NUTRITION ASSISTANT APPLICATION

A PROJECT REPORT

Submitted by

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Table of contents:

1. INTRODUCTION:

1.1 Project Overview

The cloud based system aims building a web Application that automatically estimates food attributes such as ingredients and nutritional value by classifying the input image of food. Due to the ignorance of healthy food habits, obesity rates are increasing at an alarming speed, and this is reflective of the risks to people's health . People need to control their daily calorie intake by eating healthier foods, which is the most basic method to avoid obesity. However, although food packaging comes with nutrition (and calorie) labels, it's still not very convenient for people to refer to App-based nutrient dashboard systems which can analyze real-time images of a meal and analyze it for nutritional content which can be very handy and improves the dietary habits, and therefore, helps in maintaining a healthy lifestyle.

1.2. Purpose

The purpose of the project is to helps dieticians with providing proper nutrition at healthcare facilities. It determine patients nutritional needs. It assess factors and plans,meals and menus. They also ensure proper sterilization of pates and utensils. Nutritionists work to help people establish good connections between healthy weights and overall health. It automatically estimates food attributes such as ingredients and nutritional value by classifying the input image of food.

2. LITERATURE SURVEY:

2.1. Existing problem

Patients who have to maintain diet have to give their body health details. They have to check their BMI value to predict the food for them. Then the image or name of the food have to upload to know about the full details of the food . Finally , the patient need to follow the Predicted food and proper maintanence of diet with respect to the nutrition details of a doof which is obtained.

2.2. Reference

https://www.researchgate.net/publication/346411010_DEVELOPMENT_OF_A_CLOUD_BASED_SOLUTION_FOR_EFFECTIVE_NUTRITION_INTERVENTION_IN_THE_MANAGEMENT_OF_LIFESTYLE_DISEASES

https://www.academia.edu/43016077/A_DIET_CONTROL_AND_FITNESS_ASSISTANT_APPLICATION_USING_DEEP_LEARNING_BASED_IMAGE_CLASSIFICATION

https://www.emizentech.com/blog/diet-nutrition-tracking-app-development.html

https://www.researchgate.net/publication/292153499_Smartphone_Applications_for_Promoting_Healthy_Diet_and_Nutrition_A_Literature_Review

2.3. Problem statement definition

ARCHANA is a pregnant women who wants to integrate healthy eating habits, because she think that her fetus need to have a proper nutrition. Wellness and healthy lifestyles have become mainstream. Interest in fitness applications and revenue from them grow as fast as the number of people striving to be fit.

The Main Objective of this project is to develop a web applicaton that automatically estimates food attributes such as ingredients and nutritional value by classifying the input image of food.

1.Who are all affected by this issue?

