

BSSE FINAL PROJECT Requirements Specification

Vision Forge



Project Advisor
Ms. Rubab Javaid

Presented by:
Group ID: F23SE094

Student Registration No.	Student Name
Haris Naseem Butt	L1F20BSSE0609
Asna Abroo	L1F20BSSE0608
Yumen Tariq	L1F20BSSE0617

**Faculty of Information Technology
University of Central Punjab**

Software Requirements Specification

Version 01

Vision Forge

Advisor: Ms. Rubab Javaid

Group F23SE094

Member Name	Primary Responsibility
Haris Naseem Butt	Requirement Specification and features
Asna Abroo	Gantt Chart and other requirements
Yumen Tariq	UML Diagrams

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Revision History

Name	Date	Reason For Changes	Version

Abstract

In response to the lack of career guidance in schools and colleges, Vision Forge emerges as a solution to empower students facing uncertainty in their career paths. The absence of dedicated counselors often leaves students making uninformed decisions, influenced by familial pressures rather than personal interests. Vision Forge tackles this issue by introducing a user-friendly app that allows students to input their academic records and interests, generating personalized career suggestions. The app utilizes advanced machine learning technology to analyze this data, providing insights into potential fields, associated courses, and educational opportunities. It addresses the challenge of aligning academic backgrounds with career aspirations and offers alternative courses if needed. The ultimate goal is to guide students towards confident and well-informed decisions, ensuring a rewarding and fulfilling career journey.

1. Introduction and Background

"Vision Forge" transforms career guidance using advanced machine learning. It caters to students, offering personalized career paths often missing in traditional methods. By analyzing academics and interests, it provides tailored options, empowering students for their future journeys. The motivation lies in simplifying complex decisions. The significance is profound: it helps students align their passions and strengths with career choices, ensuring a more fulfilling and successful future. Through this innovative approach, "Vision Forge" becomes a guiding light, making career decisions accessible and meaningful for every student.

1.1 Product (Problem Statement)

Students feel lost in choosing careers without proper guidance in colleges. Many end up making uninformed choices influenced by family pressure, not personal interests. Often students follow the trend where majority of the students are going without following their interest. This lack of personalized advice creates confusion and stress among students. The problem is evident: a need for accessible and tailored career guidance to help students confidently navigate their future paths.

1.2 Background

Before Vision Forge, traditional career counseling lacked depth, neglecting individual strengths and interests. Now, Vision Forge transforms the landscape, utilizing advanced machine learning algorithms and technologies like Python and data analytics. With additional tools for web application development, it ensures personalized advice. This project fills gaps in existing career guidance, providing accurate recommendations based on each student's unique abilities and passions, using a diverse set of technologies for a comprehensive solution.

1.3 Scope

In "Vision Forge," students share detailed academic info, like grades in matriculation and intermediate, and favorite subjects in these stages. We also ask fun questions about interests through multiple-choice questions (MCQs). The system then uses machine learning algorithms to process this info. We teach the program with a special set of data. It looks at your grades and interests to suggest career fields you might like. "Vision Forge" stands out because it tailors suggestions based on your school grades and interests, making it easier for you to pick a career you should enjoy.

1.4 Objective(s)/Aim(s)/Target(s)

- Develop "Vision Forge" as an easy-to-use platform for students.
- Analyze academic records and interests to provide personalized career suggestions.
- Help students make informed career choices.
- Integrate advanced machine learning algorithms for improved accuracy.
- Increase user confidence in career decisions.
- Allow students to explore and tailor suitable career paths based on strengths.
- Provide insights into various career options for informed decision-making.
- Empower students with tailored insights, ensuring a confident and successful career trajectory.

1.5 Challenges

- Finding and arranging a diverse student dataset.
- Choosing an appropriate machine learning model and effective training.
- Developing a web application for seamless model integration.
- Crafting an intuitive user interface with expertise in design.
- Successful integration of the trained machine learning model.
- Ensuring high accuracy in the training of the machine learning model.
- Overall challenge of creating an effective career counseling application for accurate and personalized guidance.

1.6 Learning Outcomes

- Learn various machine learning algorithms.
- Acquire skills to analyze and maintain large datasets.
- Develop proficiency in constructing fully operational websites.
- Gain expertise in integrating machine learning algorithms.
- Learn to use APIs for seamless integration of resources.
- Develop skills in documenting the project journey.
- Enhance research and communication skills.
- Understand and apply machine learning technology.
- Learn techniques for analyzing and maintaining datasets.
- Acquire the ability to train models and make predictions based on analyzed data.

1.7 Nature of End Product

The end product of this project will be a comprehensive software application that leverages machine learning algorithms to guide students in selecting optimal career paths. It is a practical tool born out of extensive research and data analysis. While it encompasses various components, including a dataset and algorithm integration, its primary goal is to provide students with a powerful, user-friendly system for making informed career decisions. In essence, it combines software engineering, data science, and machine learning to create a valuable resource for academic and professional guidance.

