A Minor Project Mid-Term Report on

Career Matching and Resume Optimizer

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ABSTRACT

The purpose of our project 'Career Matching and Resume-Optimizer' Web Application is to help graduates, students and job seekers identify potential career fields based on their interests, skills and qualifications. This system will take input such as user skills, preferred work environment, handling tight deadlines, favourite programming language and their dedication to any project through user surveys. The datasets are fetched from different platforms like Kaggle and LinkedIn. Model is built, trained and tested using Content Based Filtering. The model is then deployed using Term Frequency-Inverse Document (TF-IDF). Users get matching career path as an output. User Authentication and Authorization is also integrated in our system. Our platform also includes a resume optimizer tool where users can upload their resume for optimization and receive an ATS-optimized resume. Our project is especially significant for students and fresh graduates where the job market is competitive and rapidly evolving. The scope of the project includes students, job seekers and graduates who are aiming for career growth.

Keywords: Career-Matching, Resume Optimizer, AI-driven, ATS optimization, User-friendly, Scalable

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

Nowadays, students often face a dilemma when deciding to choose a career. There are several factors that influence students when choosing their career path, such as their personal interests, skills, educational achievements and their environment. Upon completing their degree students are normally starting to consider a career path which may suit their skill and potential the best. To eradicate the dilemma to choose career, our project aims to bridge the gap between the users and their desired career paths by utilizing AI. Career planning is a critical aspect for students and professionals especially in today's era where opportunities are limited and competition is high. This system focuses on recommending career fields or specific roles aligned with individual qualifications and interests.

A resume optimization tool is another important feature, as an impressive resume often determines success in securing interviews. By uploading their resumes in the optimizer tool, users can enhance their resume for Applicant Tracking System (ATS). This project automates resume enhancement which highlights the most relevant skills and experiences for the desired field.

In this introduction, we will explore problems and motivation, objectives, project scope and limitations.

1.1 PROBLEM STATEMENT

Many students and graduates struggle to select a professional path due to a lack of direction and the difficulty in matching their interests, talents or skills with relevant possibilities. Another problem is developing professional resumes since most people fail to portray their skills effectively. Existing career counseling services and resume tools sometimes fall short by providing general guidance or one-size-fits-all templates that do not address individual requirements.

To fill this need, we intend to create an AI-powered platform that provides career matching. This system will take input such as user skills, preferred work environment, handling tight deadlines, favourite programming language and their dedication to any project through user surveys. An AI-powered CV optimizer tool analyzes the user's existing resume, identifies areas for improvement and provides suggestions to highlight key skills effectively.

1.2   PROJECT OBJECTIVES

The primary objective of our project is to provide students and recent graduates with a platform that facilitates their path and helps them better understand their career alternatives. With the help of our online application, we hope to close the career advisory that many students lack. Some of the main objectives are as follows:

- To help users identify potential career fields based on their qualifications, experience, interests, skills and preferences.

- To optimize resumes for better presentation of skills and experiences

- To provide a general career plan for students to enter a competitive job market.

1.3   SIGNIFICANCE OF THE STUDY

The significance of our project is rooted in its capacity to deliver accessible career matching to students through AI-driven tools. By offering career matching to individual interests, skills and experience along with a resume optimizer, our platform seeks to fill the gap left by other career matching services. Our system is particularly beneficial for students who may not have access to individualized guidance or are unsure about their future career options. Moreover, the main points that highlight the significance of this project are:

- This platform assists students in clarifying their career paths by offering career matching based on their skills, preferred work environment, handling tight deadlines, favourite programming language and dedication to a project through user surveys.

- The integrated resume optimizer helps users to optimize their resumes efficiently. This feature provides the process of writing resumes, which allows students to differentiate themselves in competitive job environments.

- This platform provides users with essential resources to showcase their abilities and improve their job search efficiency.

- This system tackles the divison between academic instruction and practical job opportunities by leading students toward available career options.

1.4   SCOPE AND LIMITATIONS

The objective of our project Career Matching and resume Optimizer is to create a comprehensive platform that helps students and fresh graduates to successfully navigate their career paths. By integrating key features like a career matching through surveys and resume optimizer tool, our platform delivers a well-rounded solution for career advancement.

The scopes of this project are:

- Our platform provides a career matching feature that links users to appropriate career options based on their skills, preferred work environment, interests and experience through user surveys.

- AI-assisted resume optimization tool enables users to quickly produce professional and customized resumes.

The limitations of this project are:

- Our platform offers limited personalization for users pursuing niche or non-traditional career paths that may not fit within the standard categories provided by the system.

- Our platform relies on the availability of accurate and comprehensive career datasets to function effectively.

- Our project works under a Wi-Fi coverage area so users are required to have a reliable internet connection to access the platform.

2. LITERATURE REVIEW

In this section, we have reviewed some of the existing platforms providing services similar to what we aim to provide. Some that are currently in use are discussed below: The first one we reviewed was EduSanjal.com. It is a comprehensive database of schools, colleges, events and courses related to education in Nepal. Once the user navigates to its website, one can search for schools, colleges or universities in Nepal by location, level of education or type of institution. From the list of institutions that match your search criteria, more details can be explored such as address, contact information and courses offered [1]. However, this platform does not incorporate the functionality of assessing the user and giving them useful career advice and resume-optimizer. Secondly, we reviewed CareerExplorer.com which is a free online platform that helps individuals discover the most suitable career for them by analyzing their personality traits , interests and skills [2]. After answering a series of questions, it gives a personalized list of recommended careers and a summary of the user's strengths, weaknesses and interests. A career plan can be made by comparing different careers and researching each one in-depth using the provided resources and links. Its main drawback is that the test is quite time-consuming. Also, the platform does not include any resume-optimizing technology. Then, we reviewed novoresume.com. It is a website that offers resume-optimizing services. The platform provides a range of templates, design features and optimization tools to create a professional-looking resume [3]. One has to create an account first to get started with the platform. We can browse through the available free templates and then select and edit the one that suits the user's needs. That said, Novoresume's AI capabilities are limited and some users may find that the AI suggestions are not helpful or relevant to their needs. Finally, we reviewed Career Path Suggestion using String Matching and Decision Trees technology. Their model offers real world results for basic and intermediate queries of the students [4] but it can be made more efficient to handle other advanced and complex searches. Further, this was used as the basis to suggest the most appropriate career path for the person given his/her current educational status. The main drawback of the system is that the dataset is from 2015 which might be insufficient and irrelevant at the moment.

3. METHODOLOGY

We have chosen the following methodologies to effectively apply our expertise, skills and techniques, ensuring precise alignment with project requirements.

