CANCER MORTALITY & INCIDENCE RATES CLASSIFICATION USING MACHINE LEARNING

PROJECT BASED LEARNING (NALAIYA THIRAN)

on

PROFESSIONAL READINESS FOR INNOVATION, EMPLOYABILITY AND ENTREPRENEURSHIP

Submitted by

TEAM ID: NM2023TMID01905

TEAM MEMBERS:

CHARULATHA R	420420205004
JANANI K	420420205011
MOONISHAA A	420420205016
SAI SUSHMA S	420420205022

in partial fulfillment for the award of the degree

of

BACHELOR OF TECHNOLOGY

IN

INFORMATION TECHNOLOGY

ANNA UNIVERSITY : CHENNAI 600 025

NOVEMBER 2023

ANNA UNIVERSITY : CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report **"CANCER MORTALITY & INCIDENCE RATES CLASSIFICATION USING MACHINE LEARNING"** is the bonafide work of **CHARULATHA R (420420205004), JANANI K (420420205011), MOONISHAA A (420420205016), SAI SUSHMA S (420420205022),** who carried out the project work under my supervision.

SIGNATURE

DR. A. Bhuvaneswari M.E., Ph.D.,

HOD and SPOC,

Professor,

Department of information technology,

Adhiparasakthi engineering college,

Melmaruvathur-603 319

SIGNATURE

Mrs. T. Uma Maheswari M.E.,

Faculty Mentor

Assistant professor,

Department of information technology,

Adhiparasakthi engineering college,

Melmaruvathur-603 319

CERTIFICATION OF EVALUATION

College Code/Name : 4204 / Adhiparasakthi Engineering College

Branch/ Semester : Information Technology /VI

Team ID : NM2023TMID01905

S.No	Name of the Student & Register Number	Title of the project	Name of the Faculty mentor with Designation
1.	**CHARULATHA R** (420420205004) **JANANI K** (420420205011) **MOONISHAA A** (420420205016) **SAI SUSHMA S** (420420205022)	**CANCER MORTALITY & INCIDENCE RATES CLASSIFICATION USING MACHINE LEARNING**	**Mrs. T. Uma Maheswari M.E., ASSISTANT PROFESSOR,** Department of Information Technology, Adhiparasakthi Engineering College, Melmaruvathur-603319

The report of the project works submitted by the above students in the partial fulfillment for the award of Bachelor of Technology degree in Information Technology of Anna University were evaluated and confirmed to be reports of work done by the above students and then evaluated.

Submitted for the Project Work and Viva -voce examination held on…….

INTERNAL EVALUATOR **INDUSTRY EVALUATOR**

ACKNOWLEDGEMENT

It is indeed a great pleasure and proud privilege to acknowledge the help and support we received from the positive minds around us in making this Endeavour a successful one.

The spiritual blessings of His Holiness **PADMA SHRI ARULTHIRU AMMA** and the divine guidance of **THIRUMATHI AMMA** have undoubtedly taken us to the path of victory in completing this project.

The infrastructural support with all kinds of lab facilities have been a motivating factor in this completion of project work, all because of our **CORRESPONDENT SAKTHI THIRU Dr. G. B. SENTHILKUMAR** with great pleasure we take this opportunity to thank him.

From the academic side the constant support from our **PRINCIPAL Dr. J. RAJA M.E., Ph.D.,** has encouraged us to work hard and attain this goal of completing the project. Our sincere thanks to our respected **HEAD OF THE DEPARTMENT AND SPOC Dr. A. BHUVANESWARI M.E., Ph.D.,** who have given us both moral and technical support adding experience to the job we have under taken.

We take enormous pleasure in thanking our respected **FACULTY MENTOR**, **Mrs. T. UMA MAHESWARI M.E.,** who helped us in crossing obstacles in the path to our glory. We also thank other Staff members, non-teaching members of Main Block Computer Lab, Parents and Friends who have given their constant support and motivation in all our endeavors.

S. NO	TABLE OF CONTENT	PG NO
1	**INTRODUCTION**	**7**
	1.1 Project Overview	7
	1.2 Purpose	7
2	**IDEATION & PROPOSED SOLUTION**	**8**
	2.1 Problem Statement Definition	8
	2.2 Empathy Map Canvas	9
	2.3 Ideation & Brainstorming	10
	2.4 Proposed Solution	14
3	**REQUIREMENT ANALYSIS**	**16**
	3.1 Functional requirement	16
	3.2 Non-Functional requirements	17
4	**PROJECT DESIGN**	**19**
	4.1 Data Flow Diagrams	19
	4.2 Solution & Technical Architecture	20
	4.3 User Stories	21
5	**CODING & SOLUTIONING**	**22**
	5.1 Feature	28
6	**RESULTS**	**32**
	6.1 Performance Metrics	32
7	**ADVANTAGES & DISADVANTAGES**	**36**
8	**CONCLUSION AND FUTURE WORK**	**37**
9	**FUTURE SCOPE**	**38**
10	**APPENDIX**	**39**
	Source Code GitHub & Project Demo Link	50

LIST OF FIGURES

FIGURE NO	NAME OF THE FIGURES	PAGE NO
2.1	PROBLEM STATEMENT	8
2.2	EMPATHY MAP	9
2.3	DEFINING PROBLEM STATEMENT	10
2.4	IDEAS THAT ADDRESS PROBLEM STATEMENT	11
2.5	GROUP IDEAS	12
3.5	PRIORITIZE THE IDEAS	13
4.1	DATA FLOW DIAGRAM	18
4.2.1	SOFTWARE ARCHITECTURE	19
4.2.2	TECHNICAL ARCHITECTURE	20

CHAPTER 1

INTRODUCTION

Data science is an interdisciplinary field that combines scientific methods, algorithms, and tools to extract valuable insights and knowledge from large and complex datasets. Data science plays a crucial role in transforming raw data into actionable insights. It involves collecting and preprocessing data, exploring, and visualizing patterns and trends, building predictive models, and deriving meaningful conclusions. By employing statistical techniques, machine learning algorithms, and computational methods, data scientists can extract knowledge and make predictions or recommendations based on the available data. It employs data cleaning and preprocessing techniques to handle missing values, outliers, and inconsistencies. Machine learning is a fundamental component of data science. It involves the development and application of algorithms that enable computers to learn from data and make predictions or take actions without being explicitly programmed. Supervised learning algorithms, such as regression and classification, learn patterns from labeled data to make predictions or classify new instances. Unsupervised learning algorithms, such as clustering and dimensionality reduction, identify patterns and structures within data without the use of predefined labels.

1.1 PROJECT OVERVIEW

This project aims to develop a robust machine learning model for cancer mortality and incidence rate classification. By leveraging advanced algorithms and data analysis techniques, the project seeks to improve our understanding of cancer outcomes, enable early detection and intervention, and provide valuable insights for healthcare professionals and researchers. The resulting classification system can contribute to better diagnosis, treatment planning, resource allocation, and public health interventions related to cancer.

1.2 PURPOSE

Purpose of “Cancer mortality & incidence rates classification using machine learning “ is to develop an accurate and reliable machine learning model that can classify and predict cancer mortality and incidence rates based on relevant features. It helps to enhance our understanding of cancer outcomes and provide valuable insights for healthcare professionals and researchers and to improve our understanding of cancer, enhance prediction capabilities, and ultimately make a positive impact on patient care, public health, and cancer research.

CHAPTER 2

IDEATION & PROPOSED SOLUTION

2.1 PROBLEM STATEMENT DEFINITION

There are several challenges in accurately measuring and predicting cancer mortality and incidence rate, including issues with data quality, imbalanced data, and challenges with feature election and overfitting when using machine learning algorithm. The problem statement for this project is to develop accurate and reliable methods for predicting cancer mortality and incidence rates using machine learning algorithm while addressing these challenges. By doing so, this project aims to provide insights that can helps inform public health and interventions aimed at reducing cancer incidence and mortality rates.

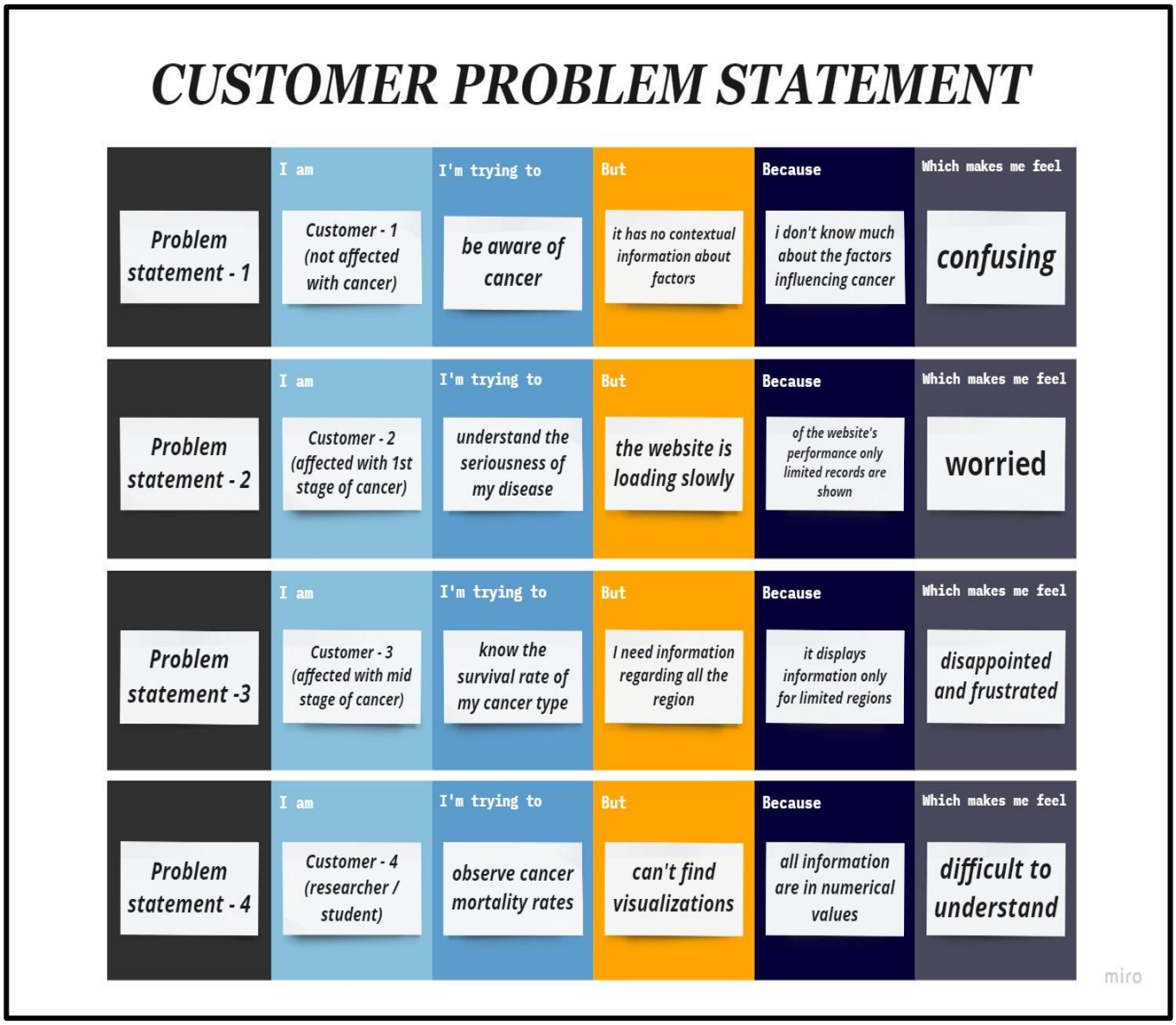


Fig 2.1 PROBLEM STATEMENT

2.2 EMPATHY MAP

An empathy map is a collaborative visualization used to articulate what we know about a particular type of user. It externalizes knowledge about users in order to create a shared understanding of user needs, and aid in decision making.