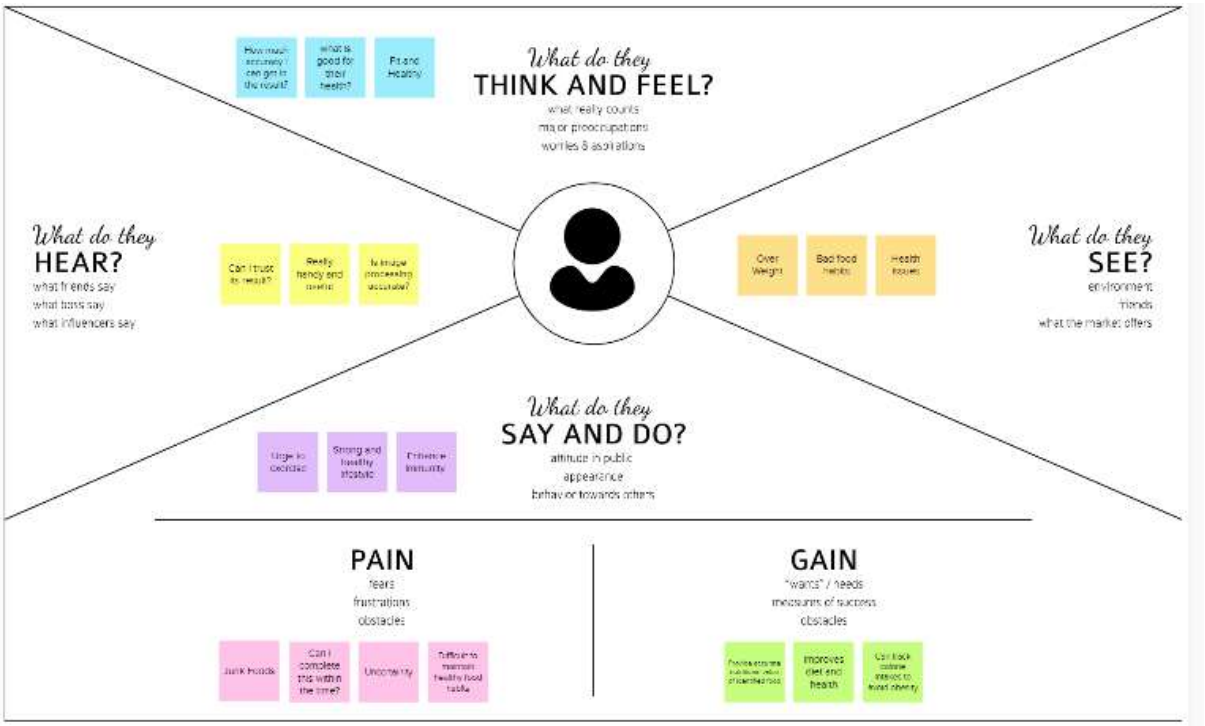
People from all ages of group who are careless about their health due to the busy schedule of their work. This leads to unhealthy lifestyle because of their food habits. These thye of habits leads to many health issues like heart attack , diabetics, obesity, and rise in cholesterol level.

2.What are the boundaries of the problem?

Based on the information given by the user ,the nutrition provide the diet chart to the user. If the user deals with diabetics, heart attack or obesity , the diet chart will be provided based on that information.

3. IDEATION & PROPOSED SOLUTION:

3.1. Empathy Map Canvas



3.2 Ideation & Brainstorming

3.3 Proposed Solution

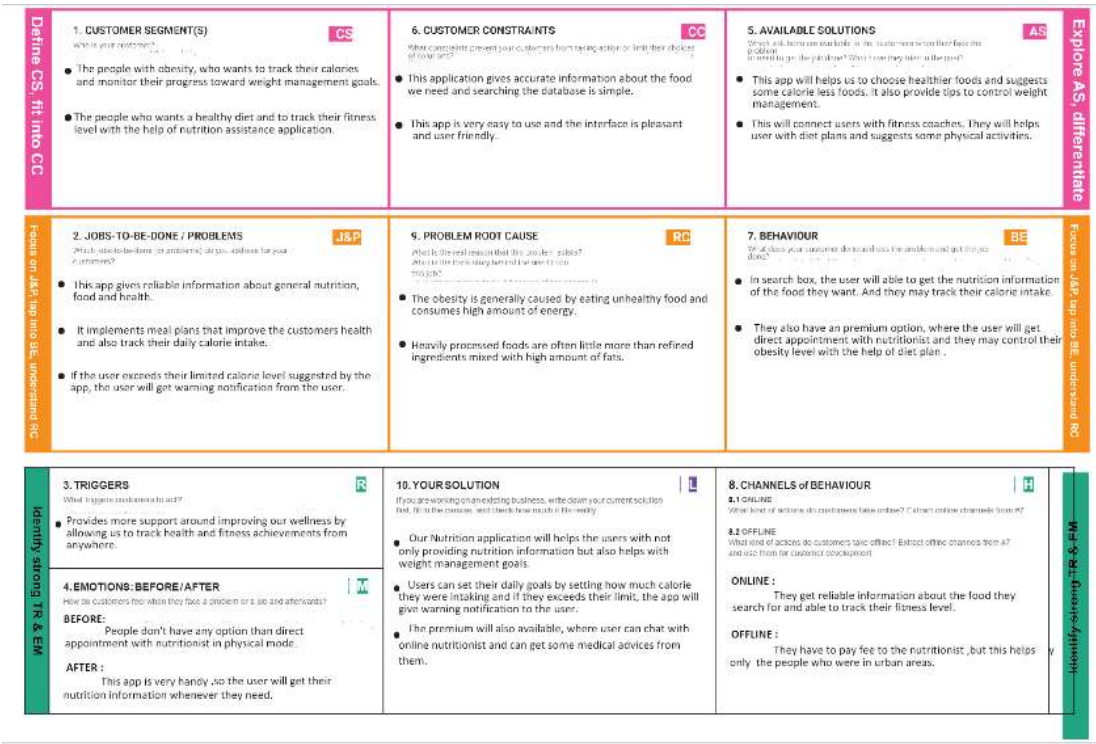
S.No	Parameter	Description
1	Problem Statement (Problem to be solved)	➢ This application provides nutrients and calories of the food which will help people with providing proper nutrition and leading a healthy lifestyle. ➢ This application will guide you through physical activities.
2	Idea / Solution description	Creating an application that suggests diet chart and exercise chart based on calories.
3	Novelty / Uniqueness	Images of meals are being analysed to get their nutritional content are found and exercises are suggested based on that.
4	Social Impact / Customer Satisfaction	It helps to maintain healthy lifestyle with physical activities that reduce obesity.
5	Business Model (Revenue Model)	The ways to develop the revenue is through social media and digital marketing.
6	Scalability of the Solution	➢ Easy to access. ➢ Different exercise chart based on calorie intake

