

A Minor Project Report on
CAREER ADVISOR

Submitted in Partial Fulfillment of the Requirements for
The Degree of Bachelors in Software Engineering
Under Pokhara University

Alishan Bhujel, 191606
Pralhad Timalisina, 191627
Rishab Kumar Shah, 191635

Under the Supervision of
Bhusan Thapa

Date:
13th July 2023



Department of Software Engineering

**Nepal College of Information
Technology**

Balkumari, Lalitpur, Nepal

ACKNOWLEDGEMENT

This project would not have been possible without the joint effort of many individuals. It has been a pleasure for us to acknowledge this assistance and contributions that were very important and supportive throughout the project. We would like to extend our sincere thanks to all of them. We owe special thanks to a number of people who have devoted much of their time and expertise without which it would have been very difficult for us to complete our project entitled “Career Advisor”.

We are highly indebted to our Project Supervisor **Bhusan Thapa**, for his valuable guidance throughout the project development period and for providing technical support with suggestions which helped our project to grow and foster to a certain level we didn’t think of reaching in such period of time.

Last, but not the least, we would like to thank our teacher and colleagues who have been knowingly or unknowingly been the part of this project and lent support and views during the entire development time.

ABSTRACT

Career advisor application is a web-based application that helps individuals make informed decisions about their career options that they can pursue depending upon their skills sets. The web-based user interface allows users to input their information about their skills and retrieve career options that are suitable for them and job information that are available based on the career options. Career advisor is designed to in a way to provide information to the users on a real time basis by providing information on career options and jobs available in the market at the time.

Keywords: Career Advisor, ML, Web Scraping, Personalized Suggestions.

Table of Contents

1. INTRODUCTION	1
1.1 PROBLEM STATEMENT	1
1.2 PROJECT OBJECTIVES	1
1.3 SCOPE AND LIMITATIONS	2
1.4 SIGNIFICANCE OF STUDY	3
2. LITERATURE REVIEW	4
3. METHODLOGY	5
3.1 ANALYSIS PHASE	6
3.2 DESIGN PHASE	6
3.3 CODING PHASE	6
3.4 TESTING PHASE	7
3.5 MANAGING INCREMENTS	7
4. TECHNOLOGIES USED	9
5. DATA COLLECTION AND ANALYSIS	10
5.1 DATA COLLECTION	10
5.2 DATA ANALYSIS	10
6. SYSTEM DESIGN AND UML MODELS	11
6.1 USE CASE DIAGRAM	11
6.2 CONTEXT DIAGRAM	12
6.3 ACTIVITY DIAGRAM	13
6.4 E-R DIAGRAM	14
7. SYSTEM DEVELOPMENT	16
8. TESTING	19
9. RESULT AND DISCUSSION	19
10. PROJECT TASK AND TIME SCHEDULE	20

11.	CONCLUSION AND FUTURE EXTENSIONS.....	23
12.	REFERENCES.....	24
	APPENDIX.....	25

List of Figures

Figure 1: Incremental Model	6
Figure 2: Role Distribution Pie-Chart	10
Figure 3: Use Case Diagram	11
Figure 4: Context Diagram	12
Figure 5: Activity Diagram	13
Figure 6: E-R Diagram	14
Figure 7: Confusion Matrix	16
Figure 8: Error Rate vs K	18
Figure 9: Gantt Chart for incremental model 1	20
Figure 10 Gantt Chart for incremental model 2	21
Figure 11 Gantt Chart for incremental model 3	22
Figure 12 Home Page	25
Figure 13 Login Page	26
Figure 14 Survey Page	27
Figure 15 Careers Page	28
Figure 16 Jobs Info Page	29

List of Tables

Table 1: Classification Report	17
Table 2: Unit Testing Table	19

1. INTRODUCTION

Career Advisor is a web-based application that assists users to provide multiple career options that they can pursue from dependent upon their skills sets and to also provides information about the currently available jobs in the market. This document provides the scope and context of the project to be undertaken. It also provides a schedule for the completion of the project, including a list of all the deliveries and presentations required.

1.1 PROBLEM STATEMENT

As the job market continues to evolve and expand with numerous career options college students often encounter difficulties in accessing comprehensive and personalized career guidance that aligns with their interests and skills. The usual career guidance resources may not consider the individual preferences and requirements of students. In addition, students face the challenge of accessing accurate and updated information about different career paths, making it harder for them to explore and compare their options effectively. This can result in a lack of direction, confusion, and dissatisfaction with their current career, which can hinder their professional growth and development.

1.2 PROJECT OBJECTIVES

1. To develop a career advisor web-based application using ML techniques to assist users in choosing a career path.
2. To create a web-based interface for users to input their skills sets, get information on relevant career paths matching their skills sets.
3. To get information about the jobs available matching their skills sets.

1.3 SCOPE AND LIMITATIONS

Scope:

1. This project can help the users to identify their skills and ultimately suggest a career path.
2. The project can provide users with information about various job roles, industries, and career opportunities.
3. This project can operate 24/7, providing users with instant access to career guidance and advice.

Limitations:

1. The accuracy of the career suggestions depends on the quality and completeness of the dataset used for training.
2. Users may not trust or feel comfortable discussing personal career- related matters with a chatbot.

1.4 SIGNIFICANCE OF STUDY

This project aims to tackle the immediate need for personalized career guidance for college students. Career advisor apps provide individuals with a wide range of resources and information to explore various career paths. Choosing a career is a crucial decision that can have a significant impact on a person's life. Research on career advisor apps can shed light on how these apps influence users' career decisions-making process, understanding the factors that influence user's career choices and the effectiveness of app features in facilitating informed decisions can help individuals make better career-related choices. Career advisor application provides access to a wealth of information related to job listing, company profiles and career advice. This project represents an innovative application of technology in the field of career guidance. This project can also be a cost-effective solution for delivering career advice, as compared to hiring and training human career counselors. This project's outcome has the potential to empower students with the knowledge and guidance needed to shape their future careers.

2. LITERATURE REVIEW

A comprehensive literature study was conducted to explore existing research and works related to career guidance applications. This literature study aims to examine the existing research and literature surrounding career guidance applications exploring their effectiveness, user perceptions, and potential implications for career counseling. As of today, there are several career advising applications such as LinkedIn, Indeed, Glassdoor, CareerBuilder, Monster, MyPlan. Some of the applications with their features described below:

LinkedIn: It is a professional networking platform with access to job listings. It assists in building connections with professionals in their respective fields. This application provides insights into different career paths with personalized job recommendations and provides professional development resources with company profiles and reviews. (LinkedIn)

MyPlan: It is a career assessment application which provides personalized career recommendations with detailed career profiles and information. Likewise, this application provides education and training requirements for different careers and does skills assessment and matching. It also has a feature for resume building and cover letter tips. (MyPlan – Career Assessment Tool and Resources)

CareerExplorer: This application provides comprehensive career assessment tools with personalized career recommendations based on interests, values, and skills. This application provides features such as in-depth career profiles with detailed information, education and training requirements for different careers, job outlooks and salary data, resources for exploring and comparing different careers, skill development suggestions, and access to expert career advice and guidance. (CareerExplorer)

Another perspective indicated that Career Advisor can be referred to as services and activities intended to assist individuals, of any age and at any point throughout their lives, to make educational, training, and occupational choices and to manage their career. “Career Advisor” denotes systematic programs that facilitate individual career development and career management.