An empathy map helps to map what a design team knows about the potential audience. This tool helps to understand the reason behind some actions a user takes deeply. This tool helps build Empathy towards users and helps design teams shift focus from the product to the users who are going to use the product.

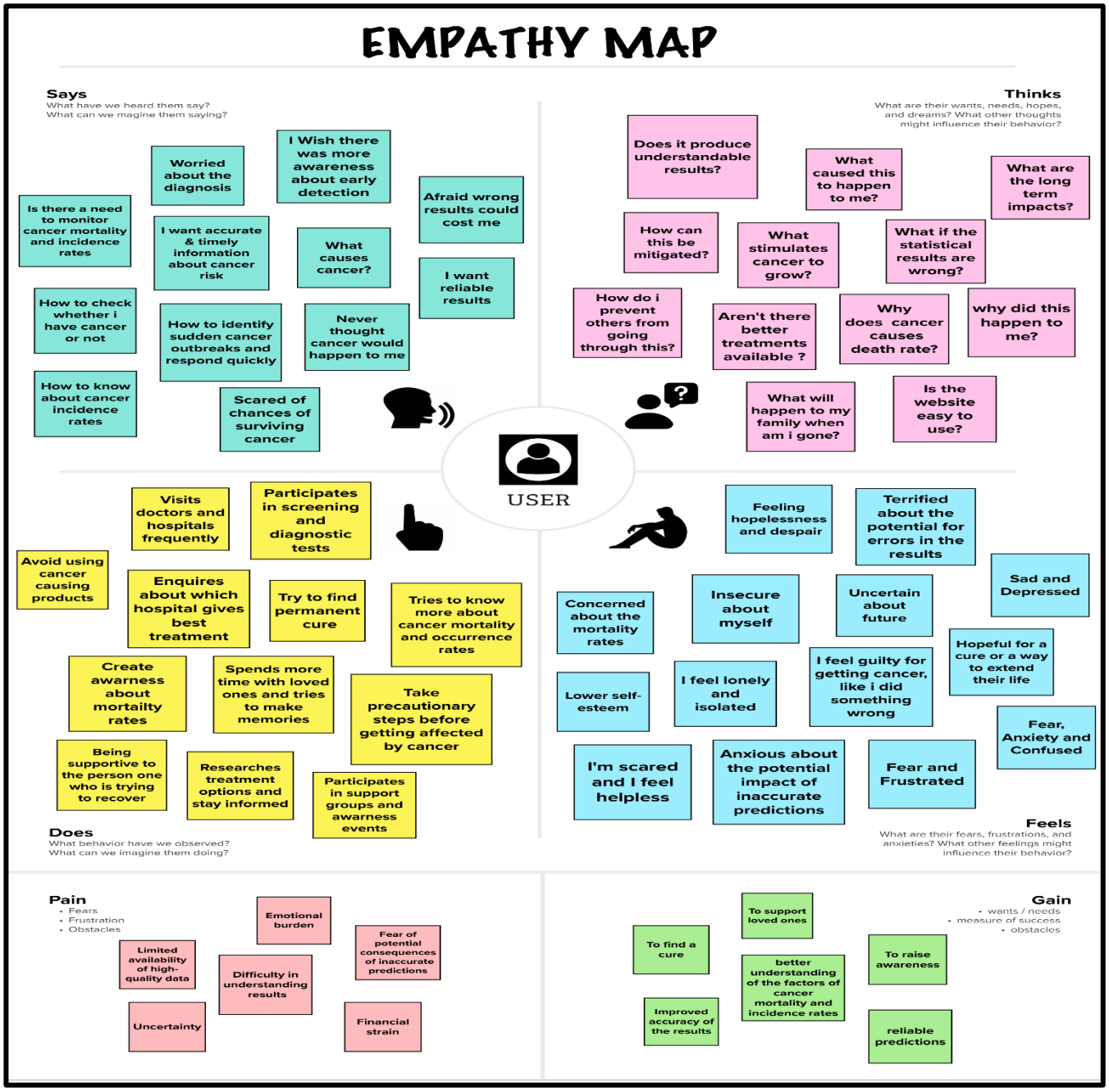
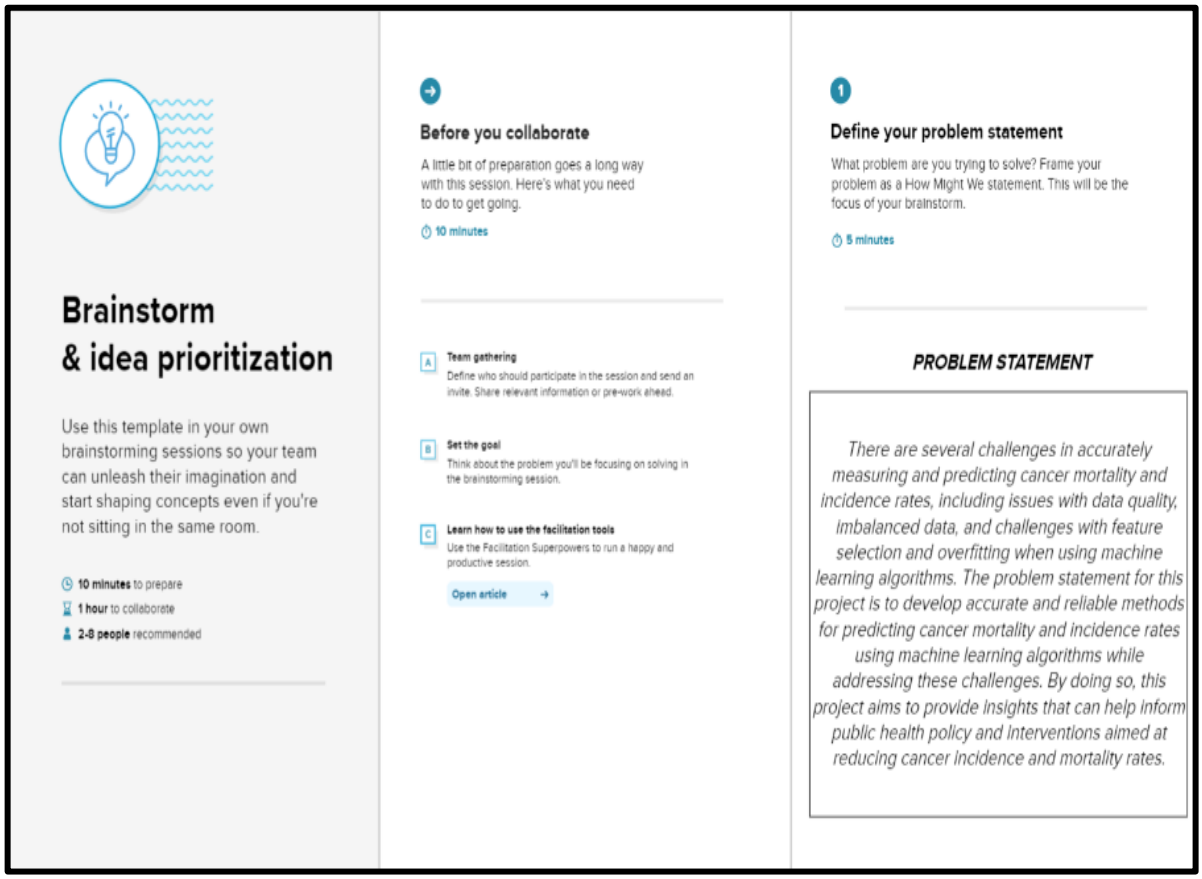


Fig 2.2 EMPATHY MAP

2.3 BRAINSTORMING

Initially we have collected ideas based on our problem definition from our teammates and we grouped ideas after that we had voting session where our teammates voted and finally, we got our problem solution.

STEP 1



Brainstorm
& idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

10 minutes to prepare
1 hour to collaborate
2-8 people recommended

Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

10 minutes

A Team gathering
Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.

B Set the goal
Think about the problem you'll be focusing on solving in the brainstorming session.

C Learn how to use the facilitation tools
Use the Facilitation Superpowers to run a happy and productive session.

Open article

1 Define your problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

5 minutes

PROBLEM STATEMENT

There are several challenges in accurately measuring and predicting cancer mortality and incidence rates, including issues with data quality, imbalanced data, and challenges with feature selection and overfitting when using machine learning algorithms. The problem statement for this project is to develop accurate and reliable methods for predicting cancer mortality and incidence rates using machine learning algorithms while addressing these challenges. By doing so, this project aims to provide insights that can help inform public health policy and interventions aimed at reducing cancer incidence and mortality rates.