3.1 SOFTWARE DEVELOPMENT LIFE CYCLE

For the software development process of our project, we've chosen for the Incremental Model, which involves building the system incrementally over multiple iterations. Each iteration encompasses the Analysis, Design, Coding and Testing phases.

In the first iteration, our primary focus was to gather requirements by collecting datasets using platforms like Kaggle and LinkedIn, which were used to train the career recommendation model. The dataset we used to train the model was 'Job Recommendation based on JD' and this data was sourced from web scrapping naukri.com conducted by PromptCloudHQ. The foundational structure of the machine learning model was designed and implemented and initial testing conducted on small datasets. These core components fulfils the foundation of our platform's functionality.

In the second iteration, machine learning model is trained in Google Colab to enable career matching using attributes such as skills, experience, desired salary range, career title, role, industry and domain knowledge. This model is trained using relevant dataset. User authentication and authorization is integrated by creating a functional register/sign up page. Basic User Interface is designed which includes homepage, dashboard.

In the third iteration, a fully functional user-friendly interface is designed to make the platform accessible and easy to navigate for users. This interface enables users to receive career recommendations that match their skills, interests, experience, industry which enhances their career search experience.

In the fourth iteration, the model will be integrated using API into the system. The platform's accuracy and usability will then be tested which ensure that it meets the system's needs and expectations. Necessary adjustments will be done to enhance the platform's overall performance and effectiveness.

In the fifth iteration, a resume optimization model will be integrated to the system which help

users enhance their resumes by highlighting key skills and experiences relevant to their desired career paths for ATS(Applicant Tracking System).

In the subsequent iterations, continuous monitoring of the performance of the system will be conducted to identify areas for improvement and refine career recommendations.

The following subsection briefly describes various phases in the incremental model of SDLC that will be applied in the development of the system:
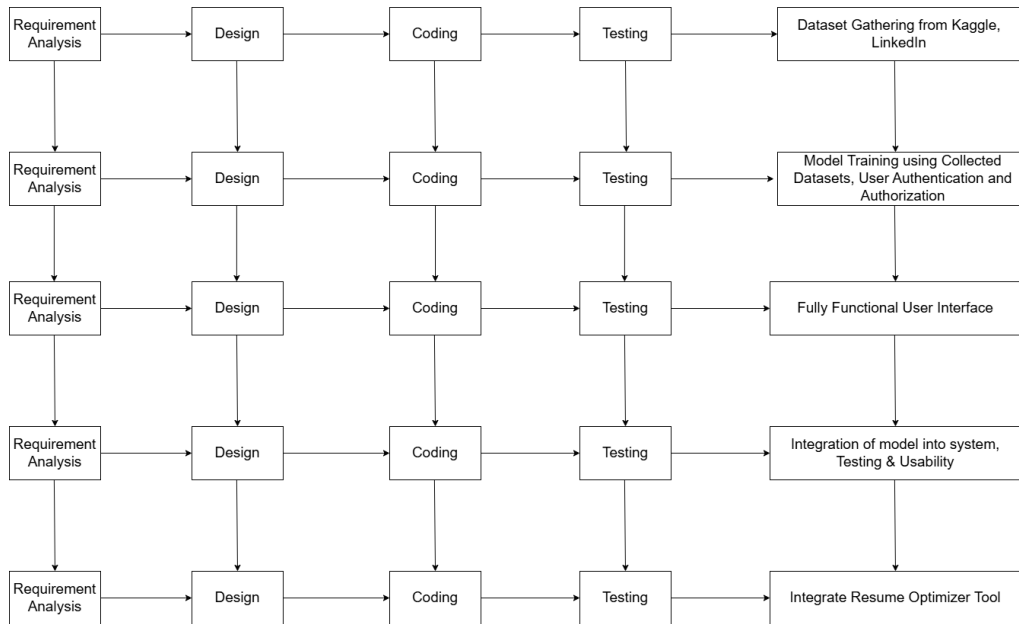

Figure 1: Incremental Model Of Software Engineering

3.1.1   REQUIREMENT ANALYSIS

In the Requirement Analysis phase, datasets were collected from different platforms like Kaggle, LinkedIn. We analyzed these datasets to understand their behavior and characteristics to develop our Machine Learning Model. Different questionnaires were developed from these datasets, which will be asked in the survey. In this phase, requirements were gathered and analyzed which lays the groundwork for our project's success. In the subsequent increments, further polishing of the existing features and addition of new features is to be studied.[5].

3.1.2   SYSTEM DESIGN

Transitioning from requirement analysis, the visualization of our project's architecture was done in the design phase. Here, we used tools like Figma to craft user interfaces which take insights from ER diagrams and Use-Case diagrams. The technical architecture of our system outlines how the client-side, server-side and database components will interact with Machine-Learning Model is developed. In further increments, further design documents are to be prepared depending on the requirements specified.

3.1.3   CODING

In coding phase, the vision outlined in requirement documents and the design artifices was materialized into functional code. In this phase, we have developed a basic user interface using HTML, CSS, and JavaScript, trained our machine learning model using Python and also worked on the backend using PHP and its framework Laravel. Addition of new functionalities is to be done in subsequent increments.

3.1.4   TESTING AND EVALUATION

On the testing phase, we tested our model using smaller datasets to check its accuracy. The User Interface was also tested in this phase. The testing and evaluation will continue with the development of new features in next increments.

3.1.5   MAINTAINENCE

We plan to implement periodic updates and enhancements to address needs, train model with precise accuracy and improve functionality.

3.2   TECHNOLOGIES TO BE USED

Technologies to be Used	Subject
HTML	Structure of webpages
CSS	Styling the components of webpages
JavaScript	Interactivity of webpages
PHP	Backend
Laravel	Framework of PHP
MySQL	Backend Database
Python	Develop machine learning model
Git and Github	Version Control
VS Code	Code Editor
LaTeX	DOcumentation

Table 1: Technologies to be used

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4.   SYSTEM DESIGN

This section provides a comprehensive overview of our system's architecture focusing on key diagrams: Entity-Relationship (ER) diagram, Use Case diagram, Class Diagram, Sequence Diagram and Activity Diagram. These diagrams illustrate the core components and the interactions between them in the system.