1.8 Completeness Criteria

Criteria	Description	Percentage
Functionality	The app accurately provides career recommendations based on academic records and interests.	30%
Machine Learning Implementation	Efficient application of machine learning algorithms ensuring personalized and precise career suggestions.	25%
User Experience	Intuitive user interface design, smooth navigation, and positive user feedback through testing.	20%
Documentation	Comprehensive user manuals, project report, and research documentation providing clear insights into the app.	15%
User Impact	Positive feedback and demonstrated impact on users' informed career decisions, indicating app effectiveness.	10%

1.9 Business Goals

Vision Forge enhances revenue by attracting students and institutions. The system generates income through high user traffic, contributing to financial gains. Streamlining administrative tasks reduces operational costs, maximizing profits. The software's popularity boosts the institution's reputation and attracts more students, aligning with core business goals. Vision Forge positions the institution as an innovative leader in tech-enhanced education, ensuring sustained financial growth and success.

1.10 Related Work/ Literature Survey/ Literature Review

"Career Vista" and "Future Track" are two prevalent career guidance systems. "Career Vista" specializes in career counseling, providing insights into various career options through assessments. On the other hand, "Future Track" offers basic career advice but lacks advanced features. Both systems fall short in comparison to "Vision Forge," which not only delivers personalized career counseling but also incorporates cutting-edge machine learning algorithms. Unlike its counterparts, "Vision Forge" offers a holistic approach, including personalized learning recommendations, university eligibility assessments, and detailed course information, redefining the landscape of comprehensive career guidance for students.

1.11 Document Conventions

Font: Times

Font Size for Text: 12

Font Size for Headings: 14

Font Size for Main Heading: 18

Highlighted Items: Enclosed in "inverted commas"

Bullet Points: Used for clear and concise understanding

2. Overall Description

2.1 Product Features

- Utilizes advanced Machine Learning for personalized career predictions.
- Analyzes academic records and interests to suggest tailored paths.
- Empowers users to explore options aligned with their strengths.
- Evaluates academic performance for university eligibility assessment.
- Provides insights into eligible courses and institutions.
- Describes chosen career paths with tasks and responsibilities.
- Offers an overview of the scope and future prospects within professions.
- Integrates insights from candidates with successful ratio after choosing their tailored path.

2.2 User Classes and Characteristics

User Class	Characteristics	Functions
Students	Varied educational levels, technical expertise	Input academic data, explore career options, view university eligibility
Educational Counselors	Educational expertise, occasional users	Access student data, provide guidance, monitor career suggestions
Administrators	High privilege levels, technical expertise	Manage user accounts, oversee system security, handle data privacy

2.3 Operating Environment

- Minimum 4 GB RAM
- Good processor for efficient performance
- At least 128 GB storage capacity
- Updated web browser (Chrome or equivalent)

- Internet service for data access
- Cross-device compatibility for accessibility
- Compatibility with various operating systems (Windows, mac OS, Linux)
- Regular security updates and patches
- Seamless connectivity with educational databases
- Scalable to accommodate increasing user traffic
- Option for user preferences and customization
- Adaptable to diverse academic and career contexts

2.4 Design and Implementation Constraints

The design and implementation constraints for "Vision Forge" include specific restrictions and choices to ensure effective functionality. Machine learning processes are confined to the Python language, while web development utilizes the MERN framework. Dataset management involves advanced analysis techniques. Access to the application is limited to students who have completed matriculation and intermediate studies, restricting usage to this specific demographic. The system's design and development follow the Software Development Life Cycle (SDLC) methodology, incorporating Unified Modeling Language (UML) diagrams for effective planning. The interface prioritizes user-friendliness to enhance accessibility and usability.

2.5 Assumptions and Dependencies

Assumptions and Dependencies	Description
Third-Party Components	Integration of external ML libraries like scikit-learn. Any changes in these libraries may impact the project.
Operating Environment	Stable internet connectivity for real-time data processing and server interactions.
Data Availability	Availability of relevant datasets for training ML algorithms. Limited data might affect prediction accuracy.
External Services	Continued availability of external services/APIs for real-time updates and information retrieval.
Development Tools	Availability of necessary software tools and licenses for development and testing purposes.
Team Collaboration	Effective collaboration among team members for consistent development progress and issue resolution.
Documentation Accuracy	Accuracy of information in the existing project documentation, which forms the basis of our development decisions.

Assumptions and Dependencies	Description
Hardware Reliability	Reliability of hardware components and servers hosting the application to ensure uninterrupted service delivery.

3- Functional Requirements

3.1 User Authentication and Login

Identifier	UC-1	
Purpose	Allow users to create accounts and log in.	
Priority	Medium	
Pre-conditions	The user is not logged in.	
Post-conditions	The user is authenticated and gains access to system features.	
Typical Course of Action		
S#	Actor Action	System Response
1	User Navigate to login page	
2	User Enter username and password	System processes the entered information.
3	System Validate credentials	System checks if the entered credentials match a registered user and redirects to homepage
4	User comes to the home page	
Alternate Course of Action		
S#	Actor Action	System Response
1	User enters incorrect username or password or both	System displays an error message.
2	System validates and provide an error message	System redirects the user back to the login page
3	User Retry entering correct credentials	System checks entered credentials with the authentic credentials and redirects to homepage
4	User is being displayed the home page	

