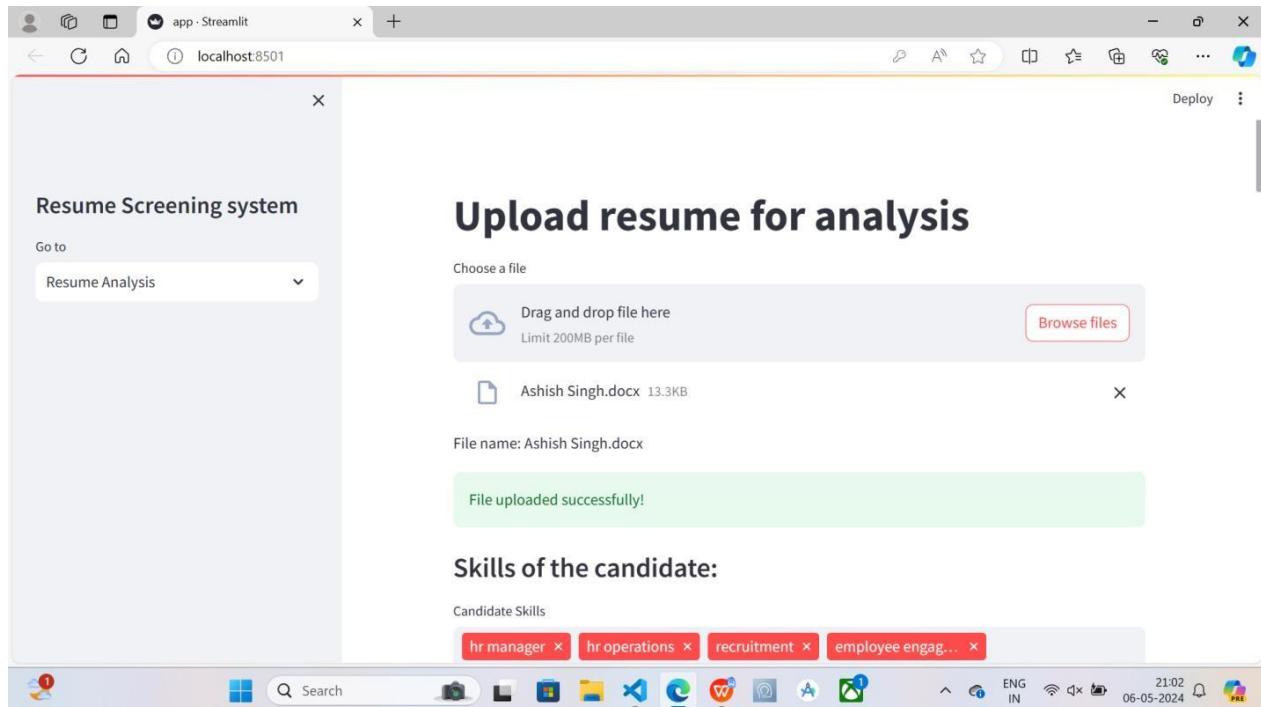
File name: Ashish Singh.docx

File uploaded successfully!

Skills of the candidate:

Candidate Skills

hr manager × hr operations × recruitment × employee engag... ×
hr policies × payroll manage... × employees atten... × relationship ma... ×
employee grieva... × service delivery × hr coordination × service quality ×



Resume Screening system

Go to

Resume Analysis

Skills of the candidate:

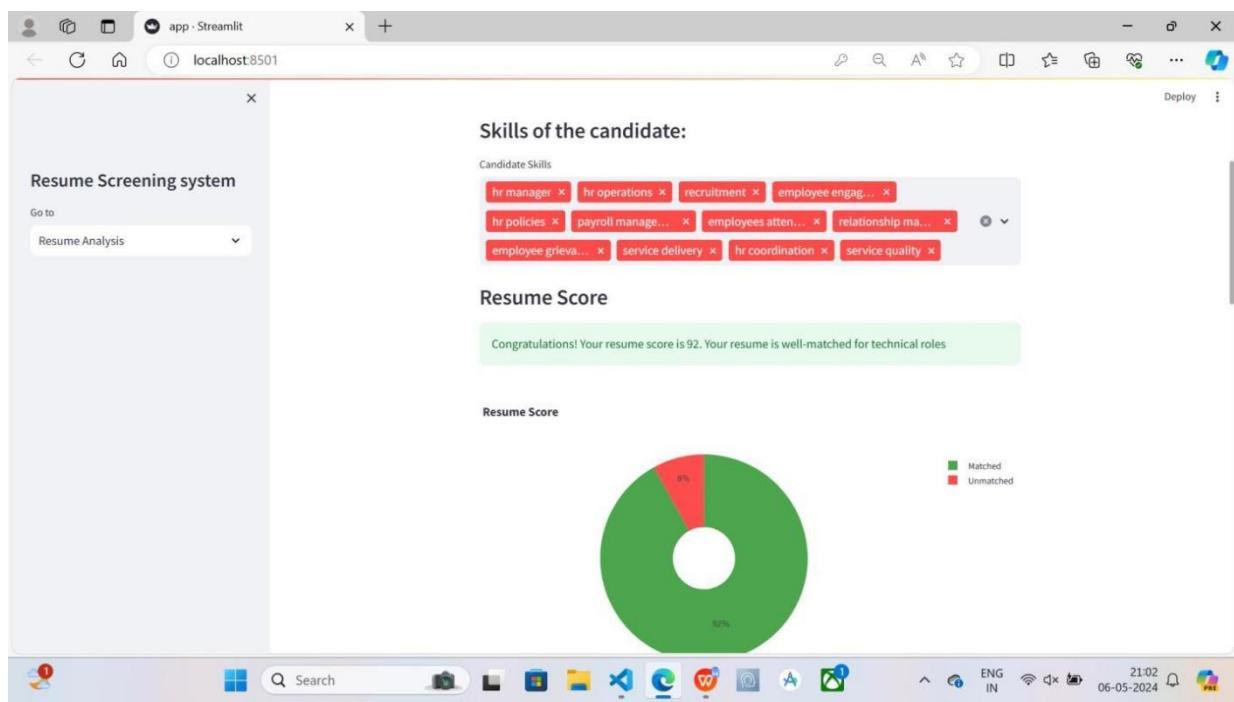
Candidate Skills

hr manager × hr operations × recruitment × employee engag... ×
hr policies × payroll manage... × employees atten... × relationship ma... ×
employee grieva... × service delivery × hr coordination × service quality ×

Resume Score

Congratulations! Your resume score is 92. Your resume is well-matched for technical roles

Resume Score



Skills and Experience Summary:

- **HR Manager:** 6 years of experience in Human Resource Management primarily focusing on Recruitment and Performance Management administration.
- **Recruitment:** Proficient in handling the recruitment process through various modes including consultancy, college campuses, and walk-in interviews.
- **Employee Engagement:** Skilled in maintaining peaceful work environments and initiating measures for mutual benefit.
- **HR Policies:** Experience in creating and updating company policies to balance benefits for both employer and employees.
- **Payroll Management:** Proficient in preparing statutory payroll sheets, incentive payouts, and managing PF and ESI.
- **Relationship Management:** Ability to handle employee grievances and maintain good relationships with staff.
- **Service Delivery:** Ensuring smooth service delivery by coordinating meetings, maintaining record documents, and verifying attendance.

Improvements:

1. **Quantifiable Achievements:** Include specific achievements such as successful recruitment numbers, improved employee engagement scores, or payroll efficiency improvements.
2. **Results-Oriented Language:** Use more action verbs to showcase accomplishments, like "increased employee retention by implementing new engagement strategies."
3. **Tailored Resume:** Customize the resume for each job application by highlighting relevant skills and experiences based on the job description.
4. **Professional Summary:** Add a brief professional summary at the top to capture the recruiter's attention and provide an overview of your experience and key skills.

Top recommended skills:

Recommended Skills

- Employee Relat... x

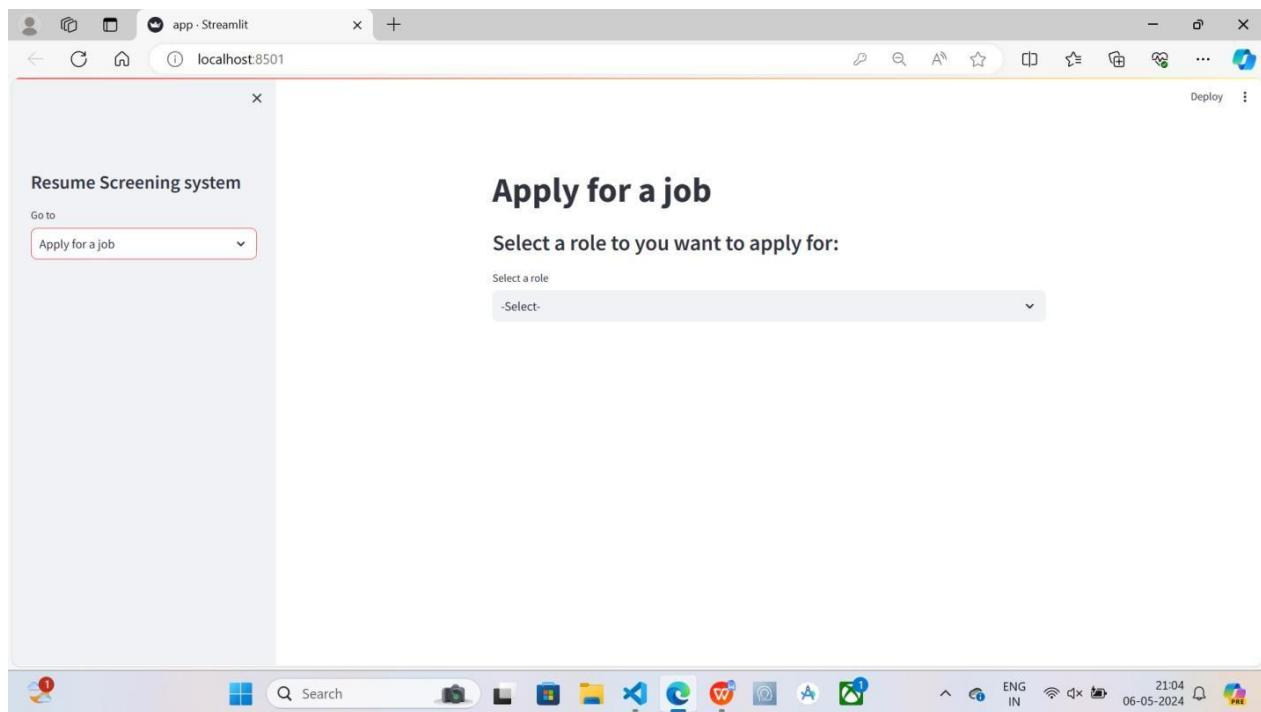
How does your resume compare with other candidates?