3.4 Problem Solution fit

This project aims at building a web App that automatically estimates food attributes such as ingredients and nutritional value by classifying the input image of food. Our method employs Clarifai's AI-Driven Food Detection Model for accurate food identification and Food API's to give the nutritional value of the identified food.

PURPOSE:

- ❖ Solve complex problems in a way that fits the state of your customers.
- ❖ Succeed faster and increase your solution adoption by tapping intoexistingmediums and channels of behavior.
- ❖ Sharpen your communication and marketing strategy with the right triggersand messaging.
- ❖ Increase touch-points with your company by finding the right problem-behavior fit and building trust by solving frequent annoyances, or urgent or costly problems.



4. REQUIREMENT ANALYSIS

4.1 Functional requirement :

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form.
FR-2	User Confirmation	Confirmation via OTP
FR-3	Uploading Image	The system should able to get the image from the user.
FR-4	Identification of image	The system should able to identify the image of the food given using model.
FR-5	Obtain the ingredients	The system must able to obtain the ingredients of the given food image.
FR-6	Display the nutritional value	The system must able to display the nutritional value of the food with the help of nutritional Application.

4.2. Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

FR No	Non-Functional Requirement	Description
NFR-1	Usability	Only registered user is allowed to using the application.
NFR-2	Security	Authentication of user is done for security purpose.
NFR-3	Reliability	The user gets the standardized nutritional value of the food items.
NFR-4	Performance	User satisfaction is ensured by getting their feedback .
NFR-5	Availability	This application can be used by the user when they are in online Mode.
NFR6	Scalability	This application can be used in all operating system and it can handle quite large Quantity of users too.