Fig 2.3 DEFINING PROBLEM STATEMENT

STEP 2

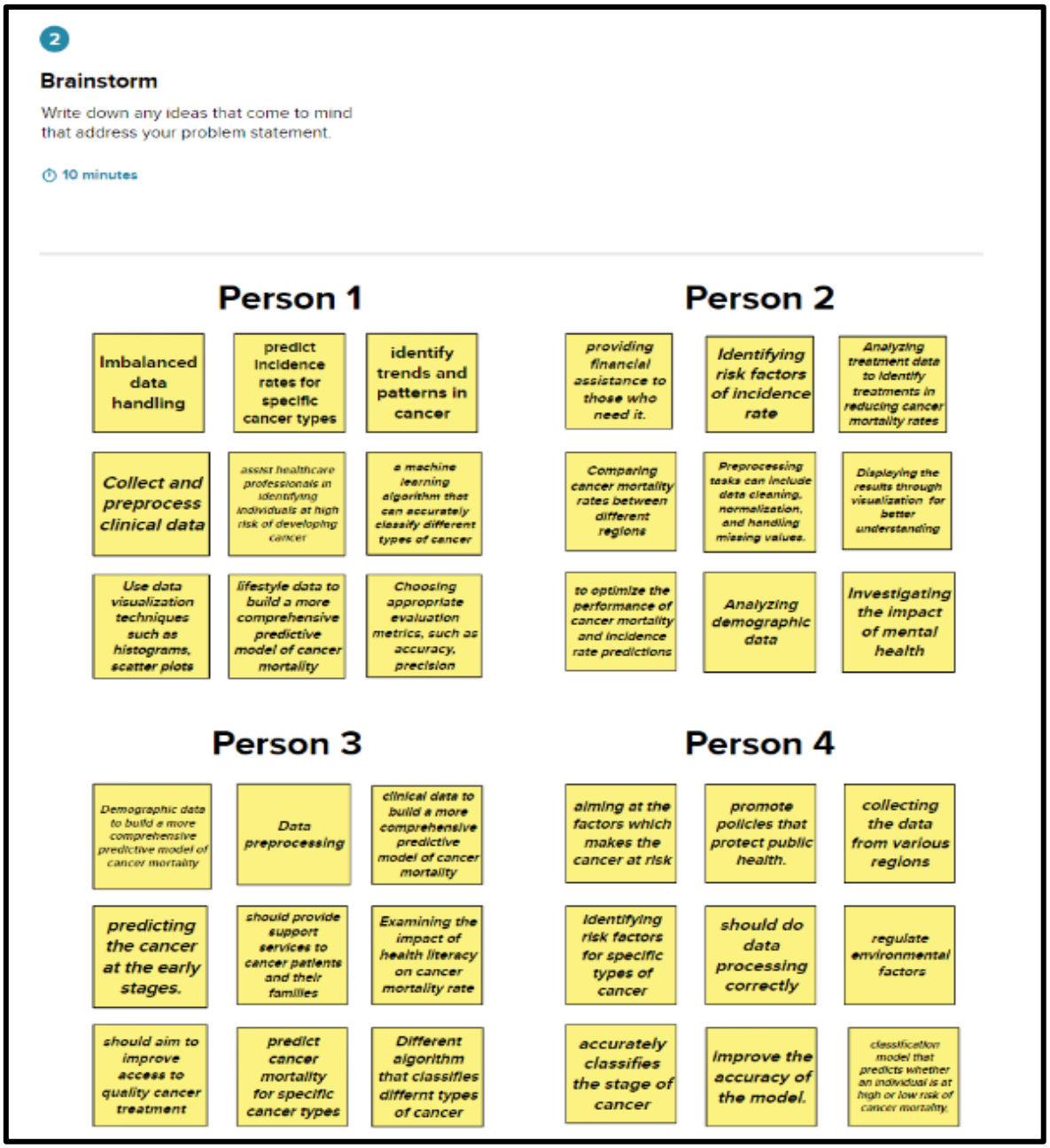


Fig 2.4 IDEAS THAT ADDRESS PROBLEM STATEMENT

STEP 3

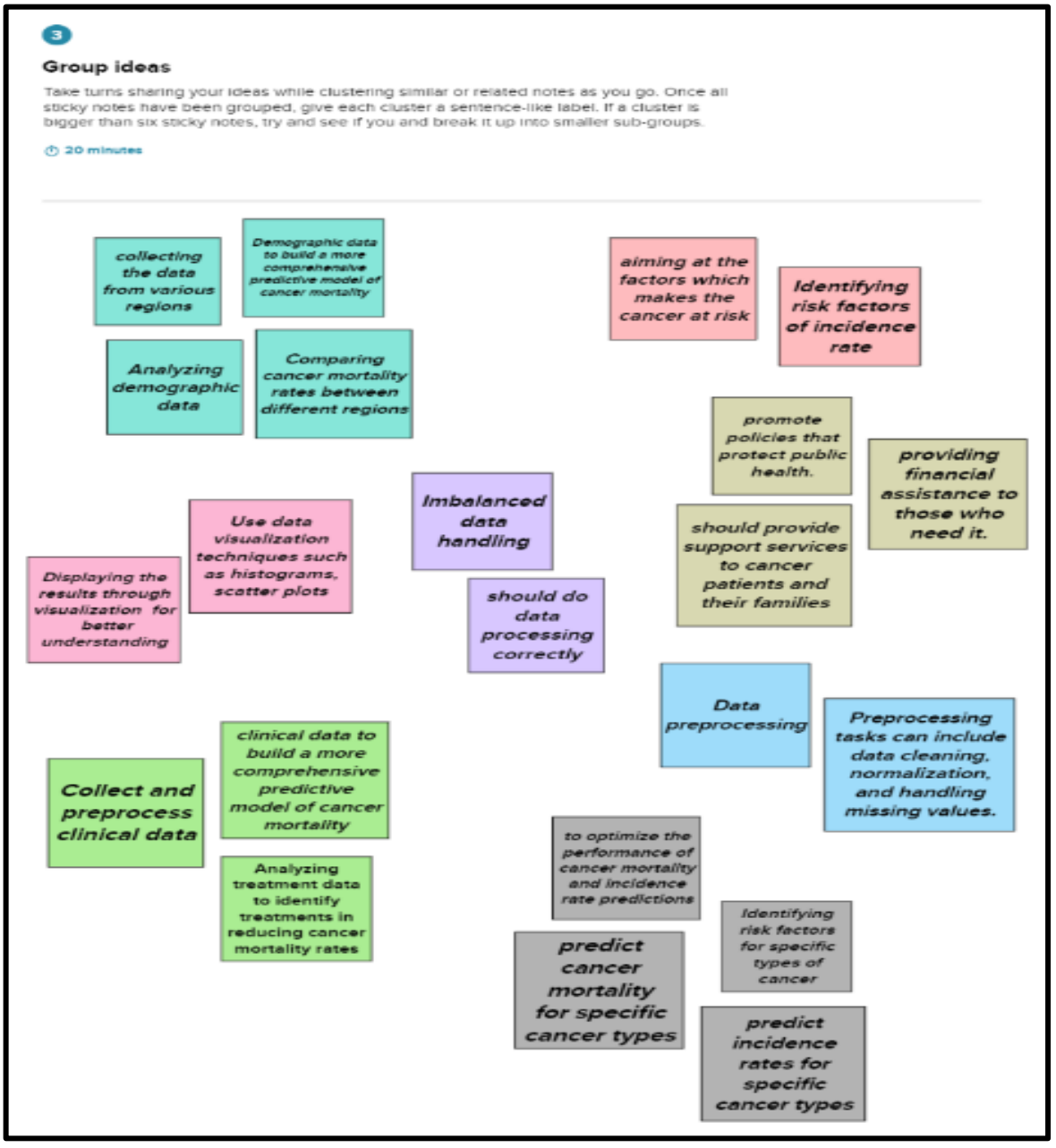


Fig 2.5 GROUP IDEAS

STEP 4

Fig 2.6 PRIORITIZE THE IDEAS

2.4 PROPOSED SOLUTION

2.4.1. Problem Statement

There are several challenges in accurately measuring and predicting ancer mortality and incidence rates, including issues with data quality, imbalanced data, and challenges with feature selection and overfitting when using machine learning algorithms. The problem statement for this project is to develop accurate and reliable methods for predicting cancer mortality and incidence rates using machine learning algorithms while addressing these challenges. By doing so, this project aims to provide insights that can help inform public health policy and interventions aimed at reducing cancer incidence and mortality rates.

2.4.2. Idea / Solution description

The solution for this project is to develop a predictive model using machine learning algorithms to accurately predict the cancer mortality and incidence rates based on various data sources such as electronic medical records, genomic data, imaging data, and lifestyle data. The project will involve data collection, data pre-processing, feature selection, model development, model training, and validation, model integration, and continuous improvement.

3. Novelty / Uniqueness

We want to show the expected results as a visualization. Another innovative feature is the addition of a tab including all cancer-related information, such as cancer awareness, cancer center information, and contact information, as well as connections to various cancer support groups, carers, and so on. In addition, we would like to have a dashboard displaying statistics on historical mortality and incidence rates.

4. Social Impact / Customer Satisfaction

Our project has a significant social impact by raising awareness about cancer mortality, incidence, and prevalence, as well as the impact of cancer on society and provides customer satisfaction through elements such as user experience, accuracy, and dependability, among others.

5. Business Model (Revenue Model)

Our project can generate revenue by displaying advertisements from relevant marketers such as pharmaceutical firms, hospitals, and health insurance providers. The website may charge these advertisers a fee to display their advertisements on the website.

6. Scalability of the Solution

Highly scalable. Produces accurate results with small and large amount of data. Any number of users may access it and advancement of chatbots can also be introduced.

CHAPTER 3

REQUIREMENT ANALYSIS

3.1 FUNCTIONAL REQUIREMENT

Functional requirements may involve calculations, technicaldetails, data manipulation and processing, and other specific functionality that define what a system is supposed to accomplish. Behavioral requirements describe all the cases where the system uses the functional requirements, these are captured in use cases. Functional requirements drive the application architecture of a system, while non-functional requirements drive the technical architecture of a system.

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	It is necessary to register by completing the registration form in order to become a new user.
FR-2	User Login	A user shall be able to log into the system using their username and password.
FR-3	User Entry	The information needed to calculate the cancer mortality and incidence rates must be entered on a form.
FR-4	Prediction Results	The user can view the predicted results of the cancer mortality and incidence rates.
FR-5	Visualizing Data	The user can visualize historical trends in mortality and incidence rates.

3.2 NON-FUNCTIONAL REQUIREMENT

Non-functional requirements are often mistakenly called the "quality attributes" of a system, however there is a distinction between the two. Non-functional requirements are the criteria for evaluating how a software system should perform and a software system must have certain quality attributes in order to meet non-functional requirements.

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Cancer incidence and mortality predictions can help public health officials plan and allocate resources for cancer prevention, screening, diagnosis, and treatment. By understanding the expected number of cancer cases and deaths in a particular population, officials can determine the resources needed to address the cancer burden.
NFR-2	Security	The system maintains the confidentiality of the details given by the user.
NFR-3	Reliability	The reliability of cancer mortality and incidence rates refers to the consistency and stability of the rates over time and across different populations. Reliable cancer rates are those that produce consistent and stable results or scores, even when the rates are calculated repeatedly or when different people are calculating the rates.
NFR-4	Performance	The performance of the system is evaluated on a range of metrics to ensure its effectiveness and accuracy in classifying cancer mortality and incidence rates.
NFR-5	Availability	The system is available 24x7 for users without any interruption.
NFR-6	Scalability	A scalable cancer prediction system can handle larger and more diverse datasets, process more complex algorithms and models, and provide accurate predictions in real-time without significant delays or errors. It can also adapt to changes in data formats, sources, and quality without compromising the accuracy and consistency of the predictions.

CHAPTER 4

PROJECT DESIGN

4.1 DATA FLOW DIAGRAMS

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.

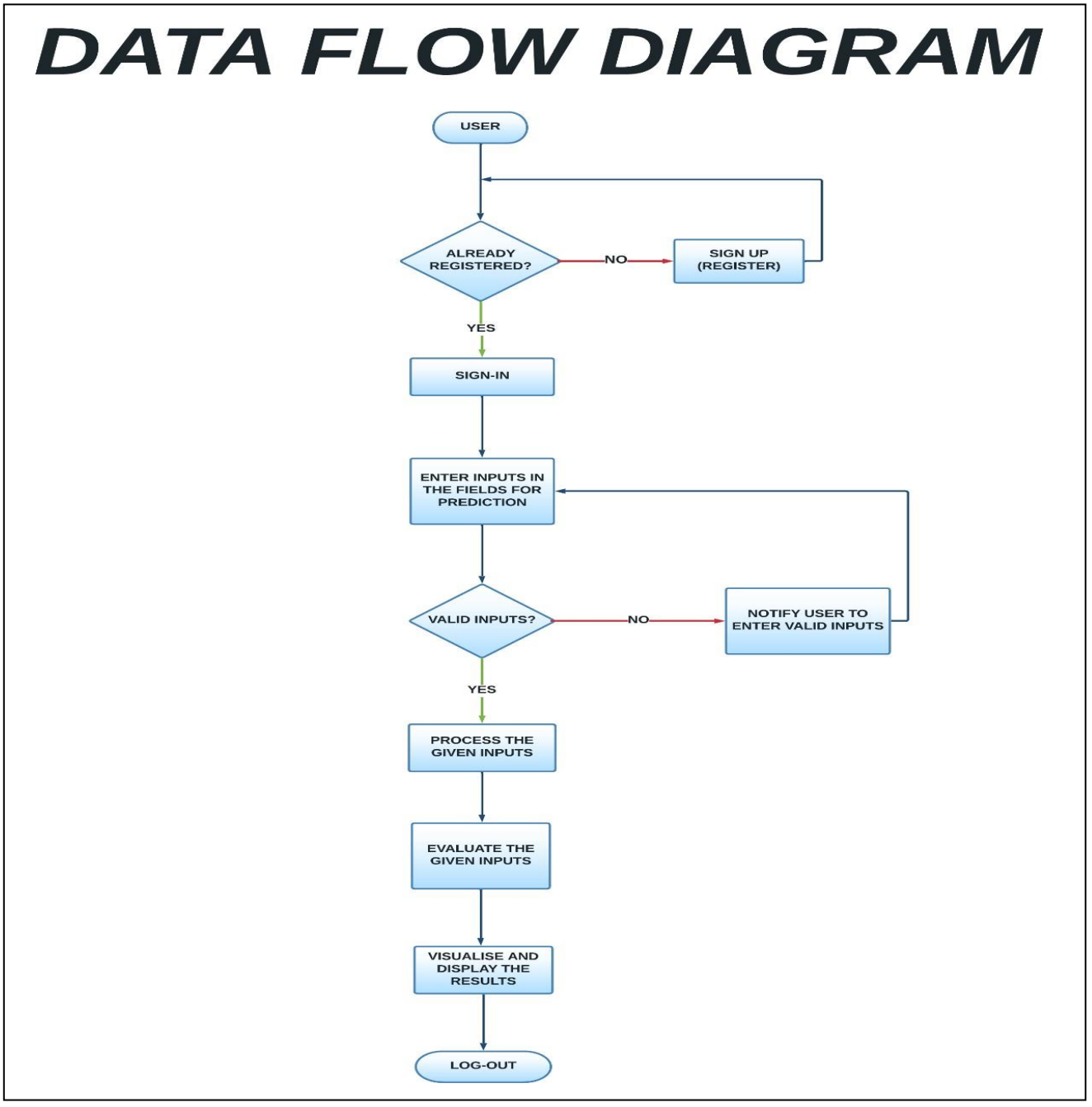


Fig 4.1 FIRST LEVEL DATA FLOW DIAGRAM

4.2 SOLUTION & TECHNICAL ARCHITECTURE

4.2.1 SOLUTION ARCHITECTURE

Solution architecture refers to the process of designing and defining the structure, components, and interactions of a software or IT solution to address a specific problem or meet specific business requirements. It involves identifying the key elements, such as hardware, software, data, network, and user interfaces, and determining how they should be integrated to create an effective solution.