4.1   ER DIAGRAM

An Entity-Relationship (ER) diagram is a visual representation of the entities(objects) within a system and the relationship between them. It is commonly used in database design to model the structure and the organization of data.
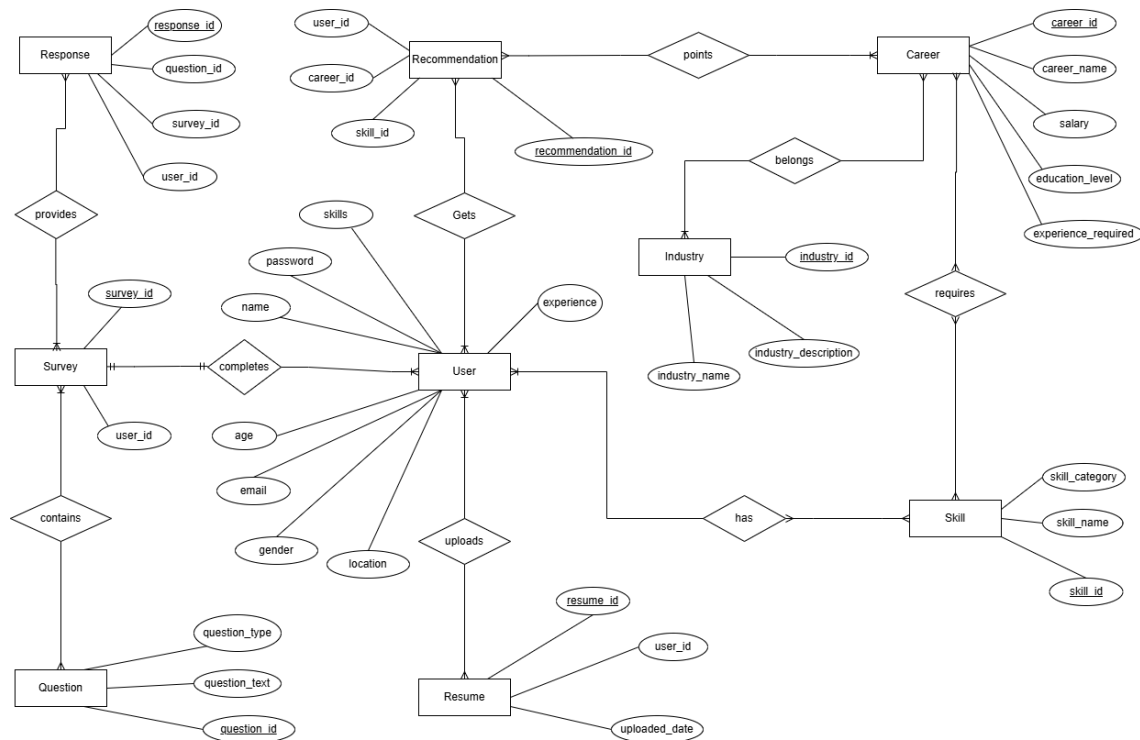

Figure 2: ER Diagram

The entities involved in our system are User, Survey, Response, Question, Recommendation, Career, Skill, Resume and Industry. The relationship between these entities are given below:

User

- A User completes multiple surveys but a survey can be completed by multiple user.

- A user can upload multiple resume but each resume belongs to one user.

- A user can receive multiple career recommendations but each recommendation belongs to one user.

- A user can have many skills but skills can belong to multiple users.

Career

- A career belongs to one industry but an industry can include multiple careers.

- A career requires multiple skills but a skill can be relevant to multiple career.

- Multiple recommendations can relate to one career.

Survey

- A survey contains multiple questions but each question belongs to one survey.

- A survey can collect multiple responses but each response is tied to one survey.

4.2 USE CASE DIAGRAM

A use case diagram is a visual representation of the interactions between actors (In our case: User, System and Admin). It shows the different use cases or functionalities provided by the system and the relationships between the actors and the use cases.
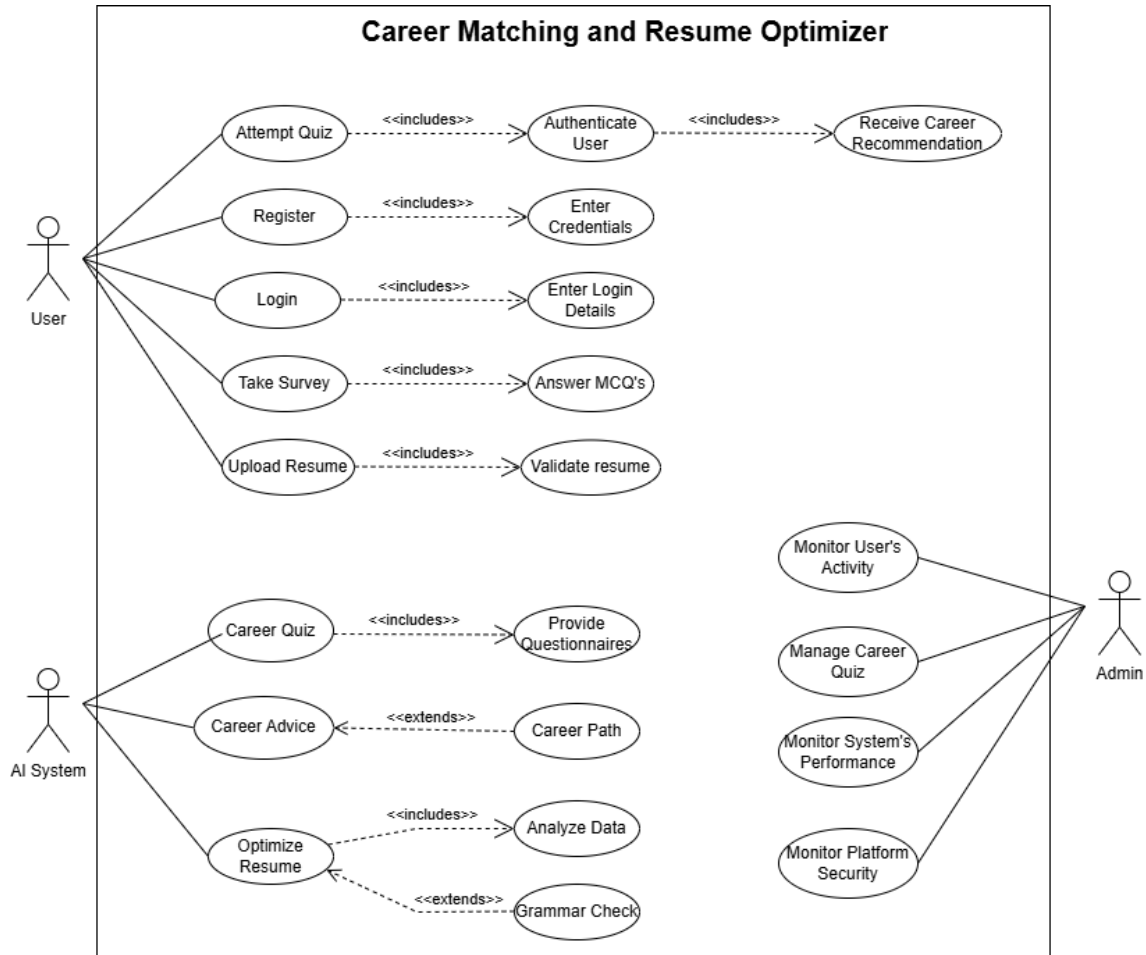