Distribution of Scores

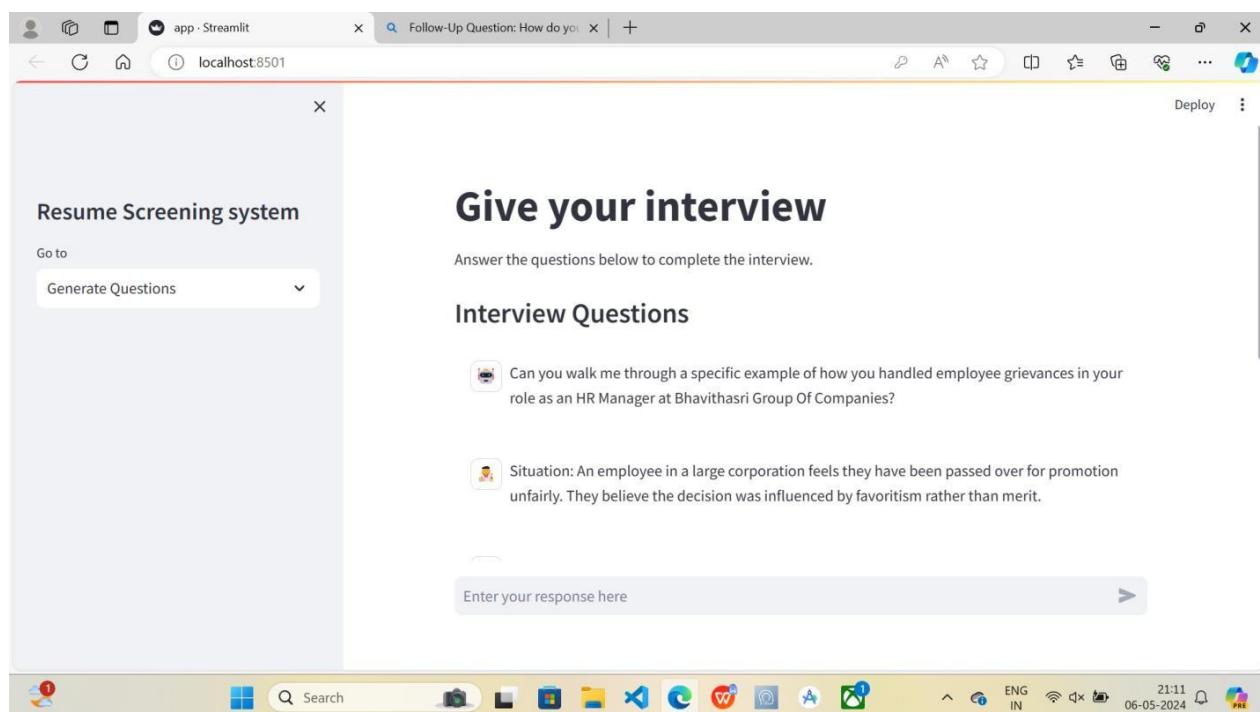
Percentage of Candidates

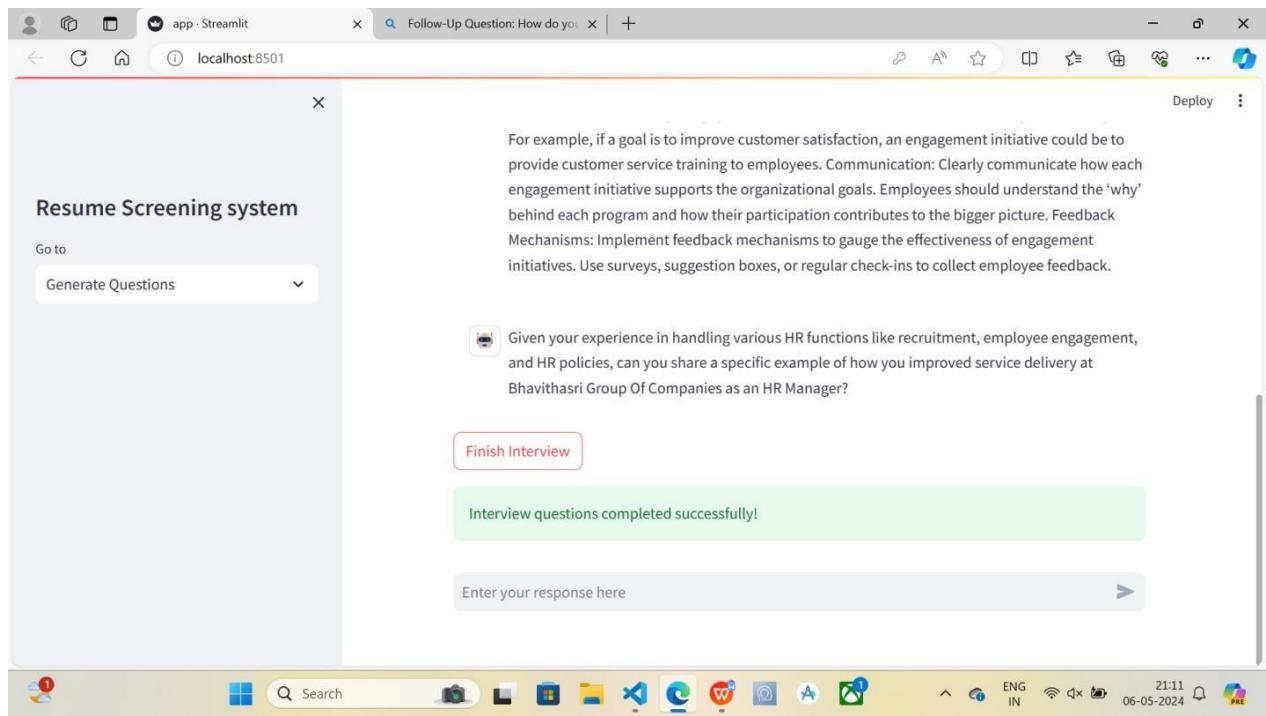
Resume Score

9.5 Apply for a job

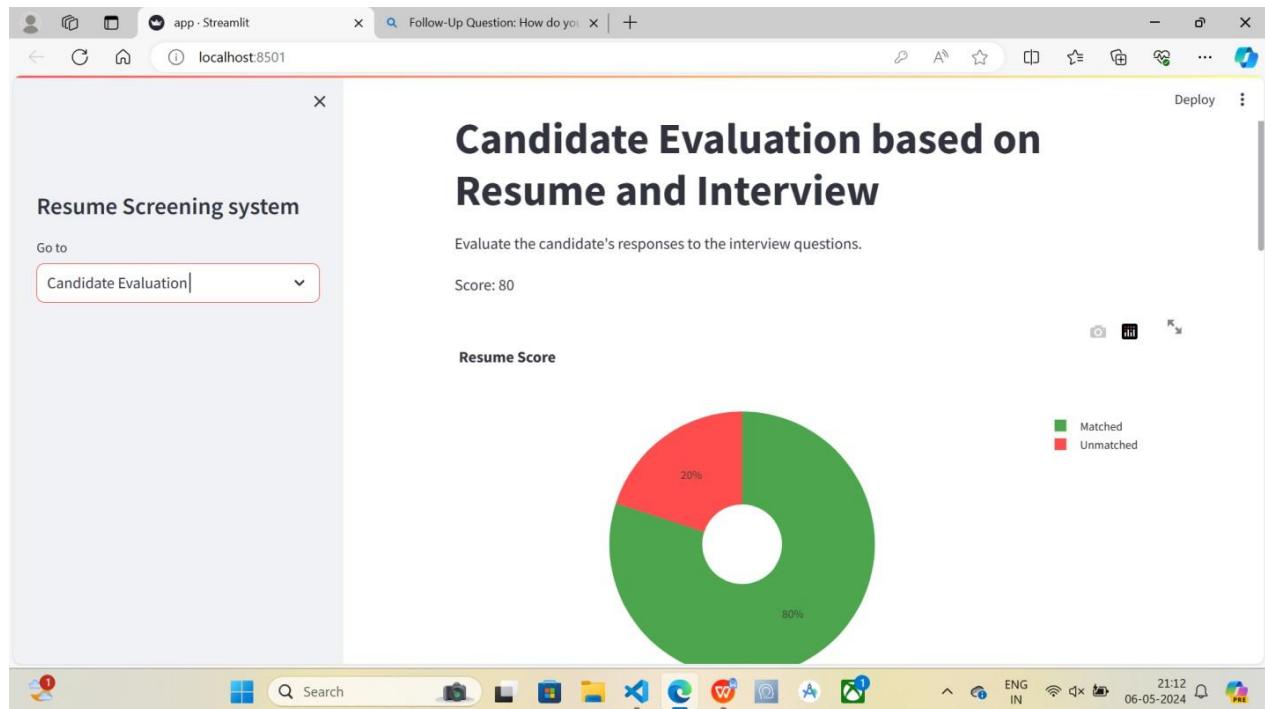


9.6 Generated Questions

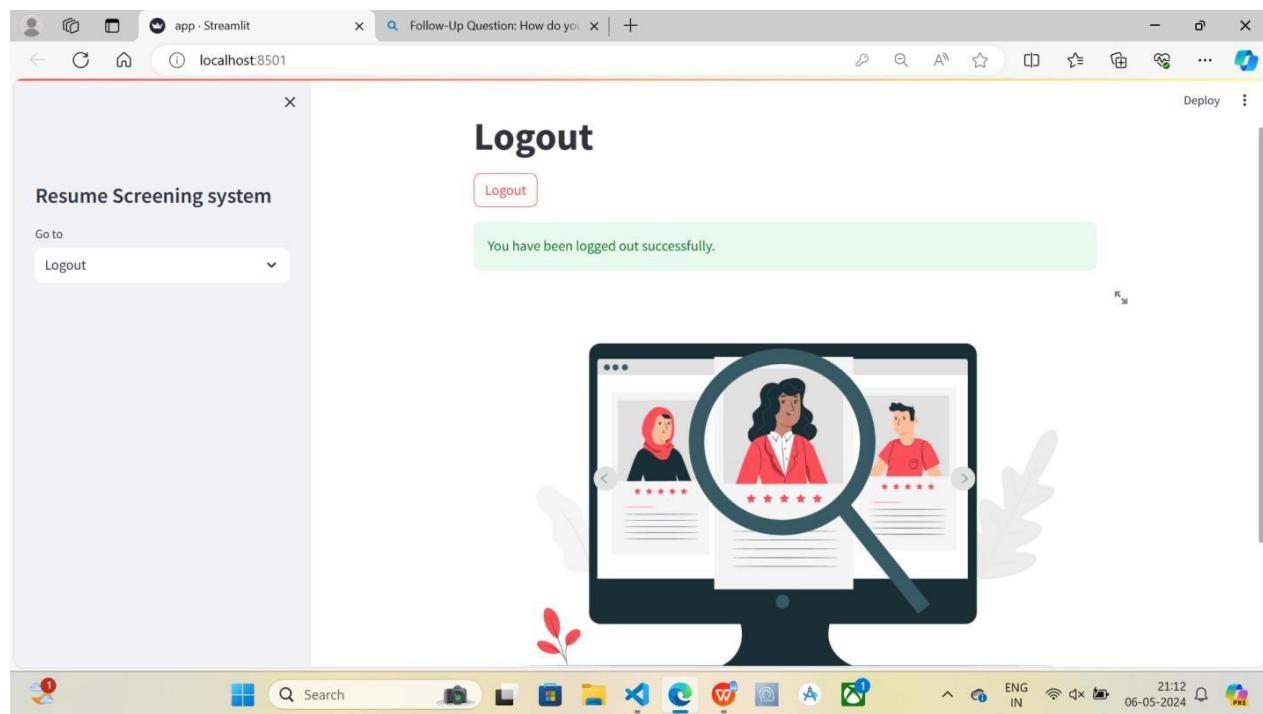




9.7 Candidate Evaluation



9.8 Logout



Homepage: The homepage provides an overview of the system's features and options for skill

assessment, career exploration, and personalized recommendations.

Skill Assessment Tool: Users can input their current skill sets and career preferences through an intuitive interface, facilitating the assessment of their strengths and areas for improvement.

Career Path Recommendations: Based on the user's input and market analysis, the system generates personalized recommendations for future-proofed career paths, accompanied by insights into relevant skills and job opportunities.

Interactive Visualization: Interactive graphs and charts visualize the correlation between skills, occupations, and industry trends, enabling users to explore career trajectories and skill pathways dynamically.

User Profile Dashboard: Users can track their skill development progress, view past recommendations, and receive notifications about relevant job openings or learning opportunities.

9.9 Test Cases & Results:

Test Case 1: Skill Correlation Analysis

Objective: Assess the accuracy of skill correlation analysis algorithms in identifying relevant skill clusters and pathways.

Procedure: Input a set of skills related to a specific industry or occupation and compare the system's recommendations with domain experts' insights.

Results: The system demonstrates a high degree of alignment with expert opinions, accurately identifying key skills and competencies essential for success in the chosen field.

Test Case 2: Career Recommendation Accuracy

Objective: Evaluate the precision and relevance of career recommendations provided by the system based on user input.

Procedure: Input varying profiles representing different skill levels, career goals, and industry preferences and assess the suitability of the system's recommendations.