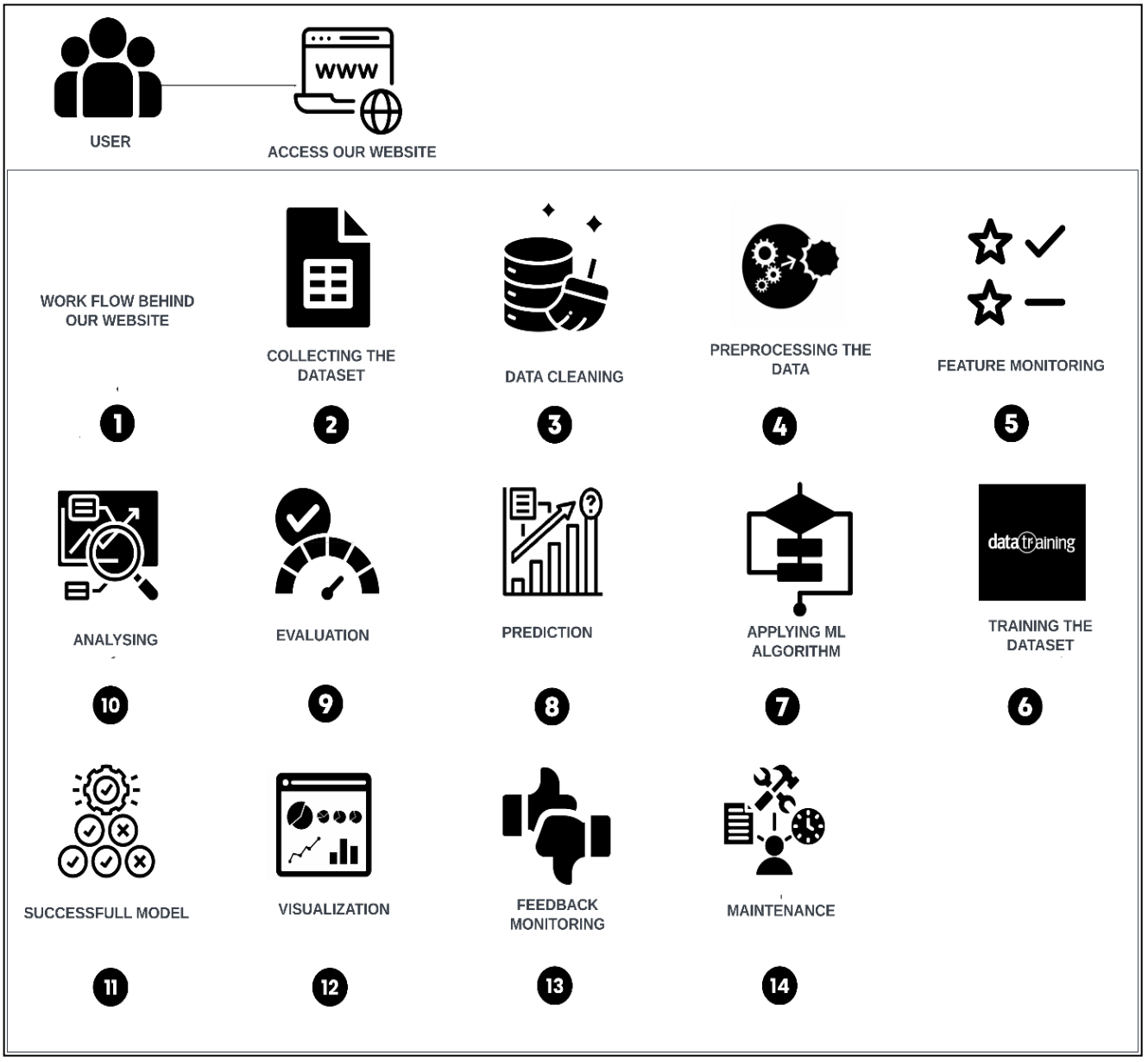


Fig 4.2.1 SOFTWARE ARCHITECTURE

4.2.2 TECHNOLOGY ARCHITECTURE

Technical Architecture finds the best tech solution to solve existing business problems, Describe the structure, characteristics, behavior, and other aspects of the software to project stakeholders, Define features, development phases, and solution requirements, Provide specifications according to which the solution is defined, managed, and delivered.

Technical Architecture (TA) is a form of IT architecture that is used to design computer systems. It involves the development of a technical blueprint with regard to the arrangement, interaction, and interdependence of all elements so that system-relevant requirements are met.

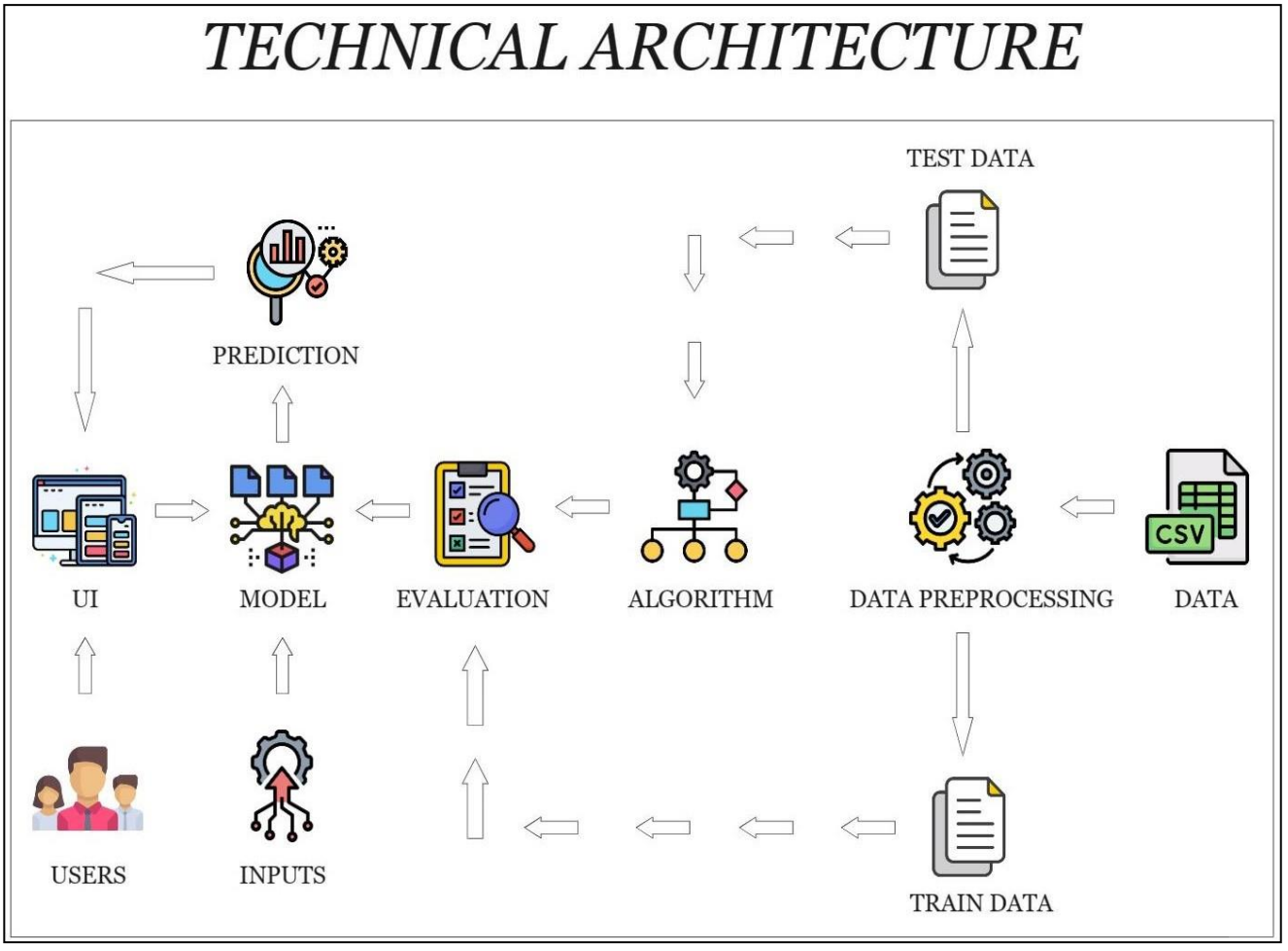


Fig 4.2.2 TECHNICAL ARCHITECTURE

4.3 USER STORIES

A user story is an informal, general explanation of a software featurewritten from the perspective of the end user or customer. The purpose of auser story is to articulate how a piece of work will deliver a particular valueback to the customer. In software development and product management, a user story is an informal, natural language description of features of a software system.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority
Customer (web user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, confirming my password and other details.	I can access my account / dashboard.	High
	Login	USN-2	As a user, I can log into the application by entering email & password.	I can access my account using my details.	High
Administrator	Admin Login	USN-3	As an administrator of the website, I can add, delete, or update the contents of the website.	I can view the organized content of the website	High