Figure 3: Use-Case Diagram

4.3   CLASS DIAGRAM

Class diagram describes the structure of the system by showing its classes, attributes, operations (or methods), and the relationships among objects. The major classes involved in our system include: User, Survey, Question, Skill, Response, Career, Recommendation, Resume, and Industry.
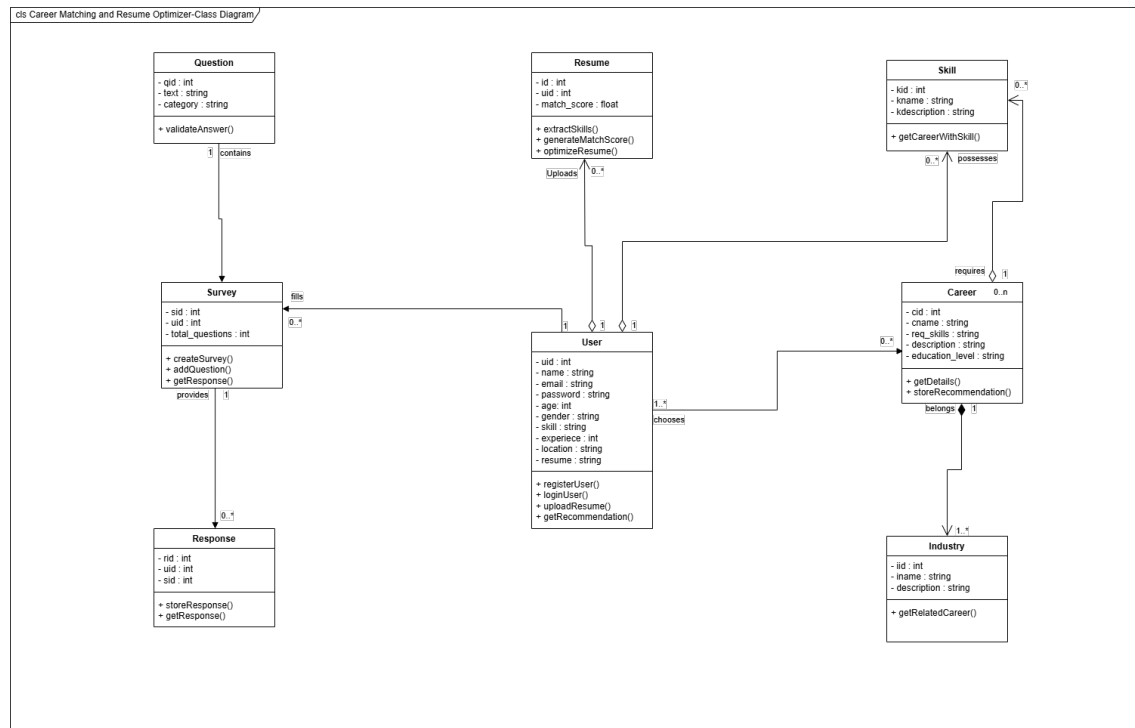

Figure 4: Class Diagram

The relationships between these classes are listed below:

- A user can complete zero or many surveys but a survey can be completed by zero or many users.

- A survey contains one or many questions but a question belongs to one and only one survey.

- As survey can have zero or many responses but a response is associated to one survey.

- A career requires zero or many skills but a skill can be required by zero or many careers.

- A user can upload zero or many resumes but a resume belongs to exactly one user.

- A career belongs to exactly one industry but an industry can have zero or many careers.

- A user can have zero or many skills but a skill can be possessed by zero or many users.

- A user can be interested in zero or many careers but a career can be pursued by zero or many users.

4.4   SEQUENCE DIAGRAM

Sequence diagram illustrates how objects interact in a particular scenario of the system. Two scenarios that have been implemented till now are illustrated through sequence diagram in this section.

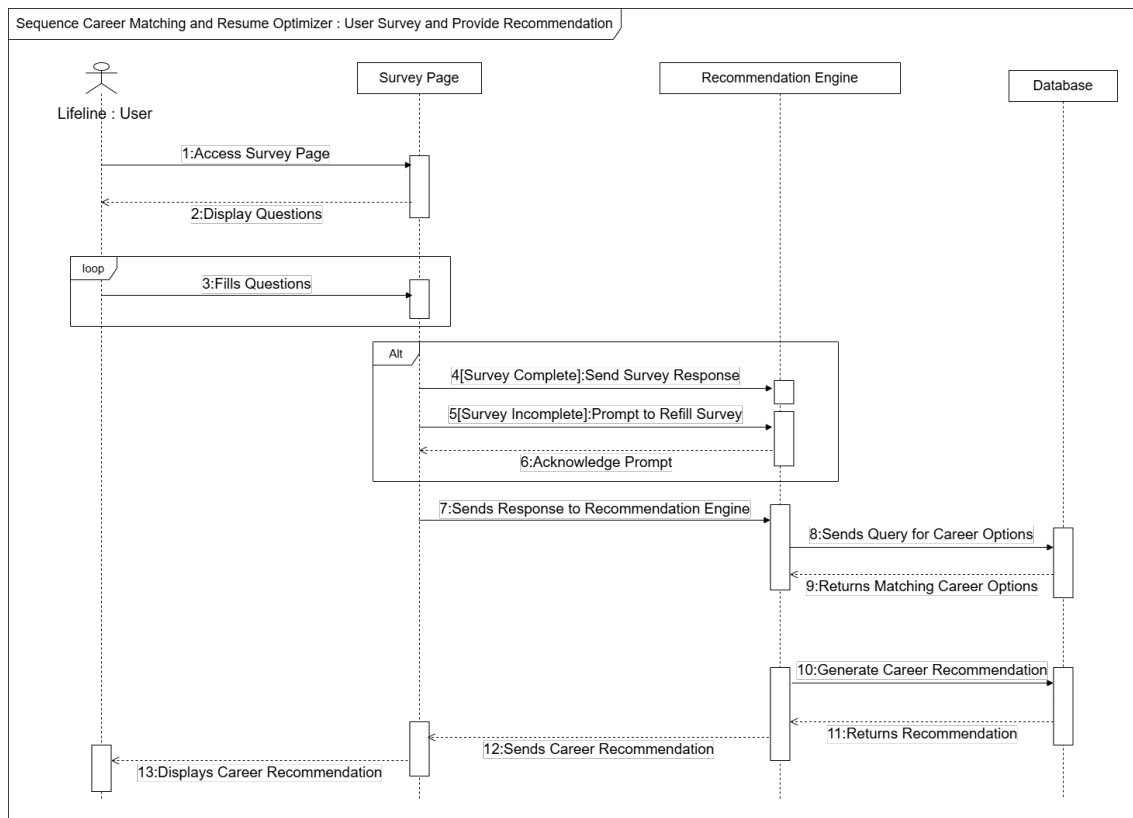- Sequence diagram for User Survey and Providing Recommendation

Figure 5: Sequence Diagram for user Survey Providing Recommendation

The diagram shows the interaction between objects like user, survey page, recommendation engine and databases. Sequence of actions are described below:

1. Survey Interaction

- The user accesses survey page.