3. METHODOLOGY

Every task is carried out with some methods, the method is either scientific or common, it provides desired output. We have proposed to construct this project using Incremental Model of Software Process Model.

This model combines linear sequential model with the iterative prototype model. The first increment is a core product and new functionality will be added as each increment is developed. The phases of the linear sequential model are Analysis, Design, Coding, and Testing. The software repeatedly passes through these phases in iteration, and an increment is delivered with progressive changes.

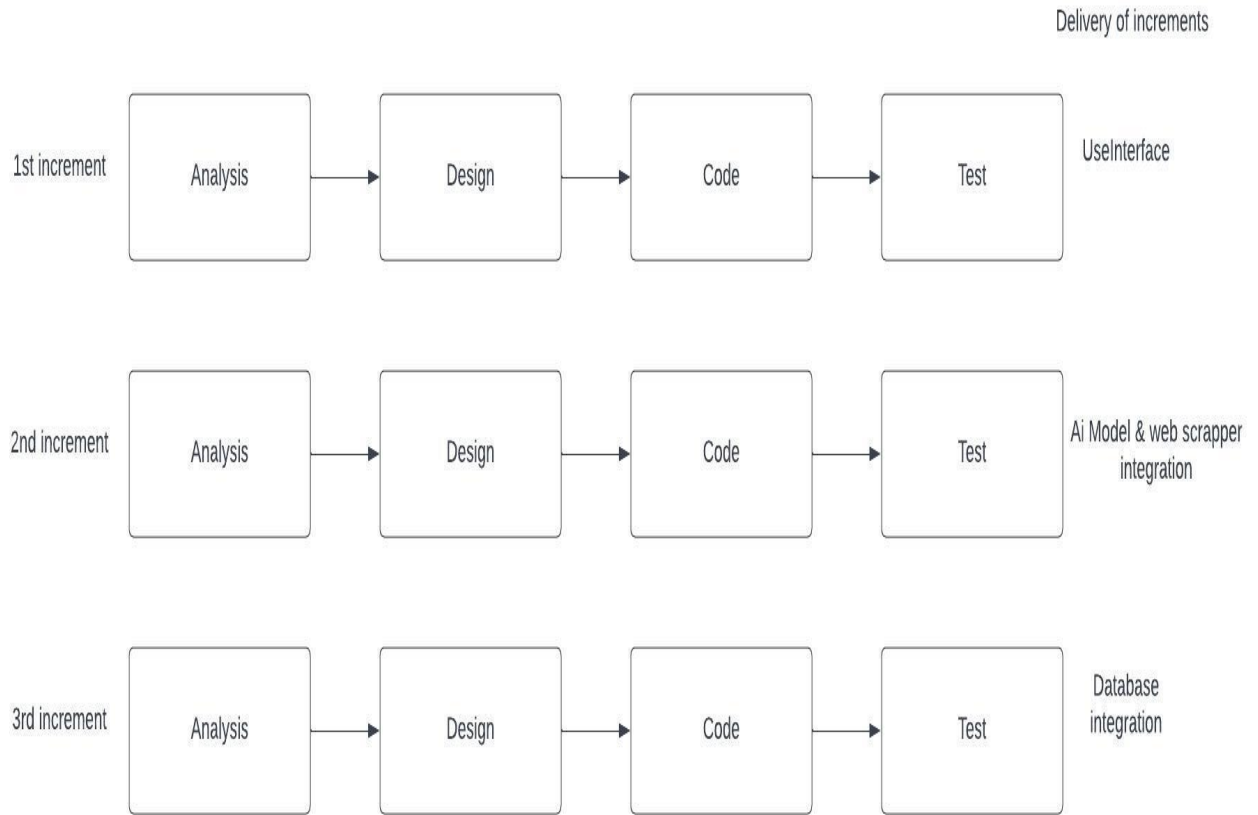


Figure 1: Incremental Model

Incremental model includes the following phases:

3.1 ANALYSIS PHASE

In this phase, the requirement of the software is analyzed and gathering the requirement of the software, including the scope, objectives and constraints.

3.2 DESIGN PHASE

In this phase, the SRS would be translated into system's design in this phase. Context Diagram, Use- Case Diagram, ER Diagram and Class Diagram are developed.

3.3 CODING PHASE

In this phase, coding will be done as per the designs, and a working system will be developed by the end of this process.

3.4 TESTING PHASE

In this phase, the system will be tested. With each test, a list of changes to the system developed is suggested. The changes will be applied to the software and delivered in successive increments until a satisfying system is achieved.

3.5 MANAGING INCREMENTS

Each stage of incremental model adds some functionality to the product and passes it on to the next stage. The iteration process, which includes the delivery of the increments to the user, continues until the software is completely developed, i.e., iteratively enhance the requirements until the final software is implemented.

- INCREMENT 1: Developed User Interface

In this phase, we focused on analysis and design of our system with the help of objectives of our project. This helped us to figure out every aspect of the project and take time into consideration. A User Interface was developed in this phase.

- INCREMENT 2: AI Model and Web Scraper Integration

In this phase, we worked on the development and integration of the AI Model with the help of data sets collected in the first increment. We were also able to develop and integrate Web Scraper into the application.

- INCREMENT 3: Database Integration

In this phase, we worked on finalizing our development of the web application by integrating database into the app to provides features such as to login and register for the users.

4. TECHNOLOGIES USED

- HTML and CSS to develop interactive user interfaces.
- JavaScript adds user interaction for event handlers and behaviors.
- Python for web scrapping and machine learning.
- Django framework for backend web applications based on Python.

5. DATA COLLECTION AND ANALYSIS

5.1 DATA COLLECTION

Data relevant to our project was collected from sources of similar projects. The data we have collected has seventeen categories of roles which can be further categorized according to the proficiency level of the user in those categories.

5.2 DATA ANALYSIS

The data that we have collected is equally distributed among the roles which can be shown by the figures below:

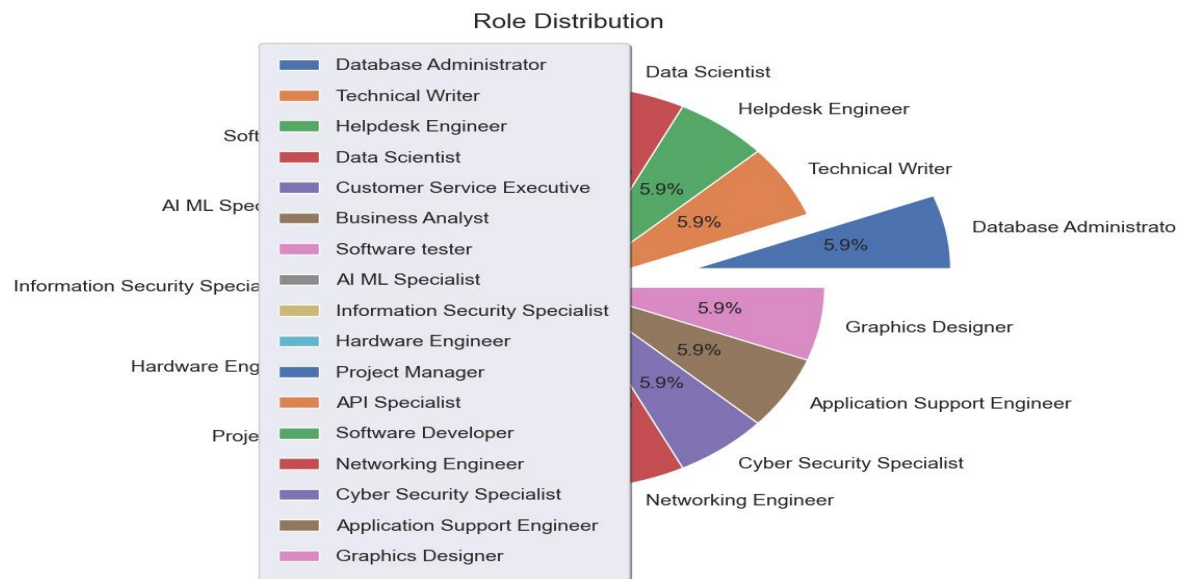


Figure 2: Role Distribution Pie-Chart

Here, the diagrams show that all the seventeen roles have equal no of data to for the ai model to train with.

6. SYSTEM DESIGN AND UML MODELS

6.1 USE CASE DIAGRAM

A use case diagram at its simplest is a representation of a user's interaction with the system that shows the relationship between the user and the different use cases in which the user is involved. The actors for our system are the user, system admin and API's. The simplified and graphical representation of what our system must do is represented below:

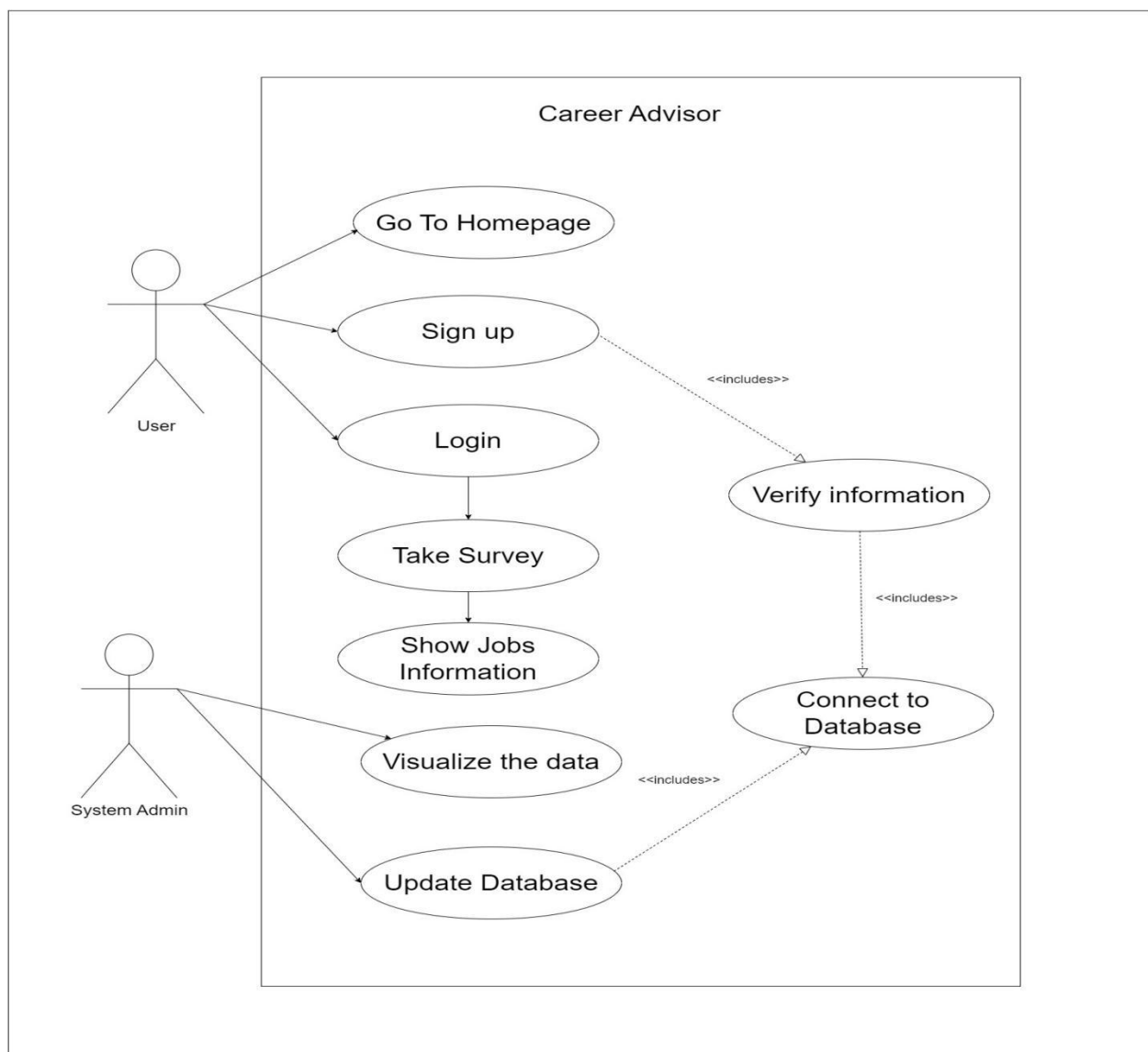


Figure 3: Use Case Diagram

6.2 CONTEXT DIAGRAM

The overall explanation of a system is represented by a context diagram. Using this diagram, we define the boundary between the system, or part of system, and its environment, showing the entities that interact with it. The diagrammatic representation of Career Advisor context diagram is represented below:

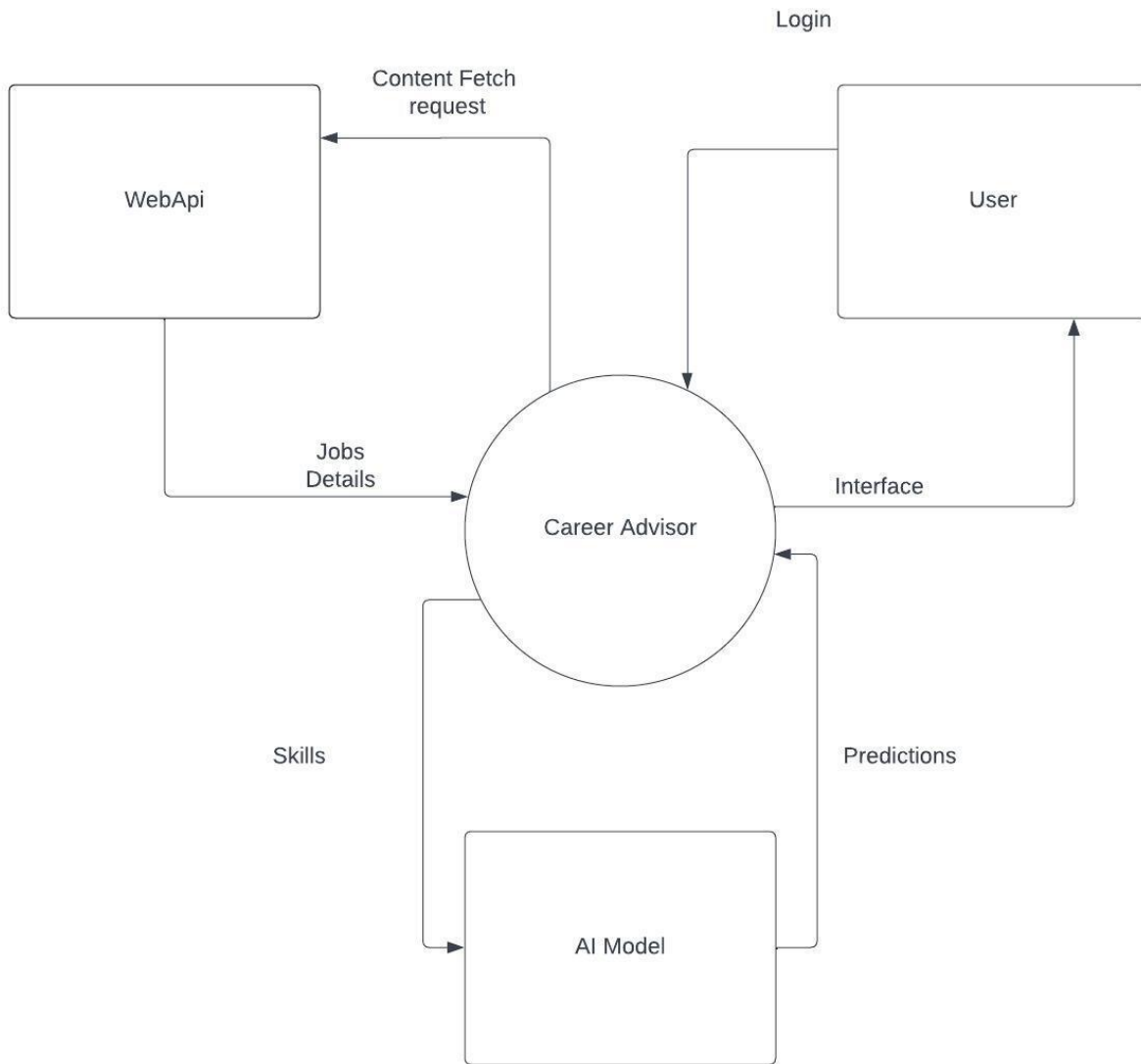


Figure 4: Context Diagram

6.3 ACTIVITY DIAGRAM

Activity diagram shows the workflow from the start to finish point. It is used to display the sequence of activities. The figure below shows the start to end activities while using the application.

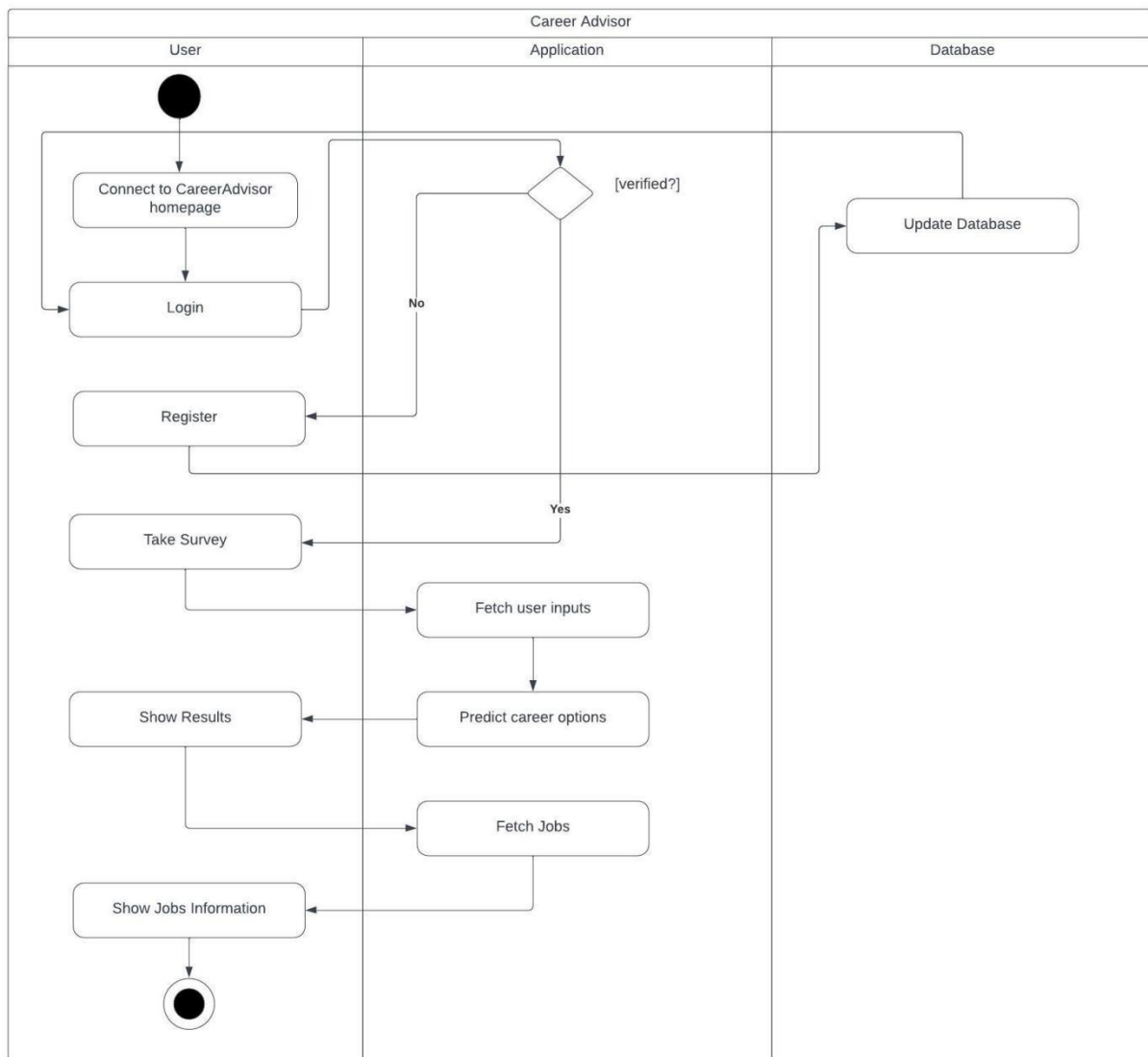


Figure 5: Activity Diagram

6.4 E-R DIAGRAM

The ER diagram is pictorial representation of the overall logical structure of the system's database. The ER Diagram of our system is given below. It shows the relationship between two entities, user, and application. The entities are represented in the rectangle, their attributes are represented in the oval and the attributes that are underlined are the primary key.