Table 1: UC-1

3.2 Career Field Option

Identifier	UC-2	
Purpose	Enable users to explore and select a career path based on their academic performance and interests.	
Priority	High	
Pre-conditions	The user has successfully logged in..	
Post-conditions	<ul style="list-style-type: none">• The user has selected a specific career path.• The system provides additional resources and guidance related to the chosen career.	
Typical Course of Action		
S#	Actor Action	System Response
1	Clicks on "Explore Careers"	Display analyzer form.
2	Enter basic information, such as name, academic background, and areas of interest.	Validates and saves the entered information, providing a confirmation message.
3	Completes the form and Clicks on "Explore Careers"	Generates and displays a list of recommended career paths
4	selects a specific career path for more information.	provides detailed information about the selected career, including potential job roles, required skills, and educational pathways.
5	Explores additional features, click "Learn More"	Offers relevant resources, success stories, and educational recommendations to further guide the user.
Alternate Course of Action		
S#	Actor Action	System Response
1	Encounters difficulties during form completion.	Provides helpful tooltips, inline assistance, or the option to contact support for guidance.

Table 2: UC-2

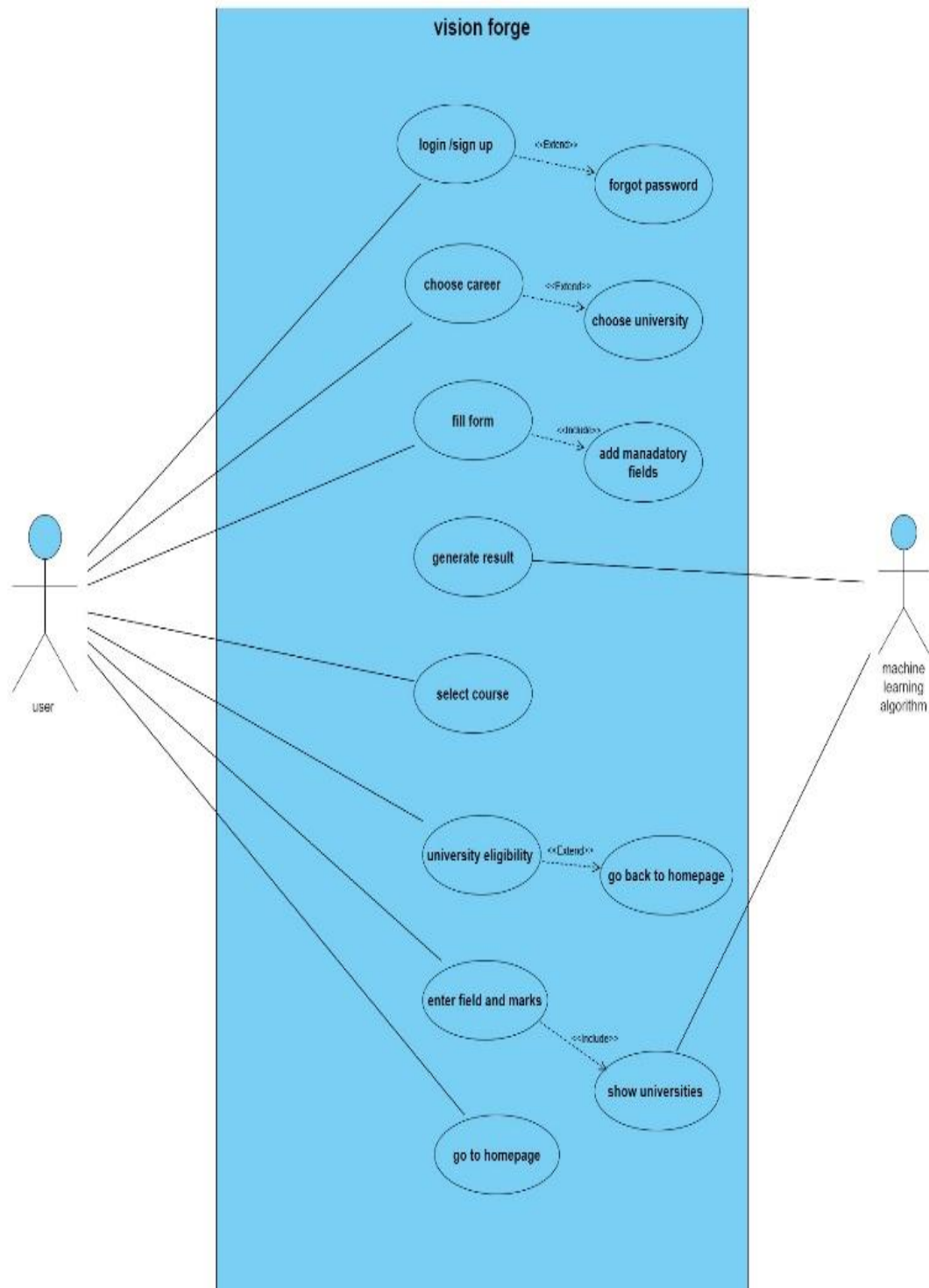
3.3 University Eligibility Assessment

Identifier	UC-2	
Purpose	Assist users in exploring and selecting universities based on their academic preferences and career goals.	
Priority	High	
Pre-conditions	<ul style="list-style-type: none">The user has successfully logged into "Vision Forge."The user has completed the profile setup, including academic preferences and career goals.	
Post-conditions	The user has selected a university or universities that align with their academic and career objectives.	
Typical Course of Action		
S#	Actor Action	System Response
1	Navigate to the "Explore Universities"	prompts the user to explore universities.
2	filters universities based on input provided of its preferred choice career and his/her marks to check eligibility	Presents a list of universities that match the user's specified criteria of marks and career eligibility.
3	Clicks on a specific university to view detailed information.	Provides comprehensive details about the selected university, including programs, faculty, campus facilities, and admission procedures.
4	Selects a university as a potential choice.	Adds the selected university to the user's list of preferred universities and offers the option to explore more
Alternate Course of Action		
S#	Actor Action	System Response
1	Encounters difficulties during the university exploration or application process.	provides support options
2	Decides to save university choices for later consideration.	Offers a "Save for Later" feature, allowing users to revisit and modify their list of preferred universities at a later time.