5. PROJECT DESIGN

5.1 Data Flow Diagram :

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. Example: DFD Level 0

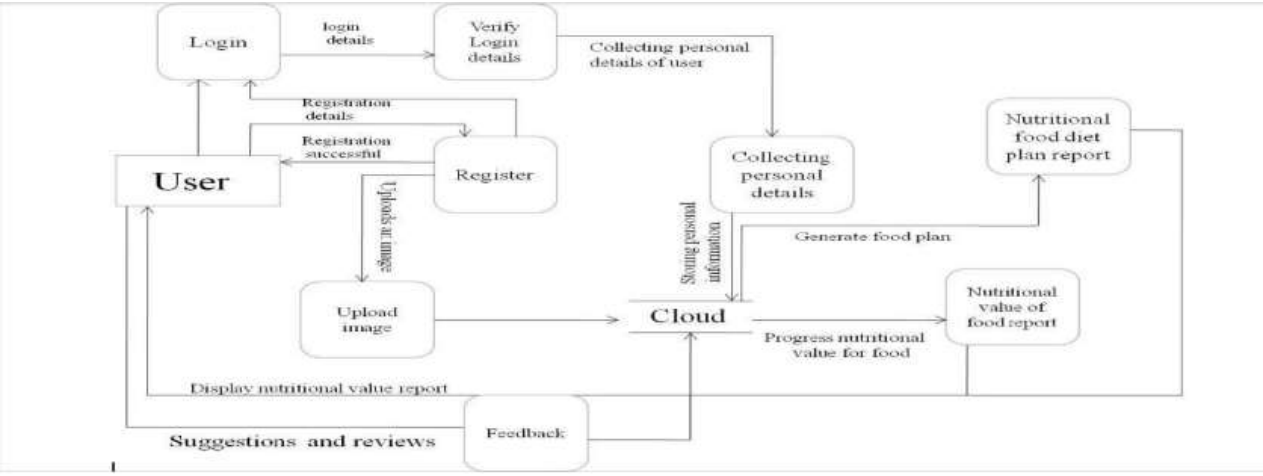


Fig: Data Flow Diagram

5.2 Solution and Technical Architecture:

Solution Architecture :

Project Description:

Due to the ignorance of healthy food habits, obesity rates are increasingatan alarming speed, and this is reflective of the risks to people's health. Peopleneed to control their daily calorie intake by eating healthier foods, whichisthemost basic method to avoid obesity. However, although food packagingcomeswith nutrition (and calorie) labels, it's still not very

convenient for peopletorefer to App-based nutrient dashboard systems which can analyze real-timeimages of a meal and analyze it for nutritional content which can be veryhandyand improves the dietary habits, and therefore, helps in maintainingahealthylifestyle.This project aims at building a web App that automaticallyestimatesfood attributes such as ingredients and nutritional value by classifyingtheinputimage of food. Our method employs Clarifai's AI-Driven FoodDetectionModel for accurate food identification and Food API's to give the nutritionalvalue of the identified food.

Technical Architecture:

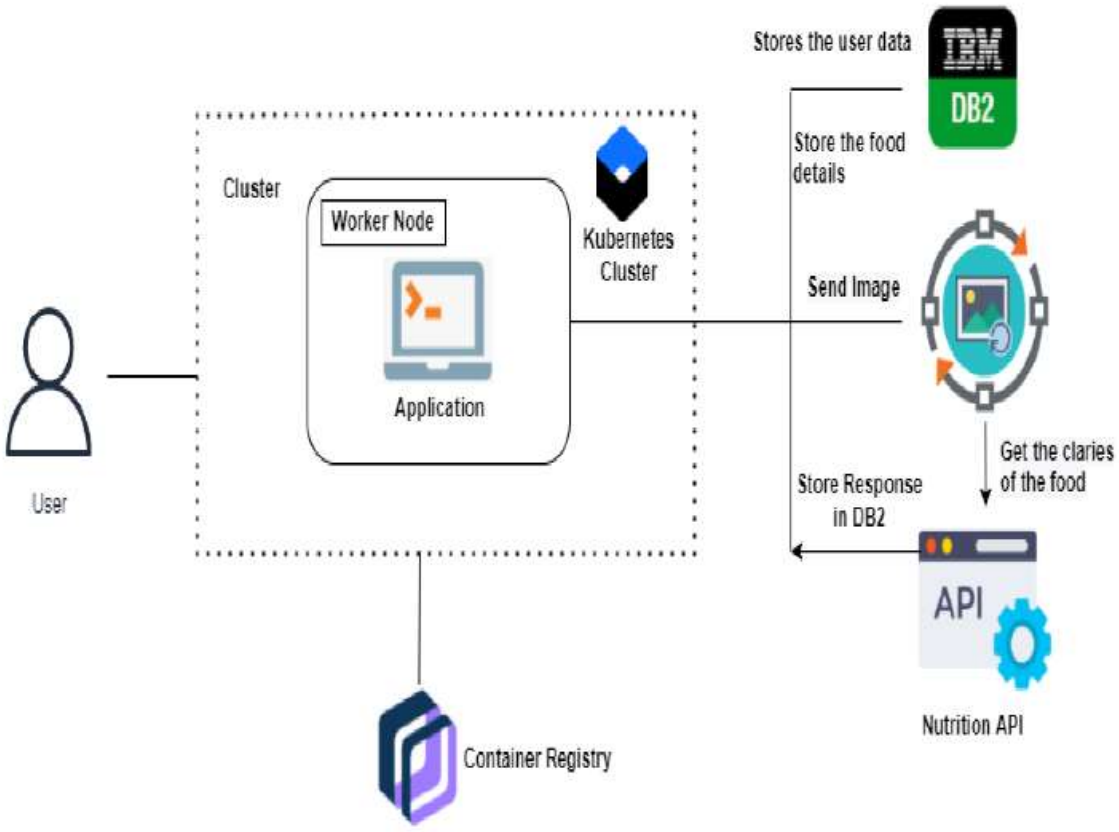


Fig: Technical Architecture

SOLUTION:

- User interacts with the Web App to Load an image.
- The image is passed to the server application, which uses Clarifai'sAI-Driven Food Detection.
- Model Service to analyze the images and Nutrition API toprovidenutritional information about the analyzed
- Image Nutritional information of the analyzed image is returned to theappfordisplay.

PROCEDURE:

1. IMPLEMENTING WEB APPLICATION

- Registration (Push the registration data into the database)
- Login (Fetch the data upon login)
- Upload the food image and get the prediction
- Get Calories from the food items
- Add food data to the database

2. CREATE UI TO INTERACT WITH THE APPLICATION

- Registration Page
- Login Page
- Upload Image page 15
- Prediction results page for food items
- View history of items

3. CREATE IBM DB2 AND CONNECT WITH PYTHON

- Create the IBM Db2 service in the IBM cloud and connect thepythoncode with DB.

4. INTEGRATE NUTRITION API

- Integrate the Nutrition API to the flask with API call.

APPROACH:

KUBERNETES CLUSTERS - Kubernetes clusters allowcontainers torunacross multiple machines and cloud based application. IBM DB2- Used for Backup & recovery. Comprehensive data resilienceforphysical and virtual servers.Cloud hosting. Dedicated, virtual private, andbaremetal server options

CONTAINER REGISTRY - Container Registry is a single place for your teamto manage Docker images, perform vulnerability analysis, and decide whocanaccess what with fine-grained access control

NUTRITION API - A nutrition API acts as a container for informationfromthousands of products. When an application sends a GET request to theAPI, itreturns the nutrition information about a given product.

RESULT:

Despite processing, we do not believe that our outcomes are flawless. There is always opportunity for improvement in your procedure becausecloudcomputing is a topic that is constantly developing. Additionally, therewillalways be new approaches that offer better results for the same problems. It hasbeen done, the application. Clarifai's AI-Driven Food Detection Model Service, Nutrition API.

5.3 User Stories:

User stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
	Login	USN-3	As a user, I can log into the application by entering email & password	I can login when password and email are correct	High	Sprint-1
	Collecting personal details	USN-4	As a user,I can provide a personal information for processing	I can enter the personal details	Medium	Sprint-1
	Upload image	USN-5	As a user,I can upload an image for the processing of food.	I can upload a food image.	High	Sprint-1
	Feedback	USN-6	As a user,I can give feedback	I can give feedback about the application	Low	Sprint-1
Cloud	Nutritional value of report	USN-7	In cloud the food image is processed and provides the nutritional value of food.	It gives the nutritional value of food.	High	Sprint-2
	Nutritional food diet plan report	USN-8	In cloud the food diet plan based on nutritional value is generated based on the personal information provided by the user.	It provides the diet nutritional plan.	Medium	Sprint-2

6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning and Estimation :