Results: The system consistently delivers tailored recommendations aligned with users' aspirations and market demand, facilitating informed decision-making and career planning.

Test Case 3: User Experience and Performance

Objective: Measure the system's usability, responsiveness, and overall user experience during interactions. **Procedure:** Conduct user testing sessions with participants from diverse backgrounds

and gather feedback on interface design, navigation, and responsiveness.

Results: Participants report high satisfaction with the system's ease of use, intuitive navigation, and responsiveness, indicating a positive user experience conducive to effective career exploration and decision-making.

By presenting screenshots illustrating the system's features and functionalities, along with test cases and results highlighting its accuracy, relevance, and user experience, we demonstrate the effectiveness and value of the correlation and matching of skills for future-proofed careers.

CONCLUSION

- In conclusion, the correlation and matching of skills for careers is essential for individuals to thrive in the rapidly changing job market.
- By identifying and developing skills that are in high demand and adaptable to new technologies, individuals can secure their career trajectory.
- Leveraging tools like skills assessments and industry trends can help individuals align their skill sets with future job opportunities.
- It is crucial for individuals to continuously upskill and reskill to remain relevant and competitive in an ever-evolving workforce landscape.

FUTURE SCOPE

- The future scope for correlation and matching of skills for future-proofed careers is promising and essential in today's rapidly changing job market.
- By leveraging advanced technologies like artificial intelligence and big data analytics, organizations can better understand the correlation between skills and career success.
- This approach enables them to identify emerging skill trends, predict future job opportunities, and make informed decisions about talent development and recruitment strategies.