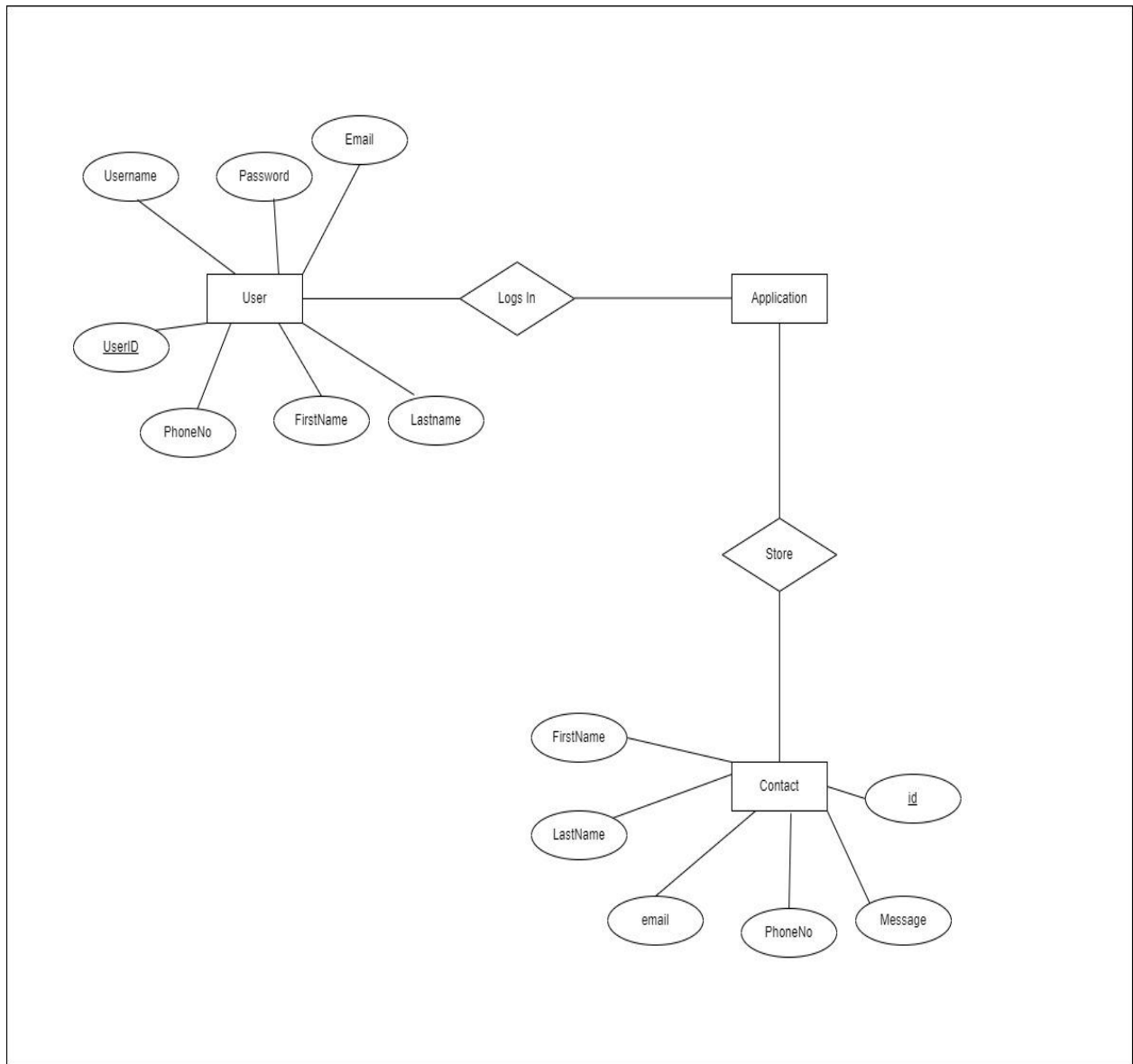


Figure 6: E-R Diagram

6.5 FIGMA DESIGN

The role of Figma as the primary design tool used in Career Advisor for creating web pages. Figma is a popular cloud-based design platform that offers numerous features and benefits to streamline the web design process. Figma facilitated the design workflow, improved collaboration among team members, and enhanced the overall productivity in developing web pages for Career Advisor.

Figma played a significant role in the successful design of web pages for Career Advisor. Highlight the overall impact on the project's efficiency, collaboration, and the quality of the final product. Conclude with a forward-looking perspective on how Figma can continue to be an integral part of future web design projects within the organization.

7. SYSTEM DEVELOPMENT

The algorithm used to develop the system is K-Nearest Neighbors Algorithm, it is a non-parametric supervised learning classifier, which uses proximity to make classifications or predictions about the grouping of individual data points. By using this algorithm, we were able to get accuracy of 97% for the datasets. The confusion matrix and classification report for this model is given below:

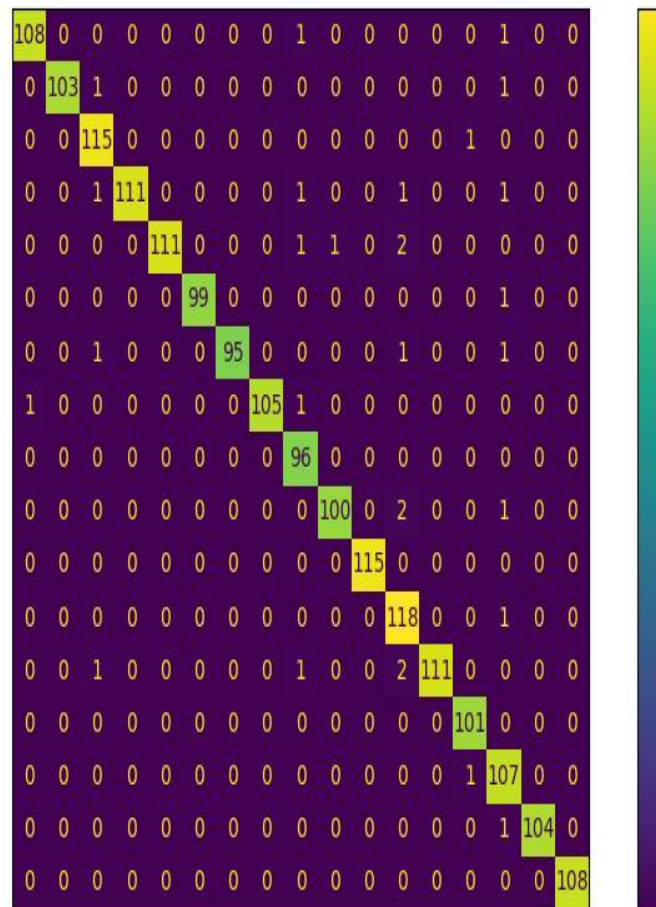


Figure 7: Confusion Matrix

	Precision	Recall	F1-score	Support
0	0.98	0.98	0.99	110
1	1.00	0.98	0.99	105
2	0.97	0.99	0.97	116
3	1.00	0.97	0.97	115
4	0.98	0.97	0.97	115
5	1.00	0.97	0.98	100
6	1.00	0.98	0.96	98
7	0.97	0.97	0.97	107
8	0.95	1.00	0.97	96
9	0.99	0.98	0.98	103
10	1.00	0.97	0.97	115
11	0.94	0.99	0.99	119
12	1.00	1.00	0.97	115
13	0.98	0.98	0.97	101
14	0.93	0.97	0.96	108
15	0.99	0.99	1.00	105
16	0.97	0.97	1.00	108
Accuracy			0.97	1836
Macro Avg	0.98	0.97	0.97	1836
Weighted Avg	0.97	0.97	0.97	1836

Table 1: Classification Report

The graph below shows the relation between the error rate and the value of k (no. of neighbors to compare with).