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Sprint	Functional Requirement (Epic)	User story number	User story /task	Story points	Priority	Team members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2	High	Farlin Deva Binusha D M Ashika P Archa H Antanin Ginista D
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application.	1	High	Farlin Deva Binusha D M Ashika P Archa H Antanin Ginista D
Sprint-1	User details	USN-3	As a user, I can log into the application by entering email & password.	1	High	Farlin Deva Binusha D M Ashika P Archa H Antanin Ginista D
Sprint-2	Login	USN-4	As a user, I can fill the Details.	2	High	Farlin Deva Binusha D M Ashika P Archa H Antanin Ginista D
Sprint-3	Push notification	USN-5	As a user, I can fill the Details.	2	Medium	Farlin Deva Binusha D M Ashika P Archa H Antanin Ginista D
Sprint-4	Shown the nutrition Recipe for scanned food	USN-6	As a user, I can scan the food an get the nutrition details and recipe for related scanned	1	High	Farlin Deva Binusha D M Ashika P Archa H Antanin Ginista D

6.2 Sprint Delivery Schedule :

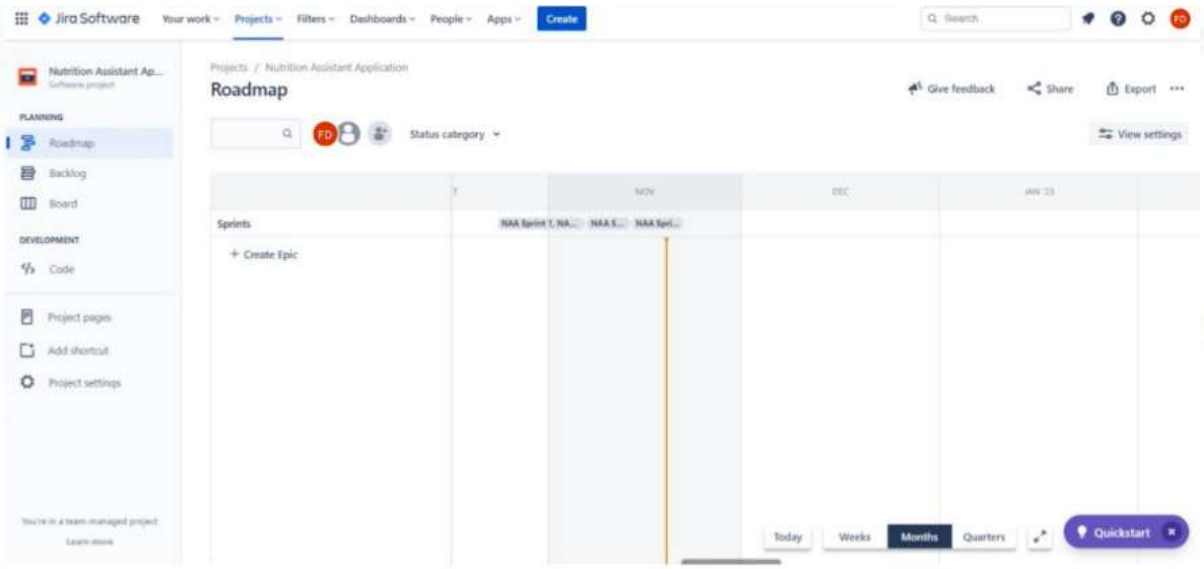
	Initial estimate						
Spring number	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
Sprint-1	20	0	10	5	3	1	1
Sprint-2	20	2	10	4	1	1	2
Sprint-3	20	5	5	5	5	0	0
Sprint-4	20	3	3	3	3	3	5
Remaining effort	80	70	42	25	13	8	0
Ideal effort	80	66.66666667	53.33333333	40	26.66666667	13.33333333	0

Velocity:

Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

$$AV = \frac{\text{Sprint duration}}{\text{Velocity}} = \frac{20}{10} = 2$$

6.3 Reports from JIRA:



7. CODING & SOLUTIONING:

7.1 Feature 1 :

Login Page:

```
<!DOCTYPE html>
<html  lang="en">
<head>
<title>Nutri Pulse</title>
<meta charset="UTF-8">
<meta name="viewport" content="width=device-width, initial-scale=1">
<!--
==========================================================================
============================-->
<link rel="icon" type="image/png" href="../static/images/icons/logo.ico"/>
<!--
==========================================================================
============================-->
<link rel="stylesheet" type="text/css"
href="../static/vendor/bootstrap/css/bootstrap.min.css">
<!--
==========================================================================
==============================-->
<link rel="stylesheet" type="text/css" href="../static/fonts/font-awesome    4.7.0/css/font-
awesome.min.css">
<!--
==========================================================================
============================-->
<link rel="stylesheet" type="text/css" href="../static/vendor/animate/animate.css">
<!--
```

```
==========
==

============================-->
<link rel="stylesheet" type="text/css"
href="../static/vendor/css   hamburgers/hamburgers.min.css">
<!--
==========
==

============================-->
<link rel="stylesheet" type="text/css"
href="../static/vendor/select2/select2.min.css">
<!--
==========
==

============================-->
<link rel="stylesheet" type="text/css" href="../static/css/util.css">
<link rel="stylesheet" type="text/css" href="../static/css/main.css">
<!--
==========
==

============================-->
</head>
<body>
<script>
window.watsonAssistantChatOptions = {
integrationID: "a09d8a78-e1f6-41b8-b072-5d26fe0b8f01", // The ID of this
integration.
region: "au-syd", // The region your integration is hosted in.
serviceInstanceID: "37c122b5-72e1-44df-a5fb-463376d0c8a1", // The ID of your
service instance.
onLoad: function(instance) { instance.render(); }
};
setTimeout(function(){
const t=document.createElement('script');
```

```
t.src="https://web-chat.global.assistant.watson.appdomain.cloud/versions/" +
(window.watsonAssistantChatOptions.clientVersion || 'latest') +
"/WatsonAssistantChatEntry.js";
document.head.appendChild(t);
});
</script>
<div class="limiter">
<div class="container-login100">
<div class="wrap-login100">
<div class="login100-pic js-tilt" data-tilt>
<img src="../static/images/img-01.png" alt="IMG">
</div>
<form class="login100-form validate-form"  action="{{
url_for('login') }}" method="POST">
<span class="login100-form-title2">
Hi Nutrio 🏋
</span>
<span class="login100-form-title">
Login here !!!
</span>
<div class="wrap-input100 validate-input" data-validate =
"Valid email is required: ex@abc.xyz">
<input id="usermail" class="input100" type="text"
name="usermail" placeholder="Email">
<span class="focus-input100"></span>
<span class="symbol-input100">
<i class="fa fa-envelope" aria   hidden="true"></i>
</span>
</div>
<div class="wrap-input100 validate-input" data-validate =
"Password is required">
<input id="password" class="input100"
```

```
type="password" name="password" placeholder="Password">
<span class="focus-input100"></span>
<span class="symbol-input100">
<i class="fa fa-lock" aria-hidden="true"></i>
</span>
</div>
<div class="container-login100-form-btn">
<button class="login100-form-btn">
Login
</button>
<p>{{ msg }}</p>
<p>{{ error }}</p>
</div>
<!-- <div class="text-center p-t-12">
<span class="txt1">
Forgot
</span>
<a class="txt2" href="#">
Username / Password?
</a>
</div> -->
<div class="text-center p-t-136">
<a class="txt2" href="{{ url_for('register') }}">
Create your Account
<i class="fa fa-long-arrow-right m-l-5" aria   hidden="true"></i>
</a>
</div>
</form>
</div>
</div>
</div>
<!--
```

```
==========================================================================
==

============================-->
<script src="../static/vendor/jquery/jquery-3.2.1.min.js"></script>
<!--
==========================================================================
==

============================-->
<script src="../static/vendor/bootstrap/js/popper.js"></script>
<script src="../static/vendor/bootstrap/js/bootstrap.min.js"></script>
<!--
==========================================================================
==

============================-->
<script src="../static/vendor/select2/select2.min.js"></script>
<!--
==========================================================================
==

============================-->
<script src="../static/vendor/tilt/tilt.jquery.min.js"></script>
<script >
$('.js-tilt').tilt({
scale: 1.1
})
</script>
<!--
==========================================================================
==

============================-->
<script src="../static/js/main.js"></script>
</body>
</html>
```