CHAPTER 5

CODING & SOLUTIONING

5.1 FEATURE

Home.html:

```
<!DOCTYPE html>
<html lang="en">
  <head>
    <meta charset="utf-8" />
    <meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-fit=no" />
    <meta name="description" content="" />
    <meta name="author" content="" />
    <title>ONCOLOGY</title>
    <link rel="icon" type="image/x-icon" href="assets/favicon.ico" />
    <!-- Font Awesome icons (free version)-->
    <script src="https://use.fontawesome.com/releases/v6.3.0/js/all.js"
crossorigin="anonymous"></script>
    <!-- Google fonts-->
    <link href="https://fonts.googleapis.com/css?family=Varela+Round" rel="stylesheet" />
    <link
href="https://fonts.googleapis.com/css?family=Nunito:200,200i,300,300i,400,400i,600,600i,700,700i,
800,800i,900,900i" rel="stylesheet" />
    <!-- Core theme CSS (includes Bootstrap)-->
    <link href="{{ url_for('static', filename='styles.css') }}" rel="stylesheet" />
  </head>
  <body id="page-top">
    <!-- Navigation-->
    <nav class="navbar navbar-expand-lg navbar-light fixed-top" id="mainNav">
      <div class="container px-4 px-lg-5">
        <a class="navbar-brand" href="#page-top">ONCOLOGY</a>
        <button class="navbar-toggler navbar-toggler-right" type="button" data-bs-toggle="collapse"
data-bs-target="#navbarResponsive" aria-controls="navbarResponsive" aria-expanded="false" aria-
label="Toggle navigation">
          Menu
          <i class="fas fa-bars"></i>
        </button>
        <div class="collapse navbar-collapse" id="navbarResponsive">
          <ul class="navbar-nav ms-auto">
            <!-- <li class="nav-item"><a class="nav-link" href="/signin">Sign in</a></li>-->
            <!--<li class="nav-item"><a class="nav-link" href="/reg">Register</a></li>-->
            <li class="nav-item"><a class="nav-link" href="/input">Predict incidence</a></li>
              <li class="nav-item"><a class="nav-link" href="/input1">Predict mortality</a></li>
              <!--<li class="nav-item"><a class="nav-link" href="#signup">Contact</a></li>-->
          </ul>
        </div>
      </div>
```

```
</nav>
<!-- Masthead-->
<header class="masthead">
  <div class="container px-4 px-lg-5 d-flex h-100 align-items-center justify-content-center">
    <div class="d-flex justify-content-center">
      <div class="text-center">
        <h1 class="mx-auto my-0 text-uppercase">CANCER MORTALITY AND INCIDENCE RATE</h1>
        <h2 class="text-white-50 mx-auto mt-2 mb-5">An awareness of one's mortality can lead you to wake up and live an authentic, meaningful life.</h2>
      </div>
    </div>
  </div>
</header>
 <!-- about-->
<section class="about-section" id="about">
  <div class="container px-4 px-lg-5">
    <div class="row gx-4 gx-lg-5">
      <div class="col-md-10 col-lg-8 mx-auto text-center">
        <i class="far fa-paper-plane fa-2x mb-2 text-white"></i>
        <h2 class="text-white mb-5">ABOUT</h2>
            <h3 style="color:#ffdab9;">CANCER</h3>
                <p style="color:white;">Cancer is a complex and diverse group of diseases characterized by the abnormal growth of cells. It can affect various parts of the body and has many different types and subtypes. Cancer occurs when normal cells undergo genetic mutations that allow them to multiply uncontrollably, forming a mass of cells called a tumor.There are two main categories of tumors: benign and malignant. Benign tumors are non-cancerous and usually do not spread to other parts of the body. Malignant tumors, on the other hand, are cancerous and can invade nearby tissues and spread to distant organs through a process called metastasis.Causes of cancer can vary and often involve a combination of genetic factors, lifestyle choices, and environmental exposures. Common risk factors include tobacco use, unhealthy diet, lack of physical activity, exposure to certain chemicals and substances, infections, and family history of cancer. Cancer symptoms depend on the type and stage of the disease but can include fatigue, unexplained weight loss, pain, changes in the skin, persistent cough, and abnormal bleeding. Early detection and timely treatment are crucial for improving outcomes and increasing survival rates. Treatment options for cancer include surgery, radiation therapy, chemotherapy, immunotherapy, targeted therapy, and hormone therapy. The choice of treatment depends on factors such as the type and stage of cancer, the patient's overall health, and individual preferences.Prevention plays a vital role in reducing the risk of cancer. Adopting a healthy lifestyle, avoiding tobacco and excessive alcohol consumption, maintaining a balanced diet, exercising regularly, protecting against infections (such as HPV and hepatitis), and getting regular screenings and vaccinations can help lower the risk. Cancer research and advancements in medical technology continue to improve our understanding of the disease and develop more effective treatments. It is important for individuals to stay informed, seek medical advice when needed, and support efforts aimed at cancer prevention, early detection, and treatment.</p> <h3 style="color:#ffdab9;">CANCER MORTALITY</h3><p style="color:white;">Cancer mortality refers to the number of deaths caused by cancer within a specific population over a given period. Predicting cancer mortality is challenging as it depends on various factors, including the type and stage of cancer, access to healthcare, treatment options, and individual patient characteristics.Population-level cancer mortality rates are often estimated through statistical analysis of large datasets, such as cancer registries and national health surveys. These data help identify trends, patterns, and risk factors associated with cancer-related deaths in specific populations. However, predicting individual cancer mortality is more difficult. Doctors and oncologists
```

use various tools and models to assess prognosis and estimate the likelihood of survival for individual patients. These tools take into account factors such as cancer stage, tumor characteristics, treatment options, and patient health status.Prognostic factors such as tumor size, grade, lymph node involvement, and the presence of metastasis are considered in determining the expected outcome for a patient. Additionally, genetic testing can provide information on specific gene mutations that may influence cancer prognosis.It is important to note that predictions of cancer mortality are not absolute and can vary for each individual. Advances in cancer treatment and personalized medicine have significantly improved survival rates for many types of cancer. Treatment plans are tailored to each patient's specific needs, and new therapies, including targeted therapies and immunotherapies, are continually being developed.Ultimately, it is essential for individuals diagnosed with cancer to consult with their healthcare team to understand their prognosis, treatment options, and make informed decisions about their care. Regular monitoring, adherence to treatment plans, and adopting a healthy lifestyle can all play a role in improving outcomes and potentially reducing the risk of cancer mortality
<h3 style="color:#ffdab9;">CANCER INCIDENCE</h3> Cancer incidence refers to the number of newly diagnosed cancer cases within a specific population over a given period. Predicting cancer incidence is challenging due to the multitude of factors involved, including genetic predisposition, lifestyle choices, environmental exposures, and chance.Epidemiological studies and cancer registries play a crucial role in estimating cancer incidence rates. These studies collect data on diagnosed cancer cases and provide information about the frequency and distribution of different types of cancer within a population. By analyzing this data, researchers can identify trends, risk factors, and changes in cancer incidence over time.To predict cancer incidence at the population level, statistical models and projections are often used. These models incorporate factors such as population demographics, known risk factors, and historical data to estimate future cancer incidence rates. However, these predictions are subject to uncertainties and assumptions and should be interpreted with caution.Predicting individual cancer incidence is challenging due to the complex interplay of various factors. Genetic testing can identify certain gene mutations associated with an increased risk of developing specific types of cancer. However, having these gene mutations does not guarantee the development of cancer.Prevention efforts, such as promoting healthy lifestyles, raising awareness about cancer risk factors, and implementing screening programs, play a crucial role in reducing cancer incidence. Screening tests, such as mammograms, Pap smears, and colonoscopies, can detect cancer at early stages or identify precancerous changes, allowing for timely intervention and potentially reducing cancer incidence.While it is not possible to accurately predict an individual's cancer incidence, understanding and addressing risk factors, following recommended screening guidelines, and adopting a healthy lifestyle can help reduce the risk of developing cancer. It is important for individuals to consult with healthcare professionals for personalized advice and guidance based on their specific circumstances.</P>

```
            </div>
        </div>
    </div>
</section>

<!-- Contact-->
<section class="contact-section bg-black">
    <div class="container px-4 px-lg-5">
        <div class="row gx-4 gx-lg-5">
            <div class="col-md-4 mb-3 mb-md-0">
```

```
                <div class="card py-4 h-100">
                    <div class="card-body text-center">
                        <i class="fas fa-map-marked-alt text-primary mb-2"></i>
                        <h4 class="text-uppercase m-0">Address</h4>
                        <hr class="my-4 mx-auto" />
                        <div class="small text-black-50">Adhiparasakthi Engineering College</div>
                    </div>
                </div>
            </div>
            <div class="col-md-4 mb-3 mb-md-0">
                <div class="card py-4 h-100">
                    <div class="card-body text-center">
                        <i class="fas fa-envelope text-primary mb-2"></i>
                        <h4 class="text-uppercase m-0">Email</h4>
                        <hr class="my-4 mx-auto" />
                        <div class="small text-black-50"><a
href="#!">cancer_rates_prediction@gmail.com</a></div>
                    </div>
                </div>
            </div>
            <div class="col-md-4 mb-3 mb-md-0">
                <div class="card py-4 h-100">
                    <div class="card-body text-center">
                        <i class="fas fa-mobile-alt text-primary mb-2"></i>
                        <h4 class="text-uppercase m-0">Phone</h4>
                        <hr class="my-4 mx-auto" />
                        <div class="small text-black-50">7397620039</div>
                    </div>
                </div>
            </div>
        </div>
        <div class="social d-flex justify-content-center">
            <a class="mx-2" href="#!"><i class="fab fa-twitter"></i></a>
            <a class="mx-2" href="#!"><i class="fab fa-facebook-f"></i></a>
            <a class="mx-2" href="#!"><i class="fab fa-github"></i></a>
        </div>
    </div>
</section>
<!-- Footer-->
<footer class="footer bg-black small text-center text-white-50"><div class="container px-4 px-lg-
5">Copyright &copy; Your Website 2023</div></footer>

<script src="https://cdn.jsdelivr.net/npm/bootstrap@5.2.3/dist/js/core.bundle.min.js"></script>
<!-- Core theme JS-->
<script src="js/scripts.js"></script>
```

```
        <script src="https://cdn.startbootstrap.com/sb-forms-latest.js"></script>
    </body>
</html>
```

Predict_incidence.html:

```
<html>
<head><meta charset="utf-8" />
        <meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-fit=no" />
        <meta name="description" content="" />
        <meta name="author" content="" />
<title>PREDICTION_INCIDENCE</title>
<link rel="icon" type="image/x-icon" href="assets/favicon.ico" />
        <!-- Font Awesome icons (free version)-->
        <script src="https://use.fontawesome.com/releases/v6.3.0/js/all.js"
crossorigin="anonymous"></script>
        <!-- Google fonts-->
        <link href="https://fonts.googleapis.com/css?family=Varela+Round" rel="stylesheet" />
        <link
href="https://fonts.googleapis.com/css?family=Nunito:200,200i,300,300i,400,400i,600,600i,700,700i,
800,800i,900,900i" rel="stylesheet" />
        <!-- Core theme CSS (includes Bootstrap)-->
                <link href="{{ url_for('static', filename='styles.css') }}" rel="stylesheet" /><style>
@import url('https://fonts.googleapis.com/css?family=Luckiest+Guy');
body {
  background-image:url("{{ url_for('static', filename='INC.webp') }}");
  background-repeat:no-repeat;
  background-size:cover;
}
table td{
color:#ffffff ;
color:black;}
h2{
color:black;
font-size:45px;
}
.cha{
size:75px;
padding:30px;
}
table{
padding-top:50px;
size:100px;
}
```

```
table td,tr{
font-size:25px;
padding-left:40px;
padding-right:40px;
}
a{text-decoration:none;
color:#fff;
}
</style>
</head>
<body>
<!-- Navigation-->
      <nav class="navbar navbar-expand-lg navbar-light fixed-top" id="mainNav">
         <div class="container px-4 px-lg-5">
            <a class="navbar-brand" href="#page-top">ONCOLOGY</a>
            <button class="navbar-toggler navbar-toggler-right" type="button" data-bs-toggle="collapse"
data-bs-target="#navbarResponsive" aria-controls="navbarResponsive" aria-expanded="false" aria-
label="Toggle navigation">
               Menu
               <i class="fas fa-bars"></i>
            </button>
            <div class="collapse navbar-collapse" id="navbarResponsive">
               <ul class="navbar-nav ms-auto">
<li class="nav-item"><a class="nav-link" href="/">Home</a></li>
                  <!-- <li class="nav-item"><a class="nav-link" href="/signin.html">Sign in</a></li>
                  <li class="nav-item"><a class="nav-link" href="/reg.html">Register</a></li> -->
                     <li class="nav-item"><a class="nav-link" href="/input">Predict mortality</a></li>
                     <!--<li class="nav-item"><a class="nav-link" href="/input1">Contact</a></li>-->
               </ul>
            </div>
         </div>
      </nav>
</br></br></br></br></br></br>
<center>
<h2 class=re>INCIDENCE PREDICTION</h2>
<!--
<table >
         <form method="post", action="http://127.0.0.1:4000/inci">
                  <tr>
                           <td>Index:</td>
                           <td><input type="text" name="index" id="index" placeholder="Enter index"
required></td>
                  </tr>
                  <tr>
                           <td>FIPS:</td>
```

```
                <td><input type="text" name="fips" id="fips" placeholder="Enter the fips" required></td>
            </tr>
            <tr>
                <td>AGE-ADJUSTED INCIDENCE RATE:</td>
                <td><input type="text" name="age" id="age" placeholder="Enter the Age-Adjusted Incidence Rate " required></td>
            </tr>
            <tr>
                <td>LOWER 95% CONFIDENCE INTERVAL FOR INCIDENCE RATE:</td>
                <td><input type="text" name="lowerinci" id="lowerinci" placeholder="Enter the Lower 95% Confidence Interval for Incidence Rate " required>
            </tr>
            <tr>
                <td>UPPER 95% CONFIDENCE INTERVAL FOR INCIDENCE RATE:</td>
                <td><input type="text" name="upperinci" id="upperinci" placeholder="Enter the upper 95% Confidence Interval for Incidence Rate " required>
            </tr>
            <tr>
                <td>AVERAGE ANNUAL COUNT:</td>
                <td><input type="text" name="avg_count" id="avg_count" placeholder="Enter the Average Annual Count" required>
            </tr>

            <tr>
                <td>RECENT 5-YEAR TREND IN INCIDENCE RATES:</td>
                <td><input type="text" name="rec_5trends" id="rec_5trends" placeholder="Enter the Recent 5-Year Trend in Incidence Rates" required>
            </tr>
            <tr>
                <td>LOWER 95% CONFIDENCE INTERVAL FOR TREND:</td>
                <td><input type="text" name="lowertrends" id="lowertrends" placeholder="Enter the Lower 95% Confidence Interval for Trend " required>
            </tr>
            <tr>
                <td>UPPER 95% CONFIDENCE INTERVAL FOR TRENDS:</td>
                <td><input type="text" name="uppertrends" id="uppertrends" placeholder="Enter the Upper 95% Confidence Interval for Trend " required>
            </tr>
            <tr>
                <td><input type="submit" class="submit" value="submit"><a href="/inci"></a></td>
                <td><input type="reset">
            </tr>
        </form>
```

```
</table>
-->
<h1>The incidence rate status is {{ predict }} </h1>
<br><br>
<img src="{{ url_for('static', filename=file) }}" height="200" width="200">
</center>
</body>
</html>
```