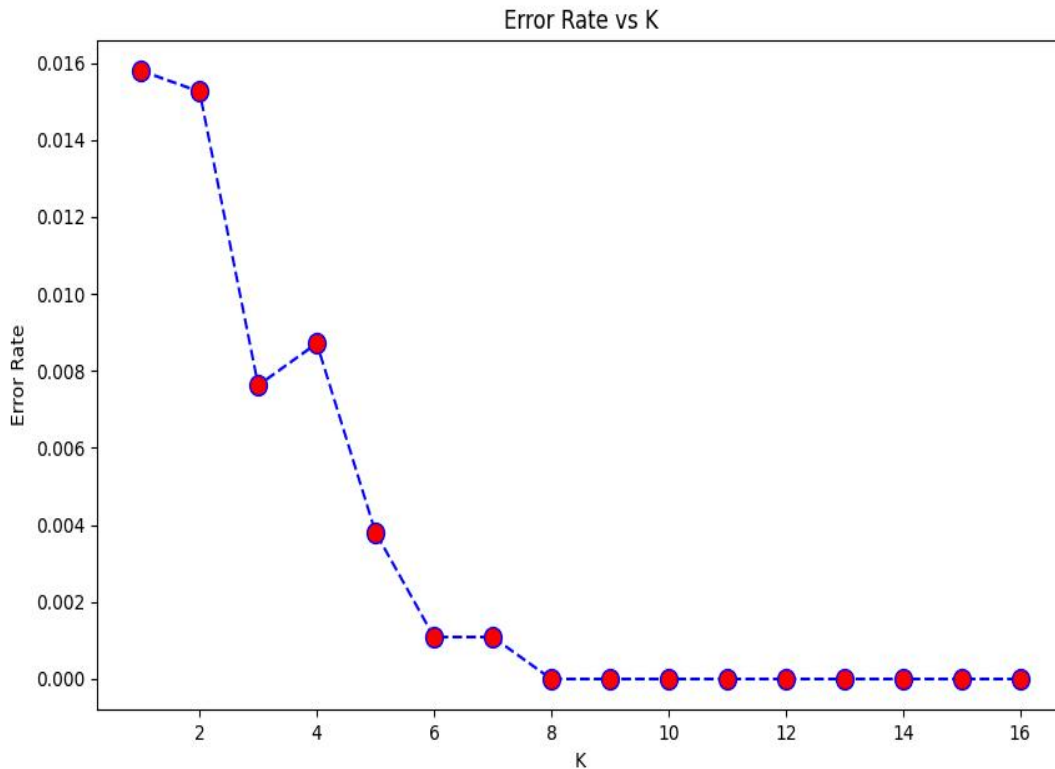


Figure 8: Error Rate vs K

Here, we can clearly see that as the value of k increases the error rate decreases. For our project we have trained the model for the value of k as 5. Thus, it compares data to its nearest 5 neighbors.

Furthermore, a user interface has been developed using HTML, CSS, and JavaScript. The snapshots of the user interface have been shown in the appendix. And the database has been designed in MySQL using Django. AI model and web scrapping is coded in python.

8. TESTING

Each unit of the system was tested for its correct and proper functionality. The unit testing of each component is illustrated in the table below.

Test No.	Unit	Test	Expected Outcomes	Test Outcomes
1	Sign Up	Check whether a new account can be created on filling up required details.	Account Successfully created.	Successful.
2	Login	Check Login credentials for valid username and password.	User is successfully logged in.	Successful.
3	Web Scraper	Extract jobs information from the third-party website using python.	Jobs are extracted successfully.	Successful.

Table 2: Unit Testing Table

9. RESULT AND DISCUSSION

- Data collection and System design has been carried out.
- User interface was successfully delivered.
- Ai model and job scraper is successfully integrated.

10. PROJECT TASK AND TIME SCHEDULE

Gantt Chart:

INCREMENTAL MODEL 1 : USERINTERFACE

ID	Task Name	Start	Finish	Duration	27/03/2023	01/04/2023			
					27/03/2023	03/04/2023	10/04/2023	17/04/2023	24...
1	Requirement analysis and information gathering	27/03/2023	04/04/2023	1.3 w.					
2	Undertaking analysis of the system	31/03/2023	06/04/2023	1.0 w.					
3	Designing System	04/04/2023	11/04/2023	1.1 w.					
4	Coding	06/04/2023	15/04/2023	1.4 w.					
5	Testing and Debugging	14/04/2023	23/04/2023	1.4 w.					
6	Documentation	30/03/2023	24/04/2023	3.7 w.					