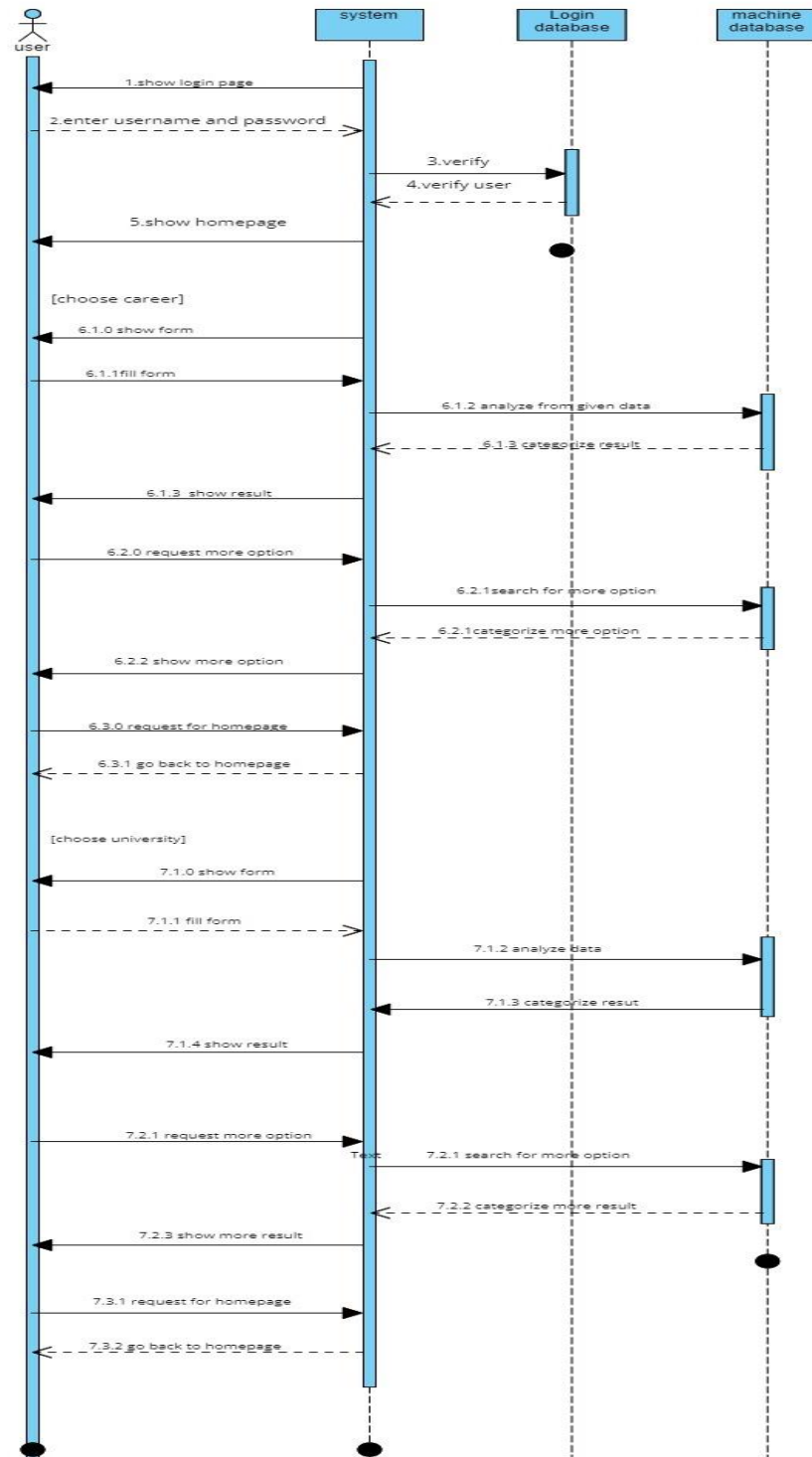
Table 3: UC-3

2.4 Requirements Analysis and Modeling

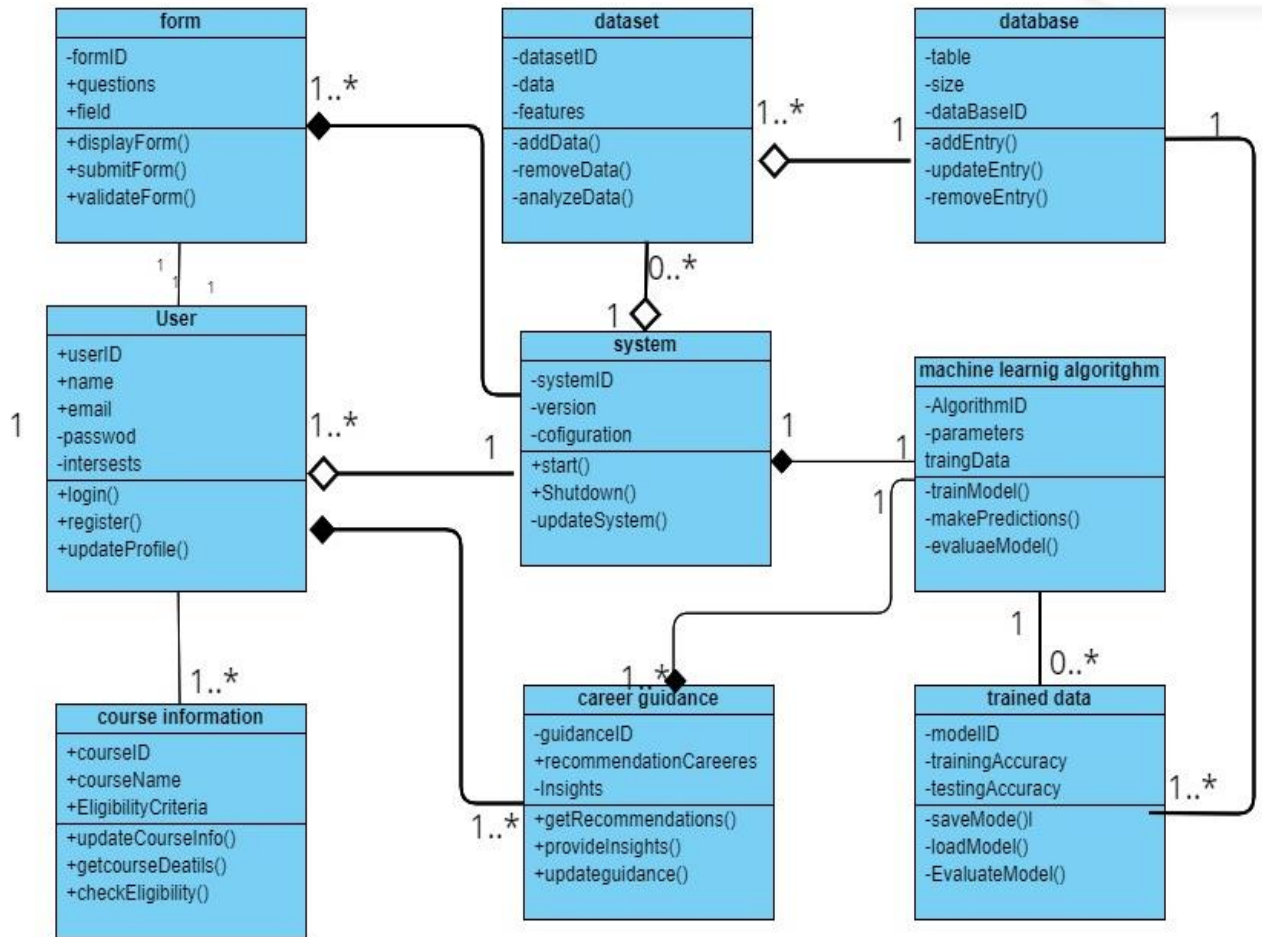
3.4.1 Use Case Diagram



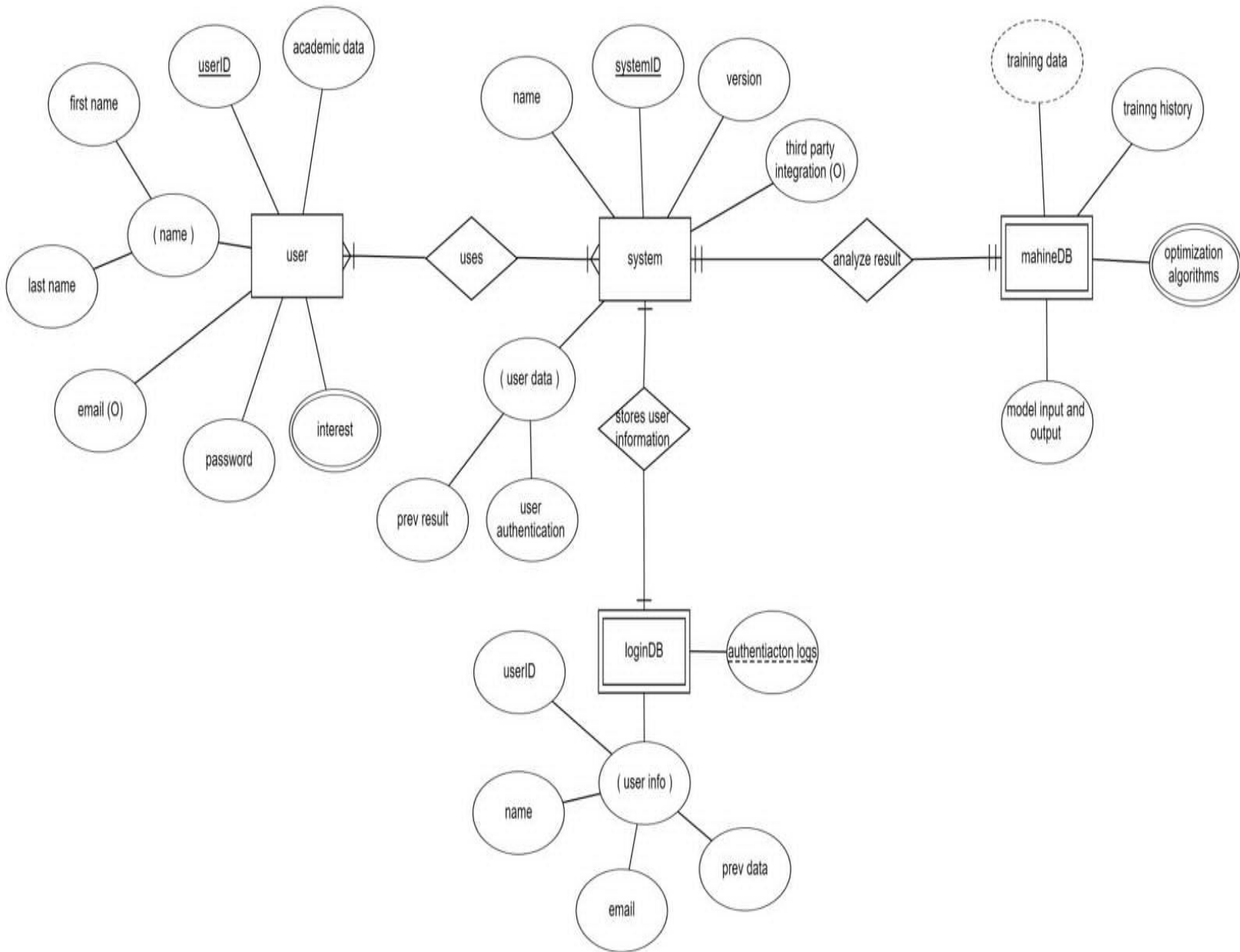
Vision Forge



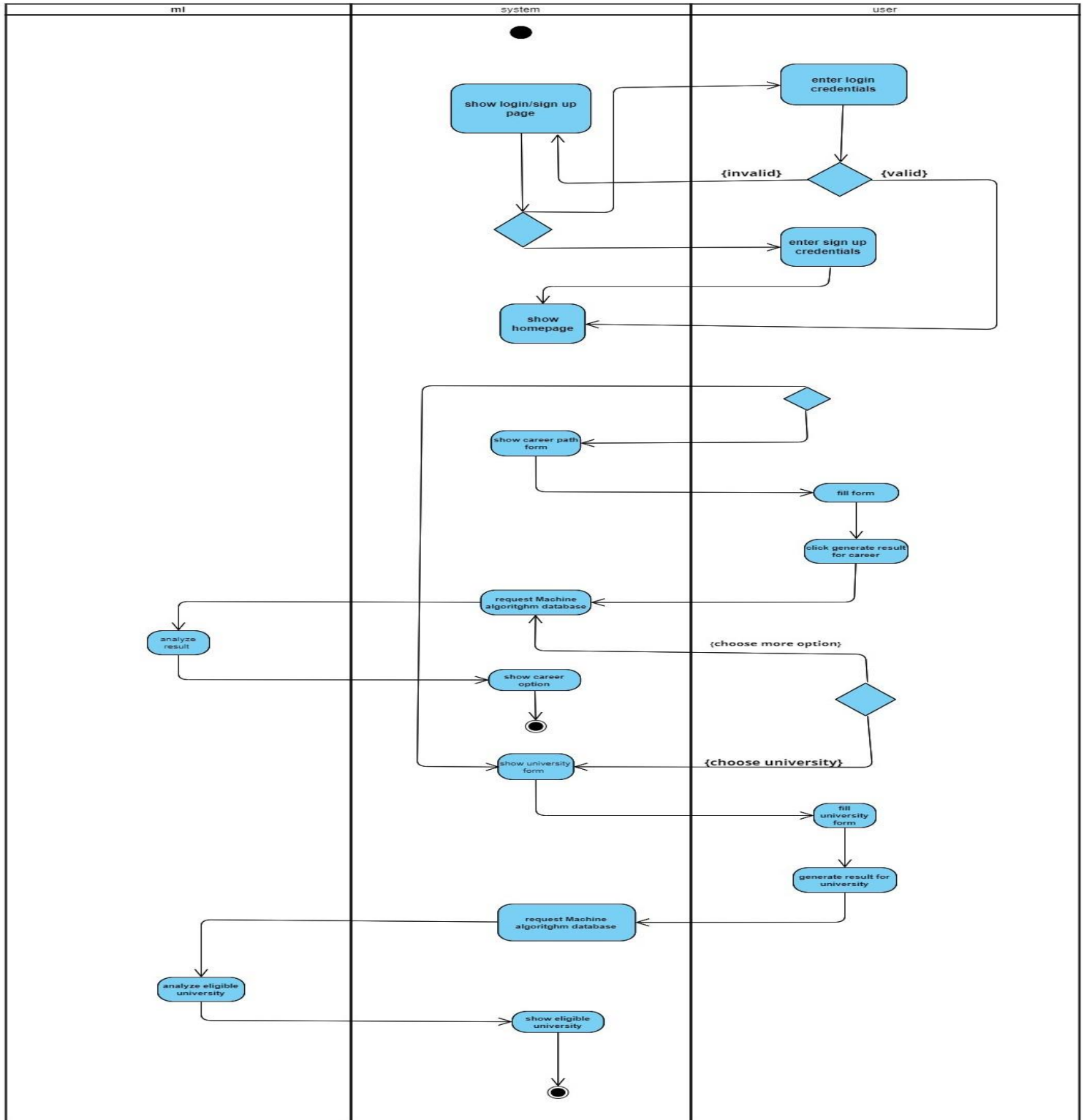
3.4.3 UML Class Diagram