- Survey page returns questions to the user.

2. User Fills Questions

- User answers questions displayed in survey page by selecting options and this goes on loop as the user answers question each time.

3. Survey Completion

- If survey is completed, survey page sends response to recommendation engine.

- If survey is incomplete, Prompt is sent to refill the survey.

4. Response to Recommendation Engine

- Survey page sends user's response to recommendation engine.

5. Query for Career Options

- Recommendation engine sends query to database for required careere options.

- Database returns matching career options to recommendation engine.

6. Career Recommendation

- Recommendation Engine asks for career generation for database.

- Database returns career generation to recommendation engine.

- Recommendation Engine sends career recommendation to survey page.

- Finally, survey page displays the matching career recommendation to user.
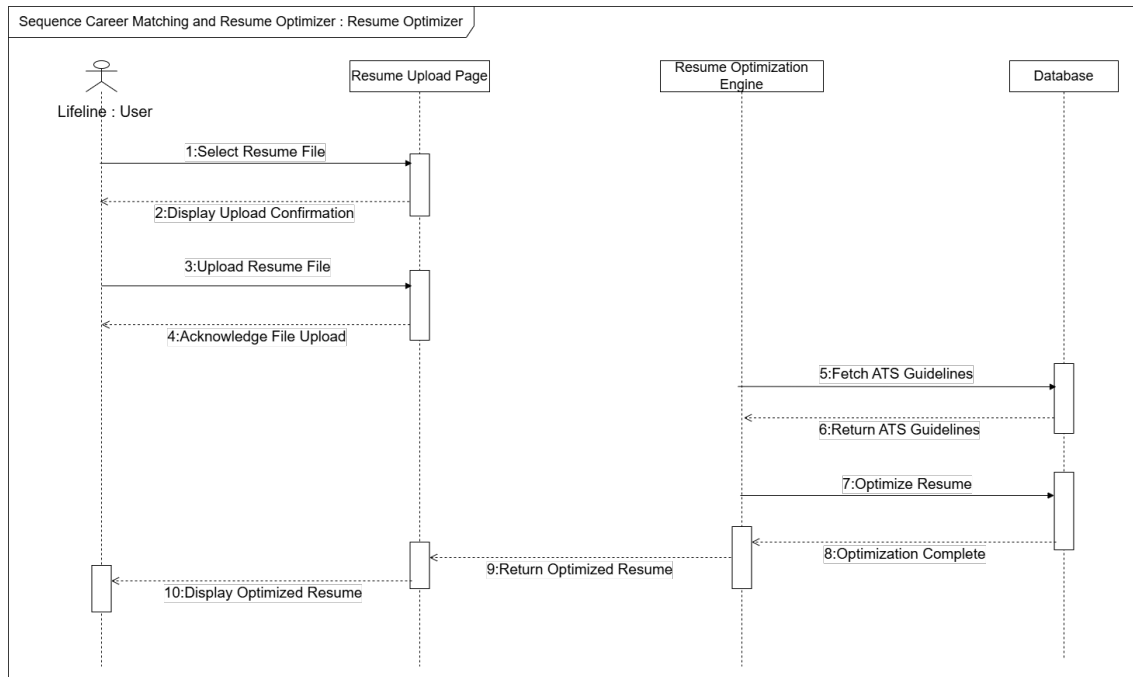
- Sequence diagram for Resume Optimizer

Figure 6: Sequence Diagram for Resume Optimizer

The diagram shows the interaction between objects like user, resume upload page, resume optimization engine and databases. Sequence of actions are described below:

1. Selection of resume file

- User selects resume file to the page.

- User is asked for upload confirmation.

2. Upload Resume File

- User uploads resume file in resume upload page.

- File upload acknowledgment is sent.

3. ATS Guidelines

- Resume optimization engine fetches ATS guidelines from the Database.

- Database returns ATS guidelines to resume optimization page.

4. Optimize resume

- Resume optimization engine sends resume to database for optmization.

- The optimized resume is then sent to resume upload page then it is displayed to user.

4.5 ACTIVITY DIAGRAM

Activity Diagram is the diagram that display the sequence of flow of actions involved in an activity. It is used to describe parallel or concurrent actions.
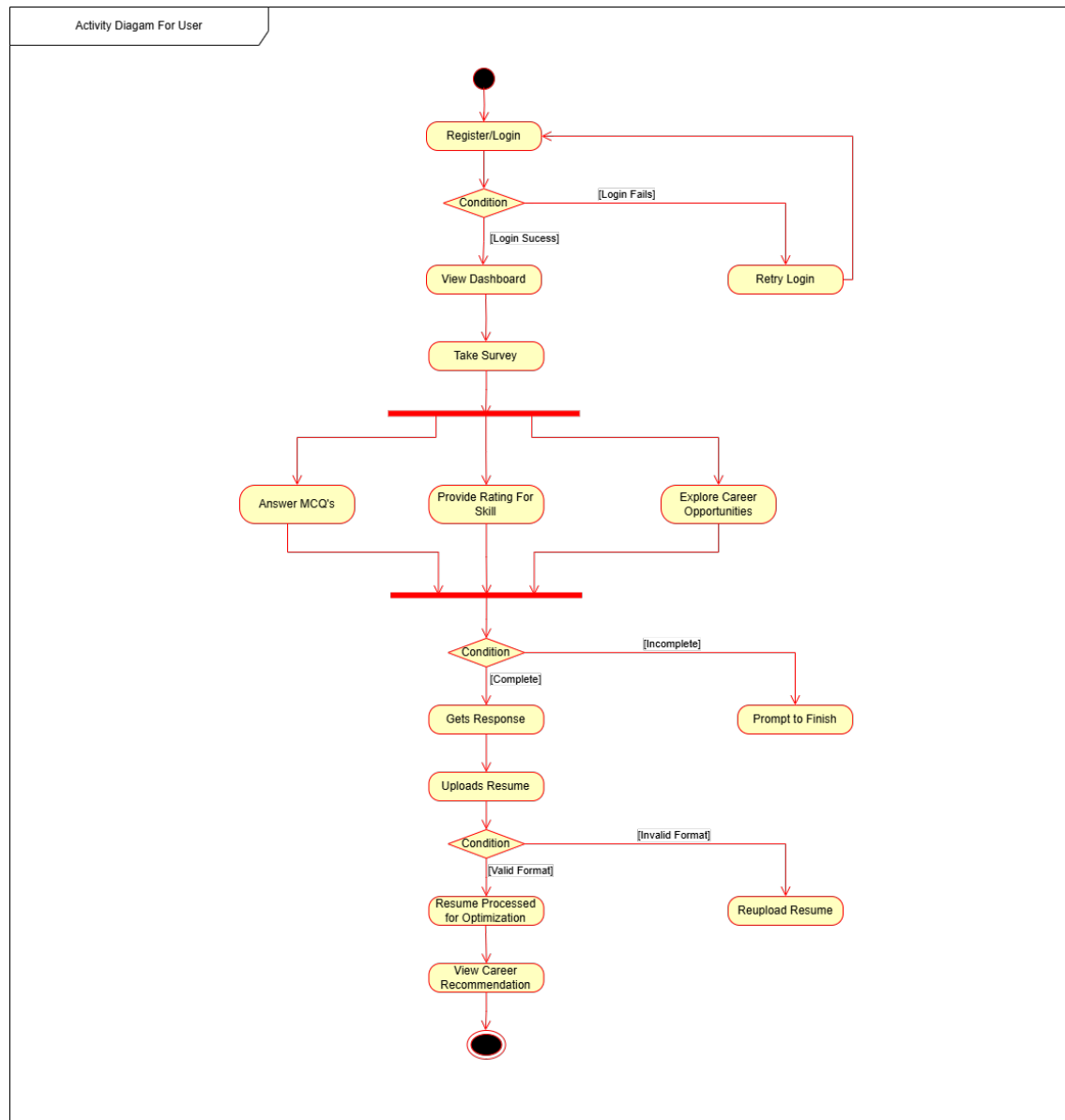
- Activity Diagram for User