Figure 9: Gantt Chart for incremental model 1

INCREMENTAL MODEL 2: AI Model and Web Scrapper Integration

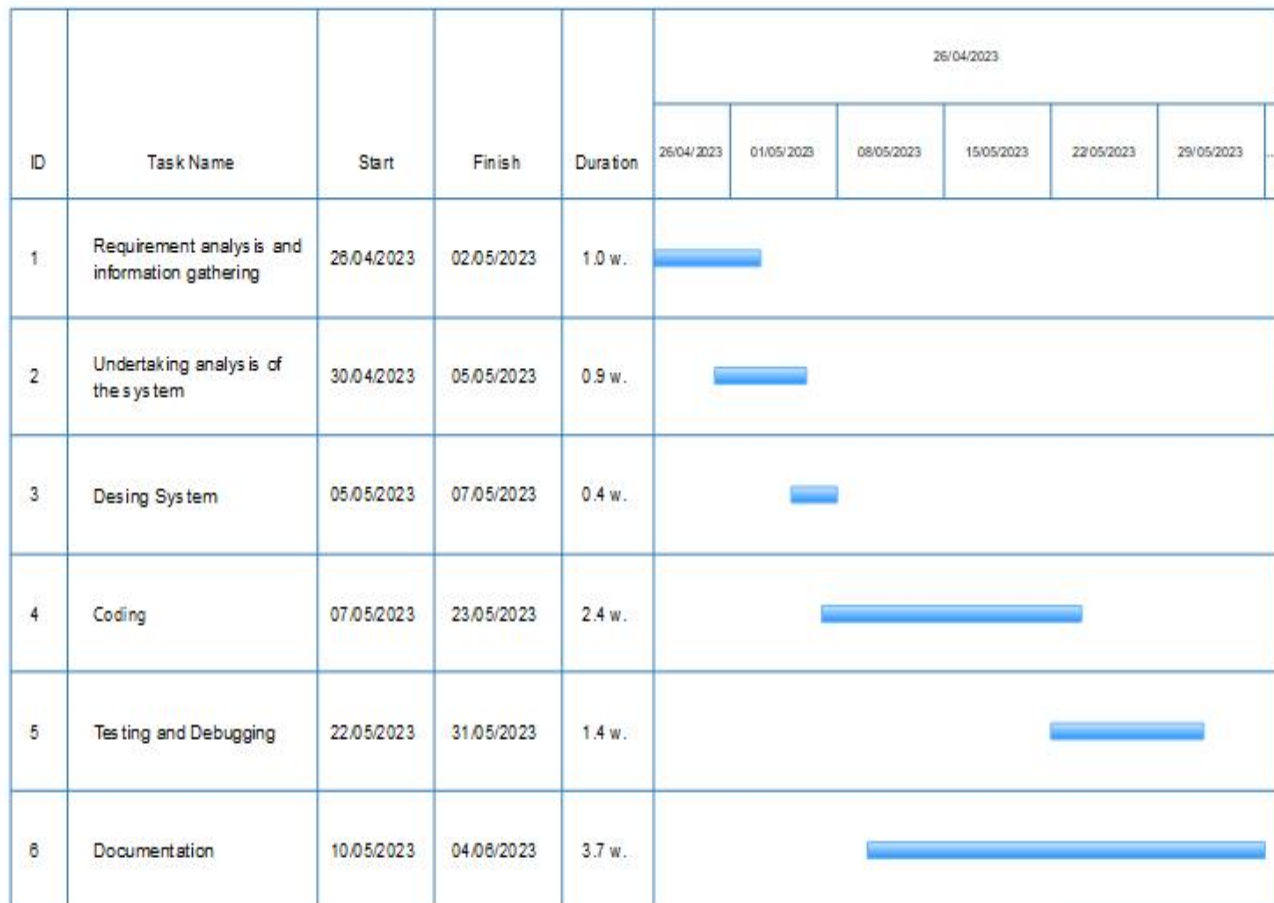


Figure 10 Gantt Chart for incremental model 2

INCREMENTAL MODEL 3: Database Integration

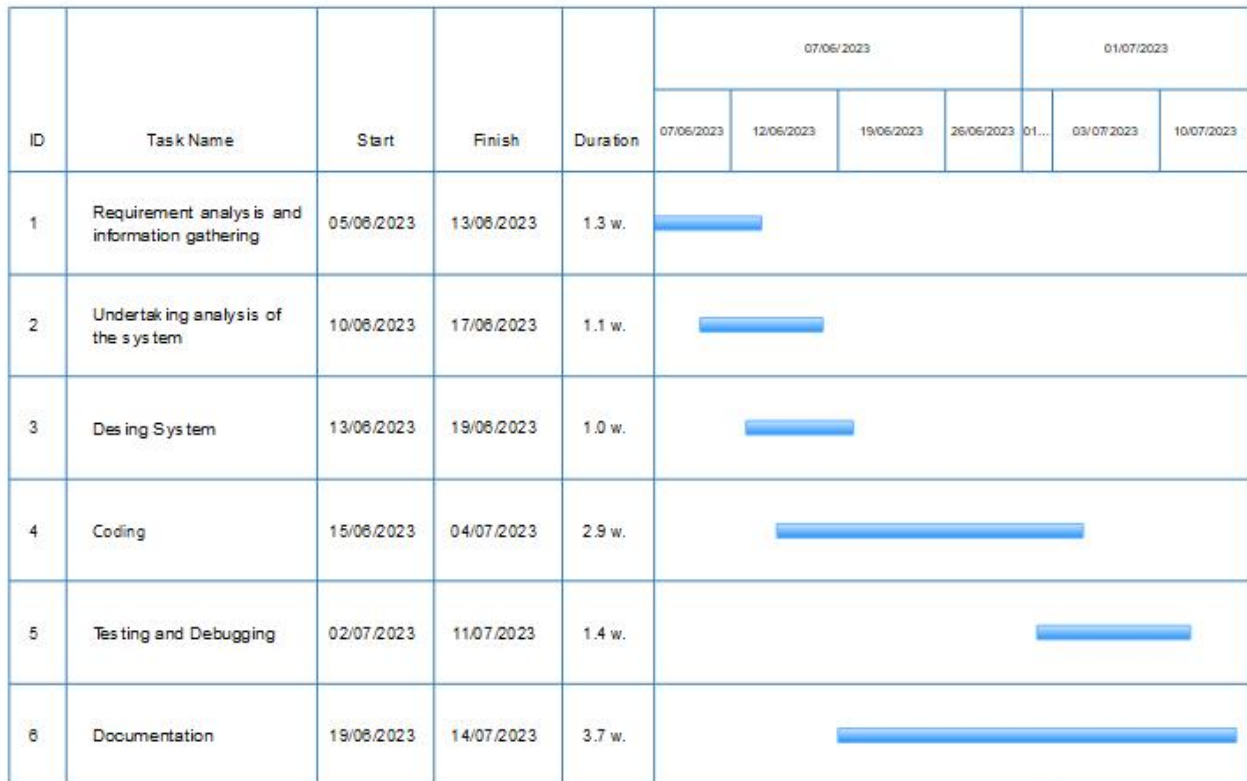


Figure 11 Gantt Chart for incremental model 3

11. CONCLUSION AND FUTURE EXTENSIONS

The Career Advisor application is now at the initial phase having most of the basic functionalities discussed before. All the modules have been working after integrating and are ready for the demonstration. As the features add up the level of complexity has been increasing as well. However, it is not complete with the ideas we have put through and might need more improvisation in the coming days as well. This makes us think about the future extensions that can be implemented in this application. Some of the extensions are:

1. Information on more skills sets can be added and the AI Model can be trained according to the large new datasets.
2. Jobs information can be fetched from multiple sources.
3. Creating a user profile that shows information about the users to other users.

12. REFERENCES

1. *CareerExplorer*. (n.d.). Retrieved from CareerExplorer:
<https://careerservices.upenn.edu/resources/careerexplorer/>
2. *django*. (n.d.). Retrieved from djangoproject: <https://www.djangoproject.com/>
3. Hanna, K. T. (n.d.). *LinkedIn*. Retrieved from LinkedIn:
<https://www.techtarget.com/whatis/definition/LinkedIn>
4. Harrison, O. (n.d.). *Machine Learning Basics with the K-Nearest Neighbors Algorithm*. Retrieved from towardsdatascience: <https://towardsdatascience.com/machine-learning-basics-with-the-k-nearest-neighbors-algorithm-6a6e71d01761>
5. *Intelligent Career Guidance System*. (n.d.). Retrieved from Github:
<https://github.com/sayaliwangane/INTELLIGENT-CAREER-GUIDANCE-SYSTEM>
6. *Machine learning*. (n.d.). Retrieved from Wikipedia:
https://en.wikipedia.org/wiki/Machine_learning
7. *MyPlan – Career Assessment Tool and Resources*. (n.d.). Retrieved from MyPlan – Career Assessment Tool and Resources: <https://careercenter.unt.edu/resources/myplan/>
8. *What is a Web Application*. (n.d.). Retrieved from STACKPATH:
<https://www.stackpath.com/edge-academy/what-is-a-web-application/>
9. *why MySQL*. (n.d.). Retrieved from mysql: <https://www.mysql.com/why-mysql/>