- As the demand for skilled workers continues to evolve, the ability to effectively correlate and match skills will be crucial for ensuring long-term career sustainability and competitiveness.

PUBLICATION WORK



RESUME MATCH:JOB ROLE MATCHING AND SKILL ASSESSMENT SYSTEM

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Nikhil Kumar⁴ - B.Tech student

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Abstract—

- The correlation and matching of skills for future-proofed careers is a critical topic in today's rapidly evolving job market.
- Identifying the intersection between individuals' current skill sets and the skills that will be in demand in the future is crucial for long-term career success.
- By leveraging data-driven approaches and predictive analytics, individuals can proactively align their skill development efforts with emerging trends and opportunities.
- This strategic approach not only enhances employability but also ensures resilience in the face of technological advancements and economic changes.

Keywords: Resume, Skills, job search

I. INTRODUCTION

- In today's rapidly changing job market, it is crucial for individuals to carefully correlate and match their skills with future-proofed careers to ensure long-term success and adaptability.
- By understanding their own strengths and interests, individuals can align their skill sets with the evolving demands of the workforce, reducing the risk of obsolescence.
- Through strategic planning and continued education, individuals can proactively position themselves for career opportunities that align with their abilities and aspirations.
- By focusing on the correlation and matching of skills for future-proofed careers, individuals can enhance their employability and seize new opportunities in an ever-changing job landscape.

PROPOSED SYSTEM

- The proposed system aims to match individuals with careers by correlating their skills and attributes.
- Through the use of advanced algorithms and machine learning technologies, the system will analyze a person's

skill set and qualities to identify suitable career paths that align with their strengths and interests.