Predict_mortality.html:

```
<html>
<head>
<meta charset="utf-8" />
	<meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-fit=no" />
	<meta name="description" content="" />
	<meta name="author" content="" />
<title>PREDICTION_MORTALITY</title>
<link rel="icon" type="image/x-icon" href="assets/favicon.ico" />
	<!-- Font Awesome icons (free version)-->
	<script src="https://use.fontawesome.com/releases/v6.3.0/js/all.js"
crossorigin="anonymous"></script>
	<!-- Google fonts-->
	<link href="https://fonts.googleapis.com/css?family=Varela+Round" rel="stylesheet" />
	<link
href="https://fonts.googleapis.com/css?family=Nunito:200,200i,300,300i,400,400i,600,600i,700,700i,
800,800i,900,900i" rel="stylesheet" />
	<!-- Core theme CSS (includes Bootstrap)-->
	<link href="{{ url_for('static', filename='styles.css') }}" rel="stylesheet" />
<style>
@import url('https://fonts.googleapis.com/css?family=Luckiest+Guy');
body {
  background-image:url("{{ url_for('static', filename='moo.jpeg') }}");
  background-repeat:no-repeat;
  background-size:cover;
}
table td{
color:black;}
h2{
color:black;
font-size:45px;
}
.cha{
size:75px;
padding:30px;
```

```
}
table{
padding-top:50px;
size:100px;
}
table td,tr{
font-size:25px;
padding-left:40px;
padding-right:40px;
}
a{text-decoration:none;
color:#fff;
}
</style>
</head>
<body>
<!-- Navigation-->
    <nav class="navbar navbar-expand-lg navbar-light fixed-top" id="mainNav">
      <div class="container px-4 px-lg-5">
        <a class="navbar-brand" href="#page-top">ONCOLOGY</a>
        <button class="navbar-toggler navbar-toggler-right" type="button" data-bs-toggle="collapse"
data-bs-target="#navbarResponsive" aria-controls="navbarResponsive" aria-expanded="false" aria-
label="Toggle navigation">
          Menu
          <i class="fas fa-bars"></i>
        </button>
        <div class="collapse navbar-collapse" id="navbarResponsive">
          <ul class="navbar-nav ms-auto">  <li class="nav-item"><a class="nav-link"
href="/rr.html">Home</a></li>
            <!-- <li class="nav-item"><a class="nav-link" href="/signin.html">Sign in</a></li>
             <li class="nav-item"><a class="nav-link" href="/reg.html">Register</a></li> -->
             <li class="nav-item"><a class="nav-link" href="/input">Predict incidence</a></li>
               <!--<li class="nav-item"><a class="nav-link" href="/contact">Contact</a></li>-->
          </ul>
        </div>
      </div>
    </nav>
</br></br></br></br></br></br>
<center>
<h2 class=re>MORTALITY PREDICTION</h2>
<!--
<table >
      <form method="post", action="http://127.0.0.1:4000/mor">
            <tr>
                  <td>INDEX:</td>
```

```
                <td><input type="text" name="index_1" id="index_1" placeholder="index" required></td>
            </tr>
            <tr>
                <td>FIPS:</td>
                <td><input type="text" name="fips_1" id="fips_1" placeholder="Enter the fips" required></td>
            </tr>
            <tr>
                <td>AGE-ADJUSTED DEATH RATE:</td>
                <td><input type="text" name="ageD" id="ageD" placeholder="Enter the Age-Adjusted Death Rate " required></td>
            </tr>
            <tr>
                <td>LOWER 95% CONFIDENCE INTERVAL FOR DEATH RATE:</td>
                <td><input type="text" name="lowerDD" id="lowerDD" placeholder="Enter the Lower 95% Confidence Interval for Death Rate " required>
            </tr><tr><td>UPPER 95% CONFIDENCE INTERVAL FOR DEATH RATE:</td>
                <td><input type="text" name="upperDD" id="upperDD" placeholder="Enter the upper 95% Confidence Interval for Death Rate " required>
            </tr>
            <tr><td>AVERAGE DEATHS PERS YEARS:</td><td><input type="text" name="avg_DD" id="avg_DD" placeholder="Enter the Average Deaths per Year" required>
            </tr><tr><td>RECENT 5-YEAR TREND FOR DEATH RATE:</td><td><input type="text" name="rec_5trendsDD" id="rec_5trendsDD" placeholder="Enter the Recent 5-Year Trend in Death Rates" required></tr><tr><td>LOWER 95% CONFIDENCE INTERVAL FOR TREND:</td><td><input type="text" name="lowertrendsDD" id="lowertrendsDD" placeholder="Enter the Lower 95% Confidence Interval for Trend " required></tr>
            <tr><td>UPPER 95% CONFIDENCE INTERVAL FOR TRENDS:</td><td><input type="text" name="uppertrendsDD" id="uppertrendsDD" placeholder="Enter the Upper 95% Confidence Interval for Trend" required>
            </tr>
                <td><input type="submit" class="submit" value="submit"></td>
                <td><input type="reset">
            </tr>
        </form>
</table>
-->
<h1>The mortality rate status is {{ predicts }} </h1>
<br><br>
<img src="{{ url_for('static', filename=file) }}" height="200" width="200">
</center>
</body>
</html>
```

CHAPTER 6

RESULTS

6.1 PERFORMANCE METRICS

Performance metrics are measures used to evaluate and assess the effectiveness and efficiency of various processes, systems, or activities. They provide quantitative or qualitative data that enable organizations or individuals to gauge their performance against specific objectives or benchmarks. Performance metrics can vary depending on the context and the goals of the measurement.

S.No.	Parameter	Values	Screenshot

1.	Metrics	**<u>CLASSIFICATION MODEL</u>**
		
		DEATH RATE:
		Confusion Matrix –
		`[[5 0 0 0 0]`
		`[0 77 0 0 0]`
		`[0 0 352 5 0]`
		`[0 0 3 181 0]`
		`[0 0 0 0 5]],`
		
		Accuracy Score – `0.9872611464968153`
		
		Classification Report –
		
		`precision recall f1-score support`
		`1 1.00 1.00 1.00 5`
		`2 1.00 1.00 1.00 77`
		`5 0.99 0.99 0.99 357`
		`6 0.97 0.98 0.98 184`
		`7 1.00 1.00 1.00 5`
		
		`Acc: 0.99 628`
		`macroavg: 0.99 0.99 0.99 628`
		`wtd avg: 0.99 0.99 0.99 628`
			DEATH RATE:

INCIDENCE RATE:

Confusion Matrix –

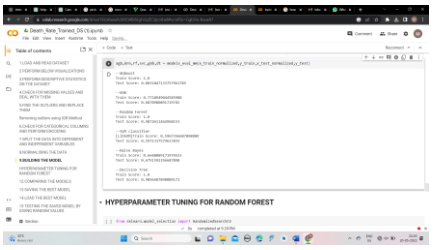
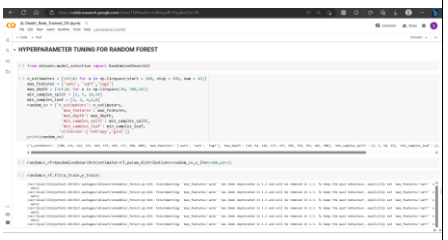
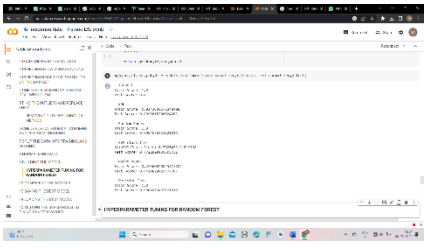
```
[[ 63   0   0   0   0   0]
 [  0  36   0   0   0   0]
 [  0   0   3   0   0   0]
 [  0   0   0 481   0   0]
 [  0   0   0   0  38   0]
 [  0   0   0   0   0   7]]
```

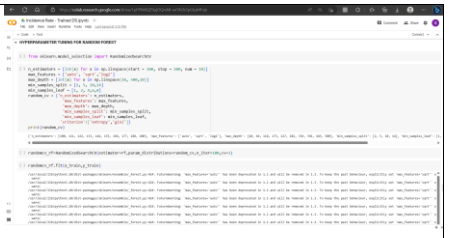
Accuracy Score – 1.0

Classification Report –

	precision	recall	f1-score	support
1	1.00	1.00	1.00	63
3	1.00	1.00	1.00	36
4	1.00	1.00	1.00	3
5	1.00	1.00	1.00	481
6	1.00	1.00	1.00	38
7	1.00	1.00	1.00	7
Acc			1.00	628
macroavg:	1.00	1.00	1.00	628
wtd avg:	1.00	1.00	1.00	628

INCIDENCE RATE:

2.	Tune the Model	**DEATH RATE:** **Validation Method –** --XGBoost Train Score: 1.0 Test Score: 0.0031847133757961785 --KNN Train Score: 0.7718949044585988 Test Score: 0.6878980891719745 --Random Forest Train Score: 1.0 Test Score: 0.9872611464968153 --SVM classifier [LibSVM]Train Score: 0.5967356687898089 Test Score: 0.5971337579617835 --Naive Bayes Train Score: 0.6648089171974523 Test Score: 0.6751592356687898 --Decision Tree Train Score: 1.0 Test Score: 0.9856687898089171 **INCIDENCE RATE:** **Validation Method –** --XGBoost Train Score: 1.0 Test Score: 0.0	**DEATH RATE:**   **INCIDENCE RATE:** 

		--KNN Train Score: 0.9243630573248408 Test Score: 0.8996815286624203 --Random Forest Train Score: 1.0 Test Score: 0.9984076433121019 --SVM classifier [LibSVM]Train Score: 0.7826433121019108 Test Score: 0.7722929936305732 --Naive Bayes Train Score: 0.45660828025477707 Test Score: 0.4410828025477707 --Decision Tree Train Score: 1.0 Test Score: 0.9984076433121019	

CHAPTER 7

ADVANTAGES AND DISADVANTAGES

ADVANTAGES-

- The major advantage of this analysis can help in identifying the patterns and trends in large datasets, enabling the early detection of cancer cases.
- Analyzing various risk factors helps in finding the individuals who may be at a higher risk of developing cancer, leading to earlier diagnosis and potentially better treatment outcomes.
- This analysis helps in assisting the resource allocation, planning for the healthcare infrastructure, and designing targeted interventions.
- It can provide more accurate predictions and provide various treatment plans.