APPENDIX

System Snapshots

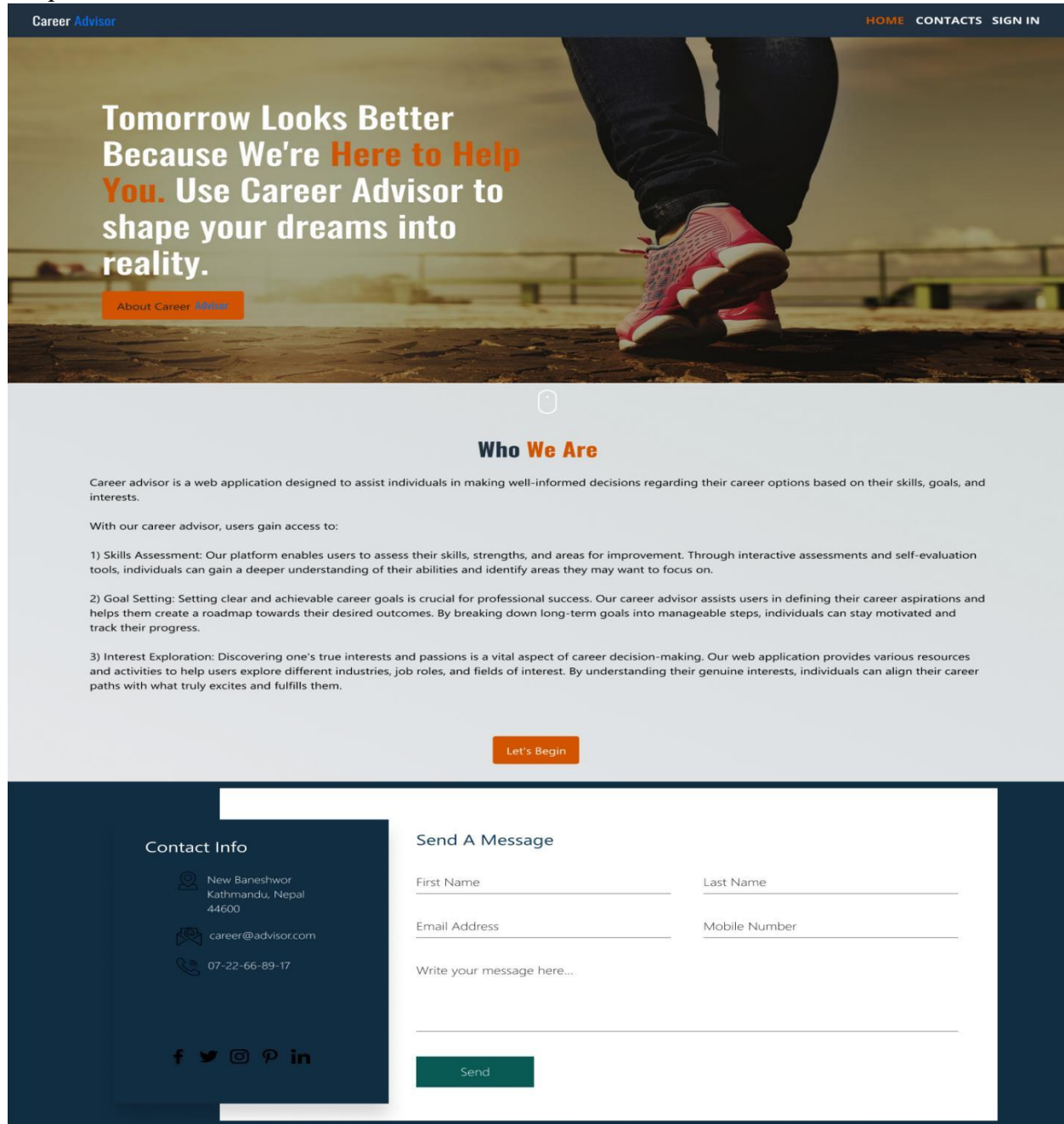


Figure 12 Home Page

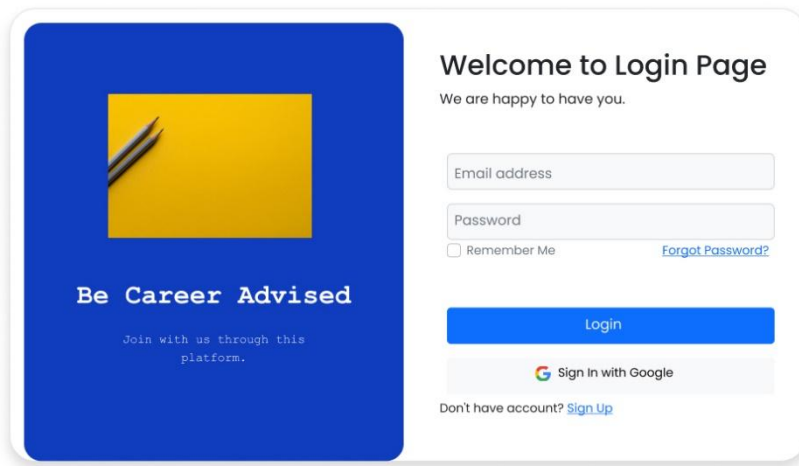



Figure 13 Login Page

Career Advisor

HOME

SURVEY

SIGN IN



Guiding you all the way

Make career decisions that will change your life 🚀

Learn more

Career interests are your preferences regarding work activities and environment. Identifying your career interest helps you make a well-informed and more strategic decision on your career path. Following your career interest means you are pursuing a career that uses your talents and aligns with your passion and preferences. Understanding and being able to determine your passion helps you find fulfillment and success in your chosen profession. In this webpage we provide tools that will enable you make the right career decisions.

LET US KNOW ABOUT YOUR INTERESTS....

Skills Evaluation Form

Database Fundamentals	<input type="text" value="Not Interested"/>
Computer Architecture	<input type="text" value="Not Interested"/>
Distributed Computing Systems	<input type="text" value="Not Interested"/>
Database Fundamentals	<input type="text" value="Not Interested"/>
Cyber Security	<input type="text" value="Not Interested"/>
Networking	<input type="text" value="Not Interested"/>
Software Development	<input type="text" value="Not Interested"/>
Programming Skills	<input type="text" value="Not Interested"/>
Project Management	<input type="text" value="Not Interested"/>
Computer Forensics Fundamentals	<input type="text" value="Not Interested"/>
Technical Communication	<input type="text" value="Not Interested"/>
AI ML	<input type="text" value="Not Interested"/>
Software Engineering	<input type="text" value="Not Interested"/>
Business Analysis	<input type="text" value="Not Interested"/>
Communication Skills	<input type="text" value="Not Interested"/>
Data Science	<input type="text" value="Not Interested"/>
Troubleshooting skills	<input type="text" value="Not Interested"/>
Graphics Designing	<input type="text" value="Not Interested"/>

Submit

Figure 14 Survey Page

Career paths to choose from your skills sets are:

Application Support Engineer

11/11

Find jobs

Networking Engineer

22/22

Find jobs

Project Manager

1/11

Find jobs

Information Security Specialist

1/11

Find jobs

Technical Writer

1/11

Find jobs

AI ML Specialist

22/22

Find jobs

Figure 15 Careers Page

Currently available jobs matching your field are:

Job Title : Applications Officer

Company Name : A One Global Consultants

Skills Required : Communication Skills Interpersonal Skills Administration Management Microsoft Office Suite

Location : 1st Floor, Samsung Plaza, Bijulubazar, Kathmandu.

[Know more](#)

Job Title : React Native Developer

Company Name : Shikhar Technologies

Skills Required : Rest Apis Javascript Typescript Mobile Application Development

Location :

[Know more](#)

Job Title : React Developer Programmer

Company Name : Sharelook PTE

Skills Required : Api Gateway Javascript Cognito Aws Amplify Mobile Application Development Ios

Location : Kathmandu

[Know more](#)

Figure 16 Jobs Info Page