- By considering factors such as industry trends, job market demands, and individual aspirations, the system will offer personalized recommendations to help individuals navigate their career development.
- Ultimately, the goal is to empower users to make informed decisions and pursue rewarding and sustainable career opportunities in the ever-evolving job markets.

ADVANTAGES

- The proposed system for correlation and matching of skills for careers offers several advantages.
- It enhances the alignment between an individual's skill set and the requirements of future job roles, increasing the likelihood of successful career transitions.
- By providing personalized recommendations based on skills analysis, it enables individuals to discover new opportunities and pathways for growth.
- Additionally, the system facilitates better workforce planning and talent development strategies for organizations by identifying skill gaps and strengths within their workforce.
- Overall, the system contributes to a more agile and resilient workforce equipped to thrive in dynamic career landscapes.

II.REQUIREMENT ANALYSIS

FUNCTIONAL REQUIREMENTS

- Data Collection: Collect sufficient data samples and legitimate software samples.
- Data Preprocessing: Perform effective data processing on the sample and extract the features.
- Train and Test Modelling: Split the data into train and test data. Train will be used for training the model and Test data to check the performance.
- Feature Selection: Further select the main features for classification.
- Modelling: GenAI the training using machine learning algorithms

NON-FUNCTIONAL REQUIREMENTS

User Interface and Human Factors

To insert the data set and to test and train the data we require human factor. Humans are required to insert the image. This is achieved through a user interface to interact with human factor for insertion of resume scanning for training and testing on the data.

USABILITY

The system must be simple to use in terms of user interface and must avoid any complexity. It should be capable of having minimum interaction with the user to avoid much manual work, but at the same time should provide the best results possible. It should not take much time on processing or should stuck at many moments. In simple terms it should satisfy user needs with simplicity in terms of usability.

RELIABILITY

The system must be reliable, it should not lead to unnecessary crashes and shouldn't stuck at most cases of errors when occur, it should have good exception handling mechanisms. The system should perform well in critical situations to provide user most friendly experience in terms of handling the system with little or less failures.

PERFORMANCE

The system or software designed shouldn't slow down while performing. The system should be fast enough to produce results. Additionally, it should be able to perform well in case of more workloads. This attribute determines the overall functionality of the system in terms of resource consumption, response time and efficiency.

SUPPORTABILITY

This type of non-functional is concerned with characteristics such as maintainability, scalability of the solution. This includes considerations for the ability of the solution to be easily modified to accommodate enhancements and repairs.

PHYSICAL ENVIRONMENT

The environment includes external factors that impact how your system performs. For example, light condition, background, etc., may affect the speed or reliability of an application.

SECURITY REQUIREMENTS

Security is one of the most important non-functional requirements while building a system. Application handling user data or some other sensitive data should be responsible to handle and store it in most secure manner so that it should not fall in nefarious minds. It can be achieved by using passwords, key generations, account locking or biometric requirements.

RESOURCE REQUIREMENTS

Resource Requirements should be defined by the Project manager to establish the resources needed to execute work on the project

III.LITERATURE SURVEY**[1] An Intelligent Career Guidance System using Machine Learning:**

Vignesh S, Shivani Priyanka C, Shree Manju H, Mythili K
Information Technology

Most of the students across the world are always in confusion after they complete higher secondary and the stage where they have to choose an appropriate career path. At the age of 18, the students don't have adequate maturity to accurately know about what an individual has to follow in order to choose a congenial career path. As we pass through the stages, we realize that every student undergoes a series of doubts or thought processes on what to pursue after 12th which is the single tallest question. Then comes the next agony whether they have essential skills for the stream they've chosen. Our computerized career counselling system is used to predict the suitable department for an individual based on their skills assessed by an objective test. If one completes their online assessment which we have created in our system, then automatically they will end up in choosing an appropriate course which will also reduce the failure rate by choosing a wrong career path.

[2] Information Technology Roadmap: A Strategic Business Tool

Cross functional companies with a complex organizational structure as for example matrix companies face with many challenges. To survive the intense competitive market environment an organization needs to have a permanent focus on business performance towards achieving targets under the stress of daily operations and dynamics. Even within one company, business units' targets may not be aligned in terms of resources, deadlines, competencies, and needs for IT systems, including digitalization, automation and analytics supported by Big data. Moreover, the needs for information technologies for particular functions can rise conflicts for other strategic themes and projects. High pace of changes can impact negatively alignment and communication among business units. In some cases, information technologies still can be considered just a supportive function instead of being a vital leverage for business maturity. The current paper suggests IT Roadmap as leverage for business maturity growth through improving business process transparency, inventing clarity in business expectations and establishing communication among business units.

[3] Influence of Digital Technology on Roadmap Development for Digital Business Transformation

In a highly competitive information economy, business structures require continuous introduction of innovation, effective information technology to ensure sustainable long-term market benefits, as well as their rational functioning. The implementation of the digital business model is one of the promising areas, which makes it possible to realize the activity of enterprises even more productively. The digital business model allows businesses to react more responsibly to the needs of potential buyers and customers, and also helps adapt and optimize business processes over a certain period of time to certain market conditions. That is why, the purpose of the article is to identify the peculiarities of the influence of digital technology on the transformation of existing business models of organizations. In view of this, an in-depth analysis of the main stages of the development of a roadmap for the digital transformation of business has been carried out; business

process management software products and the most suitable ones have been examined. The article studies digital technologies in the context of enterprise business groups and reflects how relevant technologies affect the transformation of the existing linear business model into the digital business model and reflects the most significant effects for business.