Figure 7: Activity Diagram for User

The diagram includes activities for user which shows workflow with respective actions :

1. Start:

   - User initiates the process.

2. Register/Login: The user registers or logs in.

   - If login fails, the user retries to login again.

3. View Dashboard:

   - User can take a view of dashboard.

4. Take survey:

   - A fork node divides this activity into answering mcq's, provide rating for skills and exploring career opportunities.

   - The survey includes questions based on skills, experience, desired salary range, career title, role, industry and domian knowledge.

5. Get Recommendation:

   - If survey is completed, user gets career recommendation.

   - If survey is incomplete, system prompts user to finish filling the questions.

6. Upload Resume: User uploads their resume for ATS (Application Tracking System) analysis.

   - If resume is in valid format, system processess for optimization.

   - If resume is in invalid format, user is asked to reupload resume.
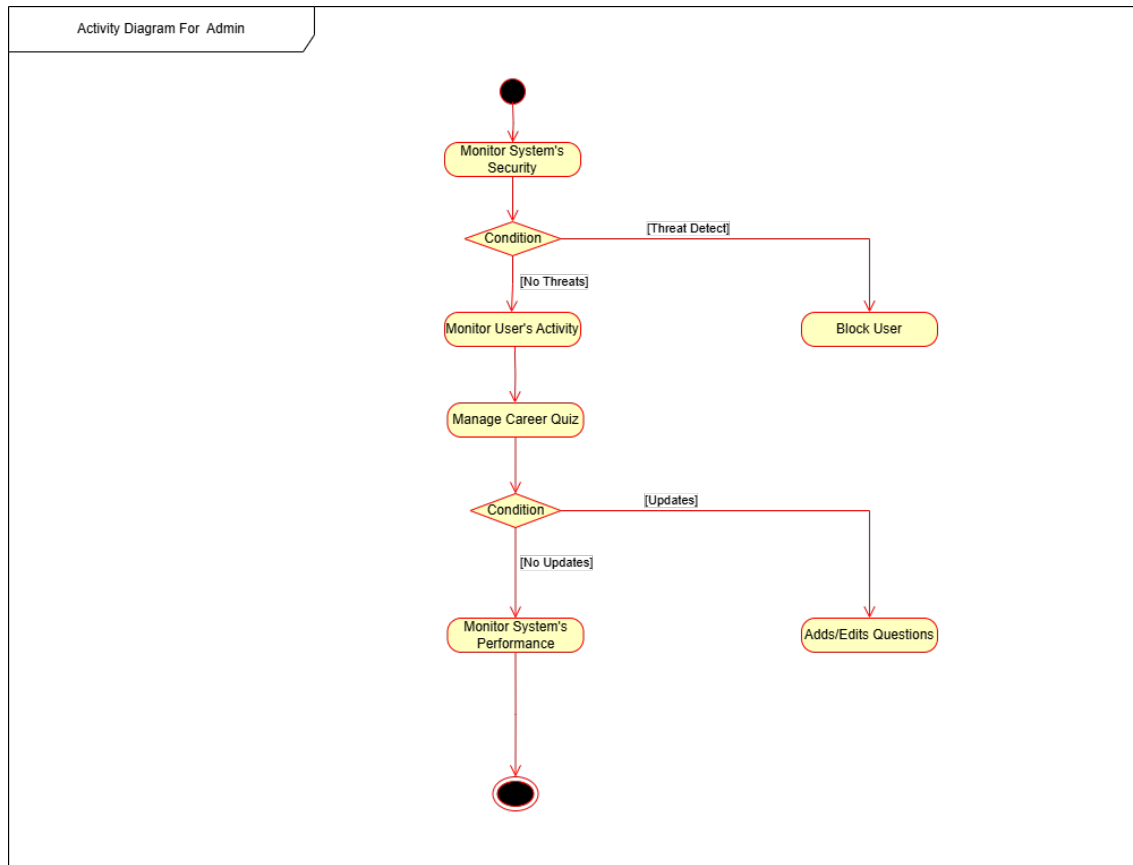
• Activity Diagram for Admin

Figure 8: Activity Diagram for Admin

The diagram includes activities for admin which shows workflow with respective actions:

1. Start:

   • Admin initiates the process.

2. Monitor System Security:

   • If any suspicious activity is detected, user is blocked.

   • If no threat is detected, then activity of user is monitored.

3. Monitor User Activity:

   • The user behaviour is observed to identify engagement of user in the system.

4. Manage Career Quiz:

   • If any update is to be done, admin adds or edits questions.

   • If no updates are to be made, system's performance is monitored.

5. Monitor System's Performance:

   • Admin evaluates the efficiency and effectiveness of the system time to time.