DISADVANTAGES-

- The accuracy and completeness of data used to calculate the Cancer mortality rate and incidence rates can vary.
- They do not provide detailed insights of context information.
- It can result in misleading interpretations or generalization.
- The calculation and reporting of cancer mortality and incidence rate often involve a time lag due to the collection, compilation and analysis of data.

CHAPTER 8

CONCLUSION AND FUTURE WORK

8.1 CONCLUSION

Cancer mortality and incidence rates are valuable measures that provide insights into the prevalence and impact of cancer on populations. These rates help identify trends, assess the effectiveness of prevention and treatment strategies, allocate resources, and guide public health policies. However, it is essential to consider the limitations and nuances associated with these rates, such as data quality issues, population heterogeneity, lack of context, and the need for additional information to fully understand the underlying causes and factors influencing cancer outcomes.

To maximize the utility of cancer mortality and incidence rates, it is crucial to integrate them with other sources of information, such as clinical data, genetic profiling, and qualitative research. This multi-dimensional approach enables a more comprehensive understanding of cancer burden, individual variations, risk factors, treatment responses, and the development of personalized treatment strategies. Furthermore, advancements in machine learning and data analytics offer opportunities to enhance the analysis and interpretation of these rates, allowing for more accurate predictions, risk assessment, and personalized approaches to cancer prevention and treatment.

CHAPTER 9

FUTURE SCOPE

9.1 FUTURE SCOPE

The future scope of cancer mortality and incidence rates should focus on addressing health disparities and promoting health equity. By identifying and analyzing disparities across different population groups, healthcare systems can implement targeted interventions and policies to reduce disparities, improve access to care, and ensure that cancer prevention and treatment efforts reach all individuals, regardless of their socioeconomic background or geographic location.

The integration of cancer mortality and incidence rates with personalized medicine approaches holds great potential. By incorporating detailed patient data, genetic profiling, and molecular characteristics of tumors, healthcare providers can tailor treatment plans to individual patients, leading to improved outcomes and reduced mortality rates.

Advancements in data collection, electronic health records, and health informatics can enable real-time monitoring of cancer mortality and incidence rates. This timely information can help identify emerging trends, assess the impact of interventions, and guide decision-making processes more effectively.

Machine learning and artificial intelligence techniques can be leveraged to develop more accurate predictive models for cancer mortality and incidence rates. These models can integrate various data sources, including genetic data, lifestyle factors, environmental exposures, and treatment history, to provide more precise predictions and support proactive interventions

CHAPTER 10

APPENDIX

10.1 SOURCE CODE

Home.html:

```
<!DOCTYPE html>
<html lang="en">
   <head>
      <meta charset="utf-8" />
      <meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-fit=no" />
      <meta name="description" content="" />
      <meta name="author" content="" />
      <title>ONCOLOGY</title>
      <link rel="icon" type="image/x-icon" href="assets/favicon.ico" />
      <!-- Font Awesome icons (free version)-->
      <script src="https://use.fontawesome.com/releases/v6.3.0/js/all.js"
crossorigin="anonymous"></script>
      <!-- Google fonts-->
      <link href="https://fonts.googleapis.com/css?family=Varela+Round" rel="stylesheet" />
      <link
href="https://fonts.googleapis.com/css?family=Nunito:200,200i,300,300i,400,400i,600,600i,700,700i,
800,800i,900,900i" rel="stylesheet" />
      <!-- Core theme CSS (includes Bootstrap)-->
      <link href="{{ url_for('static', filename='styles.css') }}" rel="stylesheet" />
   </head>
   <body id="page-top">
      <!-- Navigation-->
      <nav class="navbar navbar-expand-lg navbar-light fixed-top" id="mainNav">
         <div class="container px-4 px-lg-5">
            <a class="navbar-brand" href="#page-top">ONCOLOGY</a>
            <button class="navbar-toggler navbar-toggler-right" type="button" data-bs-
toggle="collapse" data-bs-target="#navbarResponsive" aria-controls="navbarResponsive" aria-
expanded="false" aria-label="Toggle navigation">
               Menu
               <i class="fas fa-bars"></i>
            </button>
            <div class="collapse navbar-collapse" id="navbarResponsive">
               <ul class="navbar-nav ms-auto">
                  <!-- <li class="nav-item"><a class="nav-link" href="/signin">Sign in</a></li>-->
                   <!--<li class="nav-item"><a class="nav-link" href="/reg">Register</a></li>-->
                   <li class="nav-item"><a class="nav-link" href="/input">Predict incidence</a></li>
                      <li class="nav-item"><a class="nav-link" href="/input1">Predict mortality</a></li>
                      <!--<li class="nav-item"><a class="nav-link" href="#signup">Contact</a></li>-->
               </ul>
            </div>
         </div>
      </nav>
```

```
<!-- Masthead-->
<header class="masthead">
   <div class="container px-4 px-lg-5 d-flex h-100 align-items-center justify-content-center">
      <div class="d-flex justify-content-center">
         <div class="text-center">
            <h1 class="mx-auto my-0 text-uppercase">CANCER MORTALITY AND
INCIDENCE RATE</h1>
            <h2 class="text-white-50 mx-auto mt-2 mb-5">An awareness of one's mortality can
lead you to wake up and live an authentic, meaningful life.</h2>
         </div>
      </div>
   </div>
</header>
 <!-- about-->
<section class="about-section" id="about">
   <div class="container px-4 px-lg-5">
      <div class="row gx-4 gx-lg-5">
         <div class="col-md-10 col-lg-8 mx-auto text-center">
            <i class="far fa-paper-plane fa-2x mb-2 text-white"></i>
            <h2 class="text-white mb-5">ABOUT</h2>
                  <h3 style="color:#ffdab9;">CANCER</h3>
                        <p style="color:white;">Cancer is a complex and diverse group of
diseases characterized by the abnormal growth of cells. It can affect various parts of the body and has
many different types and subtypes. Cancer occurs when normal cells undergo genetic mutations that
allow them to multiply uncontrollably, forming a mass of cells called a tumor.There are two main
categories of tumors: benign and malignant. Benign tumors are non-cancerous and usually do not
spread to other parts of the body. Malignant tumors, on the other hand, are cancerous and can invade
nearby tissues and spread to distant organs through a process called metastasis.Causes of cancer can
vary and often involve a combination of genetic factors, lifestyle choices, and environmental
exposures. Common risk factors include tobacco use, unhealthy diet, lack of physical activity,
exposure to certain chemicals and substances, infections, and family history of cancer. Cancer
symptoms depend on the type and stage of the disease but can include fatigue, unexplained weight
loss, pain, changes in the skin, persistent cough, and abnormal bleeding. Early detection and timely
treatment are crucial for improving outcomes and increasing survival rates. Treatment options for
cancer include surgery, radiation therapy, chemotherapy, immunotherapy, targeted therapy, and
hormone therapy. The choice of treatment depends on factors such as the type and stage of cancer, the
patient's overall health, and individual preferences.Prevention plays a vital role in reducing the risk of
cancer. Adopting a healthy lifestyle, avoiding tobacco and excessive alcohol consumption,
maintaining a balanced diet, exercising regularly, protecting against infections (such as HPV and
hepatitis), and getting regular screenings and vaccinations can help lower the risk. Cancer research and
advancements in medical technology continue to improve our understanding of the disease and
develop more effective treatments. It is important for individuals to stay informed, seek medical
advice when needed, and support efforts aimed at cancer prevention, early detection, and
treatment.</p>

                  <h3 style="color:#ffdab9;">CANCER MORTALITY</h3>

                        <p style="color:white;">Cancer mortality refers to the number of deaths
caused by cancer within a specific population over a given period. Predicting cancer mortality is
challenging as it depends on various factors, including the type and stage of cancer, access to
healthcare, treatment options, and individual patient characteristics.Population-level cancer mortality
```

rates are often estimated through statistical analysis of large datasets, such as cancer registries and national health surveys. These data help identify trends, patterns, and risk factors associated with cancer-related deaths in specific populations. However, predicting individual cancer mortality is more difficult. Doctors and oncologists use various tools and models to assess prognosis and estimate the likelihood of survival for individual patients. These tools take into account factors such as cancer stage, tumor characteristics, treatment options, and patient health status.Prognostic factors such as tumor size, grade, lymph node involvement, and the presence of metastasis are considered in determining the expected outcome for a patient. Additionally, genetic testing can provide information on specific gene mutations that may influence cancer prognosis.It is important to note that predictions of cancer mortality are not absolute and can vary for each individual. Advances in cancer treatment and personalized medicine have significantly improved survival rates for many types of cancer. Treatment plans are tailored to each patient's specific needs, and new therapies, including targeted therapies and immunotherapies, are continually being developed.Ultimately, it is essential for individuals diagnosed with cancer to consult with their healthcare team to understand their prognosis, treatment options, and make informed decisions about their care. Regular monitoring, adherence to treatment plans, and adopting a healthy lifestyle can all play a role in improving outcomes and potentially reducing the risk of cancer mortality

<h3 style="color:#ffdab9;">CANCER INCIDENCE</h3>

Cancer incidence refers to the number of newly diagnosed cancer cases within a specific population over a given period. Predicting cancer incidence is challenging due to the multitude of factors involved, including genetic predisposition, lifestyle choices, environmental exposures, and chance.

Epidemiological studies and cancer registries play a crucial role in estimating cancer incidence rates. These studies collect data on diagnosed cancer cases and provide information about the frequency and distribution of different types of cancer within a population. By analyzing this data, researchers can identify trends, risk factors, and changes in cancer incidence over time.To predict cancer incidence at the population level, statistical models and projections are often used. These models incorporate factors such as population demographics, known risk factors, and historical data to estimate future cancer incidence rates. However, these predictions are subject to uncertainties and assumptions and should be interpreted with caution.Predicting individual cancer incidence is challenging due to the complex interplay of various factors. Genetic testing can identify certain gene mutations associated with an increased risk of developing specific types of cancer. However, having these gene mutations does not guarantee the development of cancer.Prevention efforts, such as promoting healthy lifestyles, raising awareness about cancer risk factors, and implementing screening programs, play a crucial role in reducing cancer incidence. Screening tests, such as mammograms, Pap smears, and colonoscopies, can detect cancer at early stages or identify precancerous changes, allowing for timely intervention and potentially reducing cancer incidence.While it is not possible to accurately predict an individual's cancer incidence, understanding and addressing risk factors, following recommended screening guidelines, and adopting a healthy lifestyle can help reduce the risk of developing cancer. It is important for individuals to consult with healthcare professionals for personalized advice and guidance based on their specific circumstances.</P>

```
</section>

<!-- Contact-->
<section class="contact-section bg-black">
  <div class="container px-4 px-lg-5">
    <div class="row gx-4 gx-lg-5">
      <div class="col-md-4 mb-3 mb-md-0">
        <div class="card py-4 h-100">
          <div class="card-body text-center">
            <i class="fas fa-map-marked-alt text-primary mb-2"></i>
            <h4 class="text-uppercase m-0">Address</h4>
            <hr class="my-4 mx-auto" />
            <div class="small text-black-50">Adhiparasakthi Engineering College</div>
          </div>
        </div>
      </div>
      <div class="col-md-4 mb-3 mb-md-0">
        <div class="card py-4 h-100">
          <div class="card-body text-center">
            <i class="fas fa-envelope text-primary mb-2"></i>
            <h4 class="text-uppercase m-0">Email</h4>
            <hr class="my-4 mx-auto" />
            <div class="small text-black-50"><a
href="#!">cancer_rates_prediction@gmail.com</a></div>
          </div>
        </div>
      </div>
      <div class="col-md-4 mb-3 mb-md-0">
        <div class="card py-4 h-100">
          <div class="card-body text-center">
            <i class="fas fa-mobile-alt text-primary mb-2"></i>
            <h4 class="text-uppercase m-0">Phone</h4>
            <hr class="my-4 mx-auto" />
            <div class="small text-black-50">7397620039</div>
          </div>
        </div>
      </div>
    </div>
    <div class="social d-flex justify-content-center">
      <a class="mx-2" href="#!"><i class="fab fa-twitter"></i></a>
      <a class="mx-2" href="#!"><i class="fab fa-facebook-f"></i></a>
      <a class="mx-2" href="#!"><i class="fab fa-github"></i></a>
    </div>
  </div>
```

```
        </section>
        <!-- Footer-->
        <footer class="footer bg-black small text-center text-white-50"><div class="container px-4 px-
lg-5">Copyright &copy; Your Website 2023</div></footer>

        <script src="https://cdn.jsdelivr.net/npm/bootstrap@5.2.3/dist/js/core.bundle.min.js"></script>
        <!-- Core theme JS-->
        <script src="js/scripts.js"></script>
        <script src="https://cdn.startbootstrap.com/sb-forms-latest.js"></script>
    </body>
</html>
```