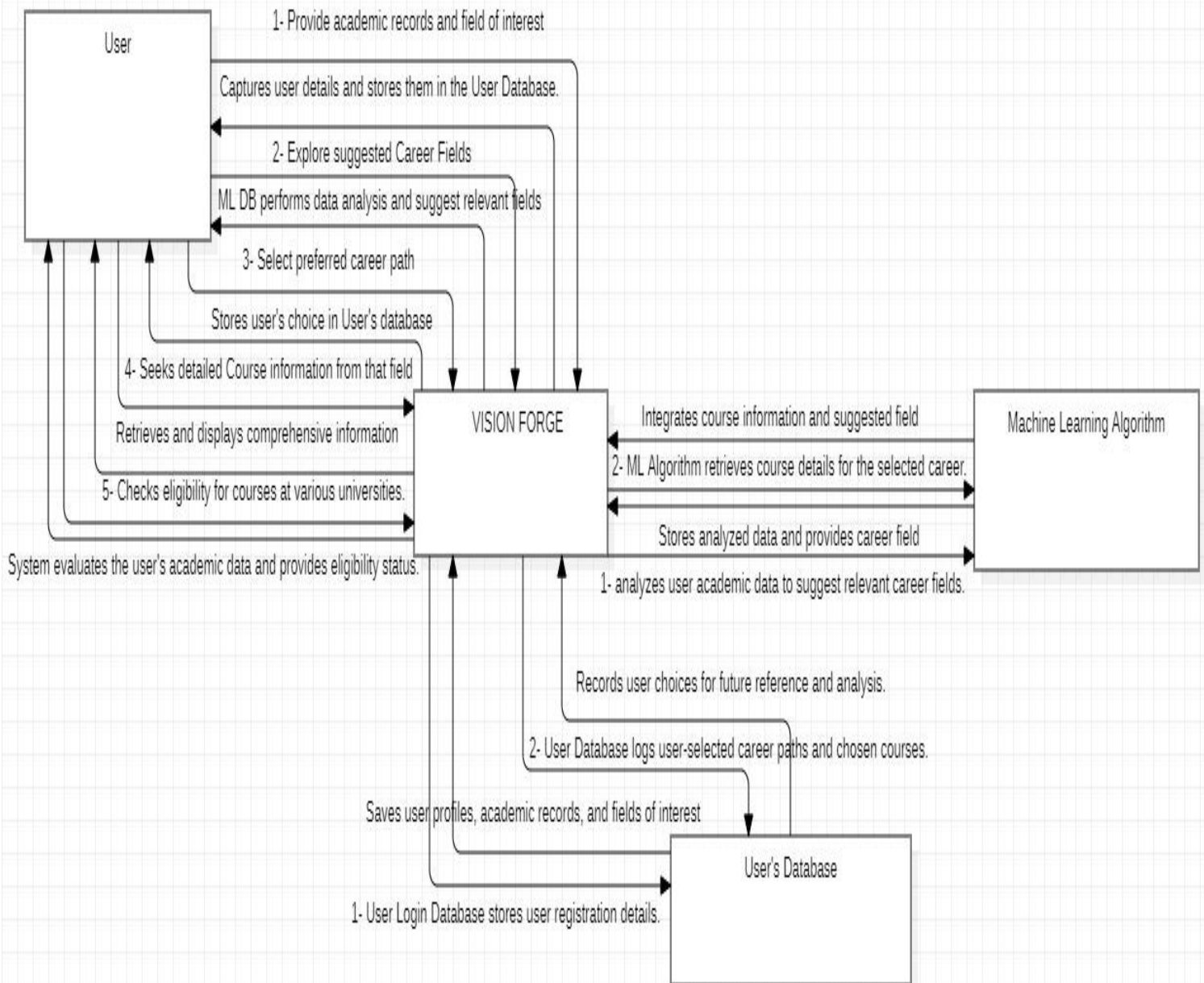
3.4.4 Entity Relationship Diagram



3.4.5 Activity Diagram



3.4.6 Data Flow Diagram



4. Nonfunctional Requirements

4.1 Performance Requirements

Performance requirements ensure the system functions optimally under various conditions. In the case of "Vision Forge," the following performance requirements are essential:

- Response Time:** The system should respond to user queries within 2 seconds to provide a seamless user experience.
- Scalability:** The application should be capable of handling an increasing number of users, with a minimum of 100,000 concurrent users.
- Data Processing Speed:** Data analysis and career recommendations should be generated in real-time, ensuring prompt feedback to users.
- System Availability:** The system should be available 99.9% of the time, with minimal downtime for maintenance.