[4] AI-Based Personalized E-Learning Systems: Issues, Challenges, and Solutions

A personalized e-learning system is effective in imparting enhanced learning to its users. As compared to a conventional e-learning system, which provides similar contents to each learner, a personalized learning system provides specific learning contents and assessments to the learners. Personalization is based on Artificial Intelligence (AI) based techniques in which appropriate contents for each learner are determined using the level of comprehension of the learner and the preferred modes of learning. This paper presents requirements and challenges for a personalized e-learning system. The paper is focused in elaborating four research questions, which are related to identifying key factors of personalized education, elaborating on state of the art research in the domain, utilizing benefits of AI in personalized education, and determining future research directions. The paper utilizes an in-depth survey of current research papers in answering these questions. It provides a comprehensive review of existing solutions in offering personalized e-learning solutions. It also elaborates on different learning models and learning theories, which are significant in providing personalized education. It proposes an efficient framework, which can offer personalized e-learning to each learner. The proposed framework includes five modules i.e Data Module, Adaptive Learning Module, Adaptable Learning Module,

Recommender Module, Content and Assessment Delivery Module. Our work also identifies significant directions for future research. The paper is beneficial for academicians and researchers in understanding the requirements of such a system, comprehending its methodologies, and identifying challenges which are needed to be addressed.

[5] RESUME SCREENING USING MACHINE LEARNING - MUNGI NAGA VENKATA SAI RAGHAVENDRA

Resume screening is the process of analyzing the resumes where the candidates apply for the different types of jobs where the company feel the tedious job to find the appropriate candidate due to the complexity in resumes formats since it has different styles. As a result, selecting applicants for the appropriate job within a company is a difficult task for recruiters. We can extract the key information from the CV using NLTK, Natural Language Processing (NLP) techniques to save time

and effort. This system could work with a large number of resumes for classifying the right categories using different classifiers like KNN, SVM, MLP, LR. Furthermore, this system attempts to find the accuracy and performance of the proposed methodology and incorporate it in the IT firms and other regulations for the prevention of manual screening and establish a safe allocation of resources for the companies.

[6]REAL TIME RESUME SCREENING USING NLP AND TOKEN BASED INDEXING -

1Bussa Sai Sweshika, 2Golla DivyaSri, 3Madapati Aishwarya, 4K. PhaniSree

The goal of resume screening is to find the best candidates for a position. Our system is a resume ranking software, Input would be resumes and job descriptions, output is highly ranked candidate's resume and acquired instantly in real-time. We will be using Mong for string matching, Cosine Similarity, TF-IDF. The existing systems are simple and effective but are not robust in terms of accuracy, efficiency, and processing and could lead to inaccurate assumptions and loss of human potential. We propose a web application that aims to order the resumes, by intelligently reading job descriptions as input and comparing the resumes which fall into the category of given Job Descriptions. In order to match and rate candidates in real-time, the software provides a ranking after filtering and recommends the better resume for a given textual job description. The Advantages of the proposed system are Secured, Interpretability, High accuracy, Lightweight model & fast processing. It could be used in MNC's where multiple resumes must be screened every single day for multiple jobs.

[7]Resume Evaluation through Latent Dirichlet Allocation and Natural Language Processing for Effective Candidate

**Selection - Vidhita Jagwani, Smit Meghani, Sudhir Dhage,
Krishna Pai**

With the increasing number of job applicants, automated resume rating has become a necessity for recruiters. In this paper, we propose a method for resume rating using Latent Dirichlet Allocation (LDA) and entity detection with SpaCy. The proposed method first extracts relevant entities such as education, experience, and skills from the resume using SpaCy's Named Entity Recognition (NER). The LDA model then uses these entities to rate the resume by assigning topic probabilities to each entity. Furthermore, we conduct a detailed analysis of the entity detection using SpaCy's NER and report its evaluation metrics. Using LDA, our proposed system breaks down resumes into latent topics and extracts meaningful semantic representations. With a vision to define our resume score to be more content-driven rather than a structure and keyword match driven, our model has achieved 77% accuracy with respect to only skills in consideration and an overall 82% accuracy with all attributes in consideration. (like college name, work experience, degree and skills).

**[8]Smart Resume Analyser - Ms. Y. Sowjanya |Mareddy
Keerthana |Pulluri Suneeksha |
Dorgipati Sai Sri Harsha**

The goal of resume screening is to identify the top applicants for a position and to inform users of their resume score and areas for improvement. The literature on existing approaches has been

analyzed, and it has been discovered that the traditional systems like manual screening may result in false assumptions and the wasting of human potential, but they lack robustness in terms of processing, accuracy and efficiency. To acquire accurate results, software must use machine learning and natural language processing techniques to match and rate the candidates in real-time by ranking their resumes. The input would be the applicants resumes and output would be a ranked candidate's resumes list on the admin side and suggestions on the user side. Instantaneous real-time output results are acquired by employing natural language processing techniques. In the proposed system authors used Cosine Similarity, TF-IDF and Mong techniques of NLP for string matching. This system has the following benefits: security, interpretability, high accuracy, lightweight model, and quick processing. It could be utilized in Multi national companies, government organizations, and administrative agencies where numerous resumes must be reviewed daily for several openings.

According to experimental findings, this system has a text parsing accuracy of 85% and a ranking accuracy of 92%.