Predict_incidence.html:

```
<html>
<head><meta charset="utf-8" />
        <meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-fit=no" />
        <meta name="description" content="" />
        <meta name="author" content="" />
<title>PREDICTION_INCIDENCE</title>
<link rel="icon" type="image/x-icon" href="assets/favicon.ico" />
        <!-- Font Awesome icons (free version)-->
        <script src="https://use.fontawesome.com/releases/v6.3.0/js/all.js"
crossorigin="anonymous"></script>
        <!-- Google fonts-->
        <link href="https://fonts.googleapis.com/css?family=Varela+Round" rel="stylesheet" />
        <link
href="https://fonts.googleapis.com/css?family=Nunito:200,200i,300,300i,400,400i,600,600i,700,700i,
800,800i,900,900i" rel="stylesheet" />
        <!-- Core theme CSS (includes Bootstrap)-->
                <link href="{{ url_for('static', filename='styles.css') }}" rel="stylesheet" /><style>
@import url('https://fonts.googleapis.com/css?family=Luckiest+Guy');
body {
  background-image:url("{{ url_for('static', filename='INC.webp') }}");
  background-repeat:no-repeat;
  background-size:cover;
}
table td{
color:#ffffff ;
color:black;}

h2{
color:black;
```

```
font-size:45px;
}
.cha{
size:75px;
padding:30px;
}
table{
padding-top:50px;
size:100px;
}
table td,tr{
font-size:25px;
padding-left:40px;
padding-right:40px;
}
a{text-decoration:none;
color:#fff;
}
</style>
</head>

<body>

<!-- Navigation-->
    <nav class="navbar navbar-expand-lg navbar-light fixed-top" id="mainNav">
      <div class="container px-4 px-lg-5">
        <a class="navbar-brand" href="#page-top">ONCOLOGY</a>
        <button class="navbar-toggler navbar-toggler-right" type="button" data-bs-
toggle="collapse" data-bs-target="#navbarResponsive" aria-controls="navbarResponsive" aria-
expanded="false" aria-label="Toggle navigation">
          Menu
          <i class="fas fa-bars"></i>
        </button>
        <div class="collapse navbar-collapse" id="navbarResponsive">
          <ul class="navbar-nav ms-auto">
<li class="nav-item"><a class="nav-link" href="/">Home</a></li>
            <!-- <li class="nav-item"><a class="nav-link" href="/signin.html">Sign in</a></li>
             <li class="nav-item"><a class="nav-link" href="/reg.html">Register</a></li> -->
              <li class="nav-item"><a class="nav-link" href="/input">Predict mortality</a></li>
              <!--<li class="nav-item"><a class="nav-link" href="/input1">Contact</a></li>-->
          </ul>
        </div>
      </div>
    </nav>
```

```
</br></br></br></br></br></br>
<center>
<h2 class=re>INCIDENCE PREDICTION</h2>
<!--
<table >
        <form method="post", action="http://127.0.0.1:4000/inci">
                <tr>
                        <td>Index:</td>
                        <td><input type="text" name="index" id="index" placeholder="Enter index"
required></td>
                </tr>


                <tr>
                        <td>FIPS:</td>
                        <td><input type="text" name="fips" id="fips" placeholder="Enter the fips"
required></td>
                </tr>


                <tr>
                        <td>AGE-ADJUSTED INCIDENCE RATE:</td>
                        <td><input type="text" name="age" id="age" placeholder="Enter the Age-
Adjusted Incidence Rate " required></td>
                </tr>


                <tr>
                        <td>LOWER 95% CONFIDENCE INTERVAL FOR INCIDENCE
RATE:</td>
                        <td><input type="text" name="lowerinci" id="lowerinci" placeholder="Enter
the Lower 95% Confidence Interval for Incidence Rate " required>
                </tr>

                <tr>
                        <td>UPPER 95% CONFIDENCE INTERVAL FOR INCIDENCE RATE:</td>
                        <td><input type="text" name="upperinci" id="upperinci" placeholder="Enter
the upper 95% Confidence Interval for Incidence Rate " required>
                </tr>

                <tr>
                        <td>AVERAGE ANNUAL COUNT:</td>
                        <td><input type="text" name="avg_count" id="avg_count" placeholder="Enter
the Average Annual Count" required>
```

```
                </tr>

                <tr>
                        <td>RECENT 5-YEAR TREND IN INCIDENCE RATES:</td>
                        <td><input type="text" name="rec_5trends" id="rec_5trends"
placeholder="Enter the Recent 5-Year Trend in Incidence Rates" required>
                </tr>
                <tr>
                        <td>LOWER 95% CONFIDENCE INTERVAL FOR TREND:</td>
                        <td><input type="text" name="lowertrends" id="lowertrends"
placeholder="Enter the Lower 95% Confidence Interval for Trend " required>
                </tr>
                <tr>
                        <td>UPPER 95% CONFIDENCE INTERVAL FOR TRENDS:</td>
                        <td><input type="text" name="uppertrends" id="uppertrends"
placeholder="Enter the Upper 95% Confidence Interval for Trend " required>
                </tr>
                <tr>
                        <td><input type="submit" class="submit" value="submit"><a
href="/inci"></a></td>
                        <td><input type="reset">
                </tr>
        </form>
</table>
-->
<h1>The incidence rate status is {{ predict }} </h1>
<br><br>
<img src="{{ url_for('static', filename=file) }}" height="200" width="200">
</center>
</body>
</html>
```

Predict_incidence.html:

```
<html>
<head>
<meta charset="utf-8" />
    <meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-fit=no" />
    <meta name="description" content="" />
    <meta name="author" content="" />
<title>PREDICTION_MORTALITY</title>
<link rel="icon" type="image/x-icon" href="assets/favicon.ico" />
    <!-- Font Awesome icons (free version)-->
    <script src="https://use.fontawesome.com/releases/v6.3.0/js/all.js"
crossorigin="anonymous"></script>
```

```
        <!-- Google fonts-->
        <link href="https://fonts.googleapis.com/css?family=Varela+Round" rel="stylesheet" />
        <link
href="https://fonts.googleapis.com/css?family=Nunito:200,200i,300,300i,400,400i,600,600i,700,700i,
800,800i,900,900i" rel="stylesheet" />
        <!-- Core theme CSS (includes Bootstrap)-->
        <link href="{{ url_for('static', filename='styles.css') }}" rel="stylesheet" />
<style>
@import url('https://fonts.googleapis.com/css?family=Luckiest+Guy');
body {
  background-image:url("{{ url_for('static', filename='moo.jpeg') }}");
  background-repeat:no-repeat;
  background-size:cover;
}
table td{
color:black;}

h2{
color:black;

font-size:45px;
}
.cha{
size:75px;
padding:30px;
}
table{
padding-top:50px;
size:100px;
}
table td,tr{
font-size:25px;
padding-left:40px;
padding-right:40px;
}
a{text-decoration:none;
color:#fff;
}
</style>
</head>

<body>

<!-- Navigation-->
```

```
    <nav class="navbar navbar-expand-lg navbar-light fixed-top" id="mainNav">
      <div class="container px-4 px-lg-5">
        <a class="navbar-brand" href="#page-top">ONCOLOGY</a>
        <button class="navbar-toggler navbar-toggler-right" type="button" data-bs-
toggle="collapse" data-bs-target="#navbarResponsive" aria-controls="navbarResponsive" aria-
expanded="false" aria-label="Toggle navigation">
          Menu
          <i class="fas fa-bars"></i>
        </button>
        <div class="collapse navbar-collapse" id="navbarResponsive">
          <ul class="navbar-nav ms-auto">   <li class="nav-item"><a class="nav-link"
href="/rr.html">Home</a></li>
            <!-- <li class="nav-item"><a class="nav-link" href="/signin.html">Sign in</a></li>
             <li class="nav-item"><a class="nav-link" href="/reg.html">Register</a></li> -->
             <li class="nav-item"><a class="nav-link" href="/input">Predict incidence</a></li>

               <!--<li class="nav-item"><a class="nav-link" href="/contact">Contact</a></li>-->
          </ul>
        </div>
      </div>
    </nav>
</br></br></br></br></br></br>
<center>
<h2 class=re>MORTALITY PREDICTION</h2>
<!--
<table >
      <form method="post", action="http://127.0.0.1:4000/mor">
            <tr>
                  <td>INDEX:</td>
                  <td><input type="text" name="index_1" id="index_1" placeholder="index"
required></td>
            </tr>
            <tr>
                  <td>FIPS:</td>
                  <td><input type="text" name="fips_1" id="fips_1" placeholder="Enter the
fips" required></td>
            </tr>
            <tr>
                  <td>AGE-ADJUSTED DEATH RATE:</td>
                  <td><input type="text" name="ageD" id="ageD" placeholder="Enter the Age-
Adjusted Death Rate " required></td>
            </tr>
            <tr>
                  <td>LOWER 95% CONFIDENCE INTERVAL FOR DEATH RATE:</td>
```

```
                        <td><input type="text" name="lowerDD" id="lowerDD" placeholder="Enter
the Lower 95% Confidence Interval for Death Rate " required>
                </tr>

<tr>
                        <td>UPPER 95% CONFIDENCE INTERVAL FOR DEATH RATE:</td>
                        <td><input type="text" name="upperDD" id="upperDD" placeholder="Enter
the upper 95% Confidence Interval for Death Rate " required>
                </tr>

                <tr>
                        <td>AVERAGE DEATHS PERS YEARS:</td>
                        <td><input type="text" name="avg_DD" id="avg_DD" placeholder="Enter the
Average Deaths per Year" required>
                </tr>

                <tr>
                        <td>RECENT 5-YEAR TREND FOR DEATH RATE:</td>
                        <td><input type="text" name="rec_5trendsDD" id="rec_5trendsDD"
placeholder="Enter the Recent 5-Year Trend in Death Rates" required>
                </tr>

                <tr>
                        <td>LOWER 95% CONFIDENCE INTERVAL FOR TREND:</td>
                        <td><input type="text" name="lowertrendsDD" id="lowertrendsDD"
placeholder="Enter the Lower 95% Confidence Interval for Trend " required>
                </tr>
                <tr>
                        <td>UPPER 95% CONFIDENCE INTERVAL FOR TRENDS:</td>
                        <td><input type="text" name="uppertrendsDD" id="uppertrendsDD"
placeholder="Enter the Upper 95% Confidence Interval for Trend" required>
                </tr>


                <tr>
                        <td><input type="submit" class="submit" value="submit"></td>
                        <td><input type="reset">
                </tr>


        </form>
</table>
-->
<h1>The mortality rate status is {{ predicts }} </h1>
```

```
<br><br>
<img src="{{ url_for('static', filename=file) }}" height="200" width="200">
</center>
</body>
</html>
```

GITHUB LINK:

https://github.com/naanmudhalvan-SI/IBM--9043-1682399090

PROJECT DEMO LINK:

https://www.youtube.com/channel/UCeyNYzLo_48X8_O7rSQ-LdQ

https://youtu.be/qtsE3GOlRd4