5.   TASKS DONE SO FAR

We have worked on some of the functionalities of the system so far. These functionalities include:

1. Dataset Gathering

   • Dataset was gathered for requirement analysis from different available platforms like Kaggle, LinkedIn .

2. Model Training and Testing in Google Colab

   • A smaller dataset was prepared and was splitted into training and testing subsets. Dataset was splitted into 80 percent for model training purpose and 20 percent for model testing purpose.

   • The model was trained using dataset and its accuracy was evaluated on the testing dataset. Model was refined accordingly.

3. Backend Development

   • Significant progress has been made in backend using Laravel.

4. Basic User Interface

   • A basic dashboard and homepage has been developed for user interface.

5. User Authentication and Authorization

   • A basic sign-up and login page has been created for user authentication and authorization.

6. RESULTS AND DISCUSSION

The tasks completed so far have provided a strong framework for the project's development and initial objectives have been met successfully:

1. Model Training Preparations:

- A smaller dataset has been prepared for training and testing purposes.

- The division of the dataset is done: 80 percent into training and 20 percent into testing. This ensures to evaluate the model's accuracy and performance.

- We selected Python for model training which provides a flexible and powerful environment for machine learning tasks with algorithms as well.

2. Backend Development

- The backend functionalities which is developed using Laravel is well-structured.

- This enables integration with frontend and model training modules.

3. Basic User Interface

- A basic user interface has been created which includes a dashboard and a home page.

4. User Authentication and Authorization

- User authentication and authorization is completed by creating a sign-up and login page.

7. TASKS REMAINING

In the subsequent increments, the following major tasks are to be done :

1. Integration of Model into the system through API

- The AI model is trained and tested in Google Colab which is yet to be integrated into the system. The platform's accuracy and usability will be tested which ensures to meet the system's needs and expectations for precise accuracy.

2. Development of Fully Functional User-Friendly Interface:

- An appealing and fully functional user interface is to be developed which includes survey section in homepage after model integration to the system ensuring ease of navigation for users.

- A fully functional dashboard will be developed to display career recommendations that match the user's skills, interests, experience.

3. Development of Resume Optimization Model:

- A machine learning model is to be built and trained which can analyze and optimize resumes for applicant tracking system.

- Key skills, experiences and achievements will be highlighted that will be relevant to users desired career paths.

- The model will be tested using sample resumes to validate its functionality and accuracy.

8. PROPOSED DELIVERABLES

The proposed Career Matching and Resume Optimizer will provide the following deliverables and outputs:

1. Interactive User Interface: A fully functional dashboard and homepage is integrated which includes a survey section with questionnaires for career matching and a resume upload section to optimize resume.

2. User Authentication and Authorization: Sign-up and Login page is integrated for user authentication and authorization.

3. AI-Powered Career Suggestions: Based on user input by answering questions about skills, industry, functional area, AI will match the career for the user.

4. Resume Optimizer: User can upload resume and AI-powered recommendation will enhance the resume to improve its content for ATS compatibility.

5. Database and Reports: User data storage is centralized which features downloadable insights for career matching and resume enhancement.

9. TASK AND TIME SCHEDULE

The project schedule has been designed as per the requirements and constraints involved. The project is estimated to be completed in about 12-13 weeks. Research and requirement analysis is to be done first and is also crucial for overall working of the project explaining the lengthy time requirements. The project will be well documented on both the iterations reporting the working of the project at each time. Debugging and testing are to be done prior to the completion of the project.

TASK	APPROX DURATION IN DAYS
Requirement Analysis and Specification	41
System Design	11
Coding and Implementation	20
Testing and Debugging each Module	19
Documentation	60