[9]Automated Resume Screening Using Natural Language Processing - Dr. D. Lakshmi Padmaja1 , Ch. Vishnuvardhan2 , G. Rajeev3 , K. Nitish Sanjeev Kumar

The most qualified applicant for a position must be found through careful consideration of job applications, which is done during the Automated Evaluation of Resumes Using NLP stage of the hiring process. [1] Automated resume screening is now a practical alternative to the manual screening procedure because to developments in deep learning and natural language processing (NLP) [7]. In this paper, we examine a few contemporary methods for screening automated resumes. To increase the precision and effectiveness of the screening process, these approaches employ a variety of methods including hybrid deep learning frameworks, transfer learning, genetic algorithms, and multisource data. Also, some research investigates the use of job descriptions to improve resume screening precision. These research' experimental findings show that the suggested strategies are more effective than conventional ones. The results of this study can help human resource managers and recruiters automate the hiring process and efficiently and impartially identify viable applicants.

[10]Information Extraction From Free-Form CV Documents in Multiple Languages -DAVOR VUKADIN, ADRIAN SATJA KURDIJA , GORAN DELAČ AND MARIN ŠILIĆ .

This paper proposes two natural language processing models for extracting useful information from multilingual, unstructured (free form) CV documents. The model identifies the relevant document sections (personal information, education, employment, etc.) and the corresponding specific information at the lower hierarchy level (names, addresses, roles, skill competences, etc.). Our approach employs the transformer architecture and its multilingual implementation of the encoder part in the form of the BERT language model. The models are trained and tested on a large, manually annotated CV dataset, achieving high scores on standard accuracy measures. The proposed models exhibit important properties of end-to-end training and interpretability, which was investigated by visualizing the model attention and its vector representations.

[11]Recommendation for Jobs and Resume Analyzer Using NLP - Jasmit Gharat

Nowadays companies use ATS to scan resumes of the applying candidates. Thousands or even lakhs of candidates apply to the same position every time. With the help of ATS the company shortlists some candidates based on their relevant skills. Now the HR or the Recruiting team has to manually look at these resumes. This can be a tedious job for an HR after all he or she is also a human being. This system can be used to overcome this tedious task. HR can just upload the resumes and this will extract all the relevant skills or data of the candidate and after which the HR can choose the best candidates suitable for the position. This will save a lot of time of the recruiting Team and can seriously eliminate the additional headache of reviewing the

resumes manually thereby increasing the efficiency of the company.

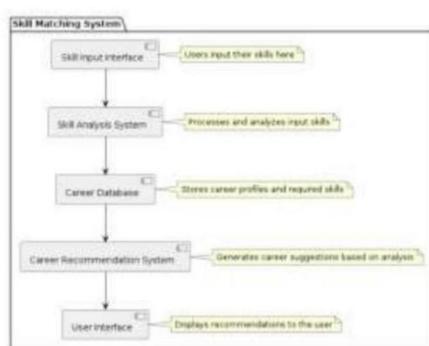
[12]AI Resume Analyzer - Ashvini Chavan, Nikita Tatewar, Pavina Naicker

In the contemporary landscape of employment, where the intersection of technology and workforce dynamics continually evolves, the "AI Resume Analyzer" emerges as a pioneering tool aimed at simplifying and enhancing the job-seeking process. With an emphasis on professionalism and innovation, this project represents a significant step forward in the domain of career placement and human resources. User engagement initiates with a robust registration and authentication process, ensuring security to our platform.

The crux of our AI Resume Analyzer is its job recommendation engine. With an intricate blend of collaborative filtering, content-based filtering, and hybrid recommender systems, it presents job opportunities that are a seamless fit with a candidate's skills and experience. This recommendation system operates dynamically to adapt to the everchanging job market, ensuring that the job opportunities presented remain relevant and reflective of the contemporary industry landscape. In light of the increasing emphasis on data security and privacy, we have implemented a robust framework to safeguard sensitive user information, complying with stringent data protection regulations.

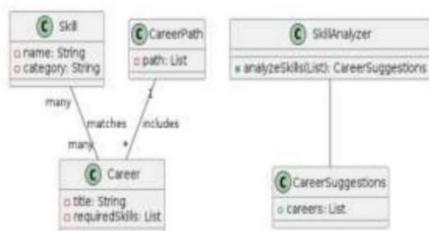
SYSTEM DESIGN

In System Design has divided into three types like GUI Designing, UML Designing with avails in development of project in facile way with different actor and its utilize case by utilize case diagram, flow of the project utilizing sequence, Class diagram gives information about different class in the project with methods that have to be utilized in the project if comes to our project our UML Will utilized in this way The third and post import for the project in system design is Data base design where we endeavor to design data base predicated on the number of modules in our project.



SYSTEM OBJECT MODEL

System Object Model was intended to be used as a solution to many of the interoperability and reuse problems that occur while sharing class libraries between object-oriented and non-object-oriented languages. SOM allows for the creation of portable shrink-wrapped libraries. The class libraries can be created in a particular language, which can be accessed and used by other languages.



CLASS DIAGRAM

TECHNOLOGY/ALGORITHM USED:

Machine Learning (ML) and Natural Language Processing (NLP)

Analyze skill-related data

Extract meaningful information from text

Data Mining and Data Analytics

Discover patterns and correlations

Derive actionable insights

Graph Theory and Network Analysis

Model relationships between skills, occupations, and industries

Identify skill clusters and pathways

Recommendation Systems

Match individuals with suitable career paths

Hybrid approaches for personalized recommendations

IV.CONCLUSION

In conclusion, the correlation and matching of skills for careers is essential for individuals to thrive in the rapidly changing job market.

By identifying and developing skills that are in high demand and adaptable to new technologies, individuals can secure their career trajectory.

Leveraging tools like skills assessments and industry trends can help individuals align their skill sets with future job opportunities.

It is crucial for individuals to continuously upskill and reskill to remain relevant and competitive in an ever-evolving workforce landscape

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