4.2 Safety Requirements

Safety is a critical consideration for "Vision Forge." To ensure user safety and data security, the following requirements are in place:

- Data Privacy:** The system must comply with data privacy regulations to protect user information.
- User Identity Authentication:** Users must undergo secure authentication to access personal data.
- Data Backup and Recovery:** The system should regularly back up user data and provide a recovery mechanism in case of data loss.
- Security Certifications:** The application must meet relevant security certifications to ensure user data and privacy.

4.3 Security Requirements

Security and privacy are paramount for "Vision Forge." The following security requirements are specified:

- Data Encryption:** User data and communication should be encrypted to prevent unauthorized access.
- Access Control:** Access to sensitive user data should be restricted to authorized personnel.

-Security Certifications: The application must meet security and privacy certifications to ensure data protection.

4.4 Additional Software Quality Attributes

In addition to the primary functional requirements, the following software quality attributes are essential for "Vision Forge":

-Usability: The system should have a user-friendly interface with a user satisfaction rating of at least 90%.

-Reliability: The system should have a reliability rate of 99.9% to ensure consistent service.

-Maintainability: The system should be easy to maintain and update as needed.

5. Other Requirements

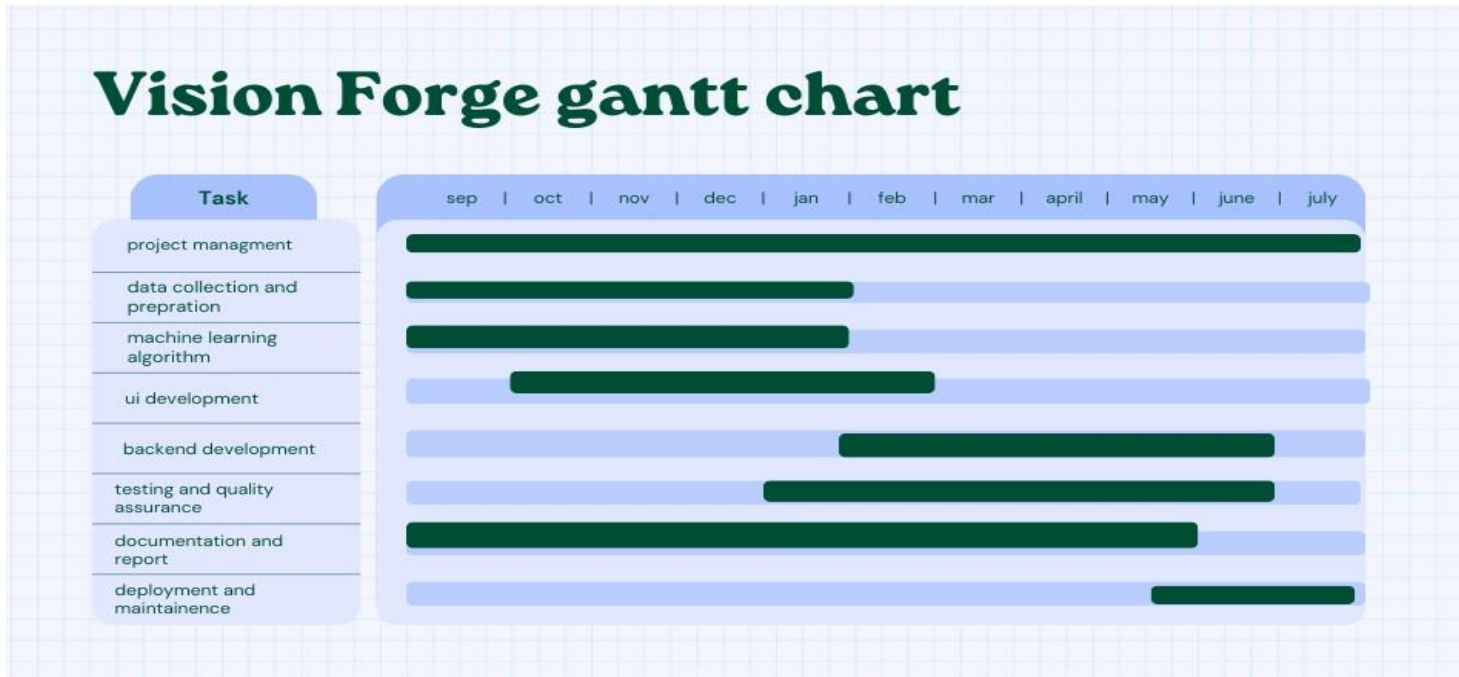
-Database Requirements: The system should utilize a secure and scalable database system for efficient data storage and retrieval.

-External Interface Requirements: The system should integrate with external data sources and APIs for enriching career data.

-Internationalization Requirements: The application should support multiple languages to cater to a diverse user base.

-Legal Requirements: The system must adhere to all relevant legal regulations regarding data privacy and security.

6. Revised Project Plan



7. References

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Appendix A: Glossary

Acronym	Full Form
UML	Unified Modeling Language
SDLC	Software Development Life Cycle
API	Application Programming Interface

Appendix B: IV & V Report

(Independent verification & validation)
IV & V Resource

Name

Signature

S#	Defect Description	Origin Stage	Status	Fix Time	
				Hours	Minutes
1					
2					
3					
...					

Table 2: List of non-trivial defects