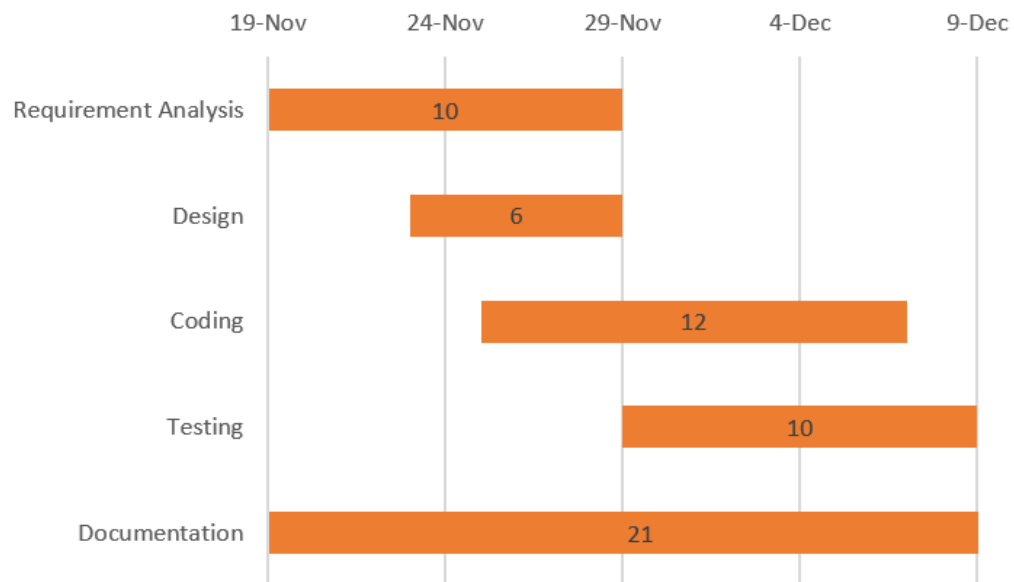Table 2: Time Schedule

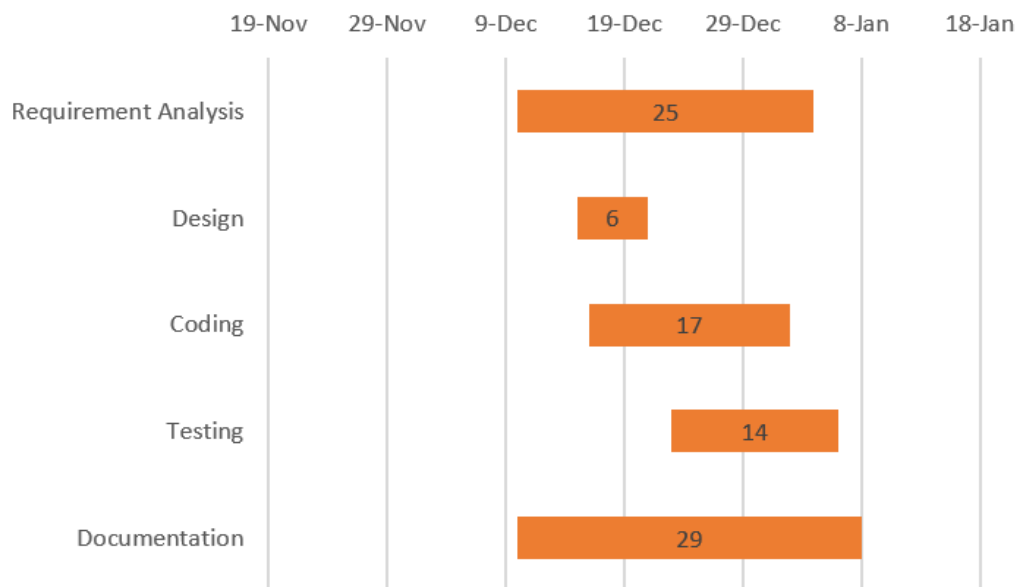## 9.1   GANTT CHART
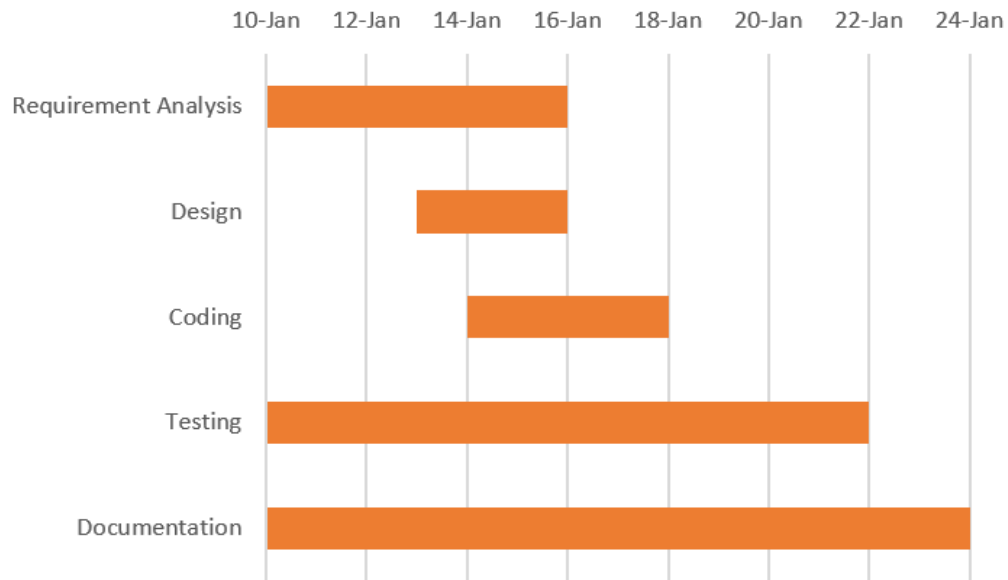

Figure 9: Iteration 1

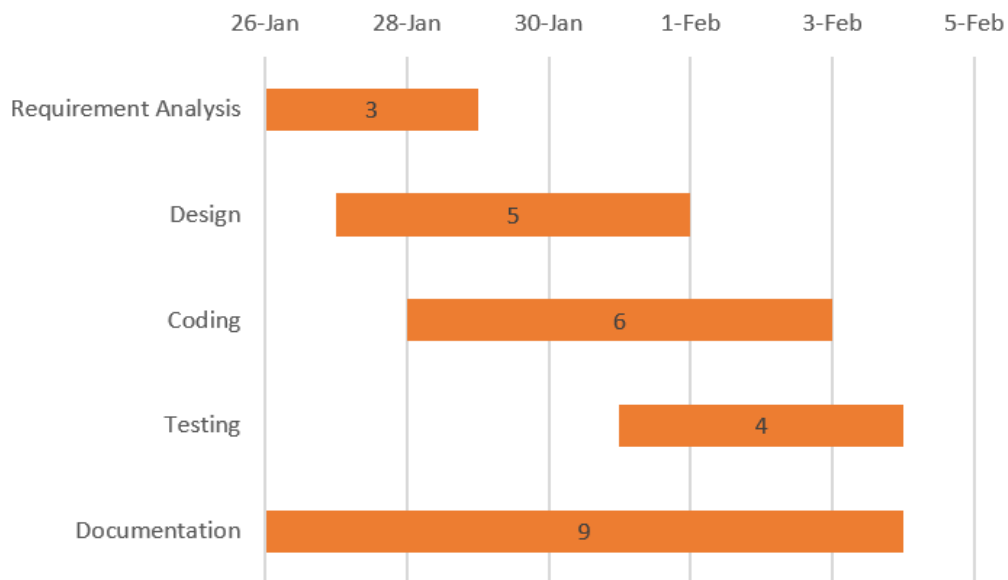Figure 10: Iteration 2
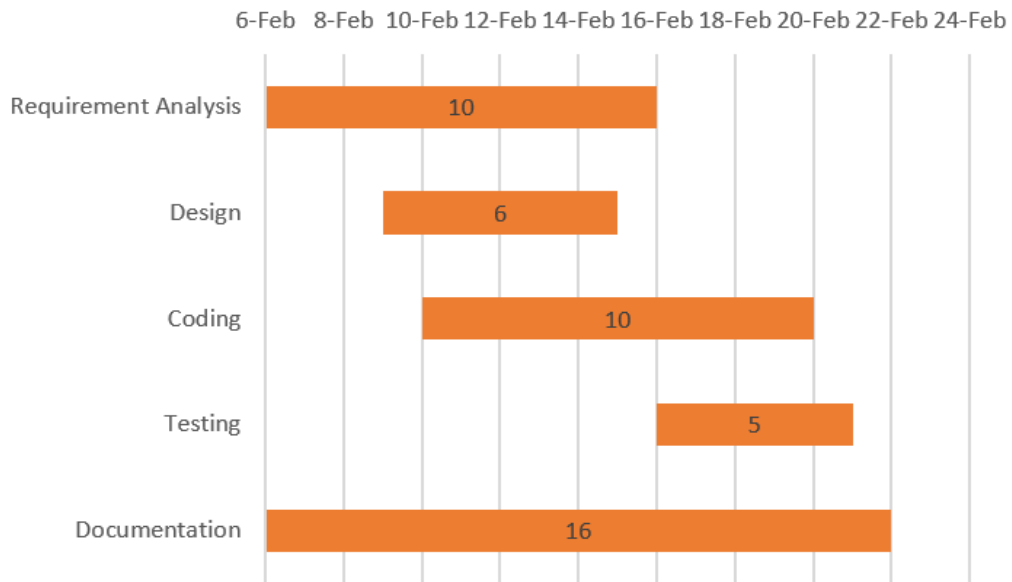
Figure 11: Iteration 3

Figure 12: Iteration 4

Figure 13: Iteration 5

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