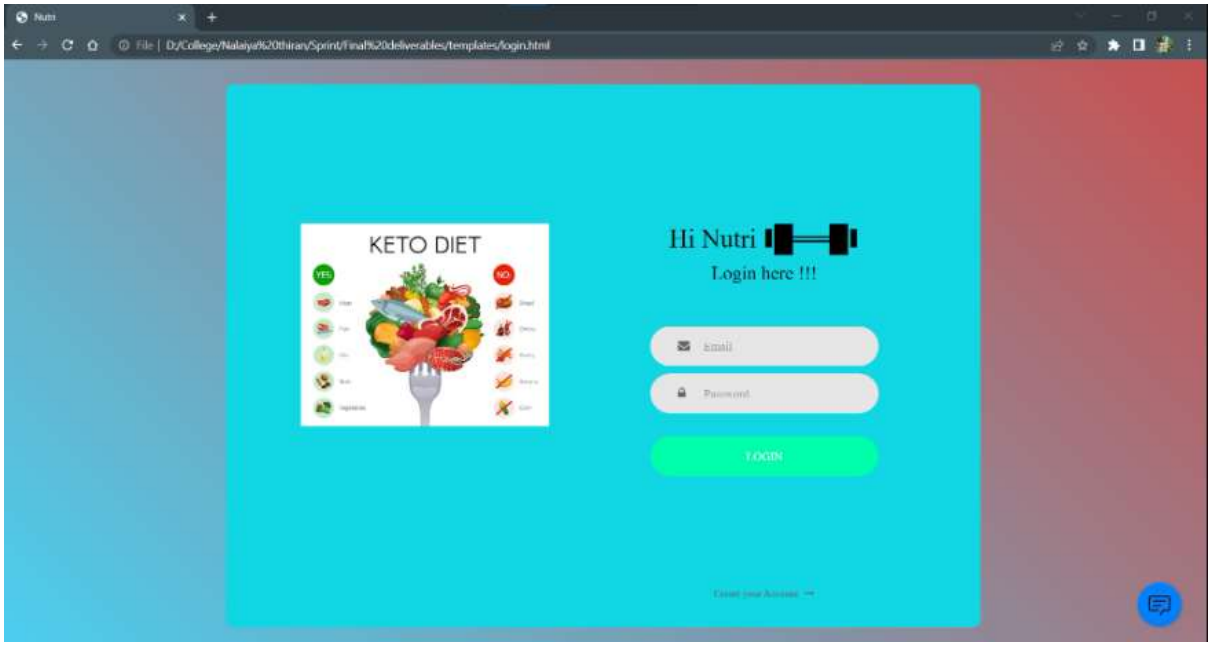


Fig 7.1 . Login Page

7.2 Feature 2 :

Register:

Query to check if email is registered or not :

```
<!DOCTYPE html>
<html lang="en" >
<head>
<meta charset="UTF-8">
<title>We Nutri0 Registration</title>
<link rel="icon" type="image/png" href="../static/images/icons/logo.ico"/>
<meta name="viewport" content="width=device-width, initial-scale=1"><link
rel="stylesheet"
href="https://cdnjs.cloudflare.com/ajax/libs/normalize/5.0.0/normalize.min.css">
<link rel='stylesheet' href='https://cdnjs.cloudflare.com/ajax/libs/twitter-bootstrap/4.0.0-
alpha/css/bootstrap.min.css'>
<link rel='stylesheet'
```

```
href='https://fonts.googleapis.com/css?family=Open+Sans:400,600,700,300'>
<link rel='stylesheet' href='https://fonts.googleapis.com/css?family=Roboto:400,700,300'>
<link rel='stylesheet' href='https://maxcdn.bootstrapcdn.com/font-awesome/4.4.0/css/font awesome.min.css'>
<link rel="stylesheet" href="../static/css/style.css">
</head>
<body>
<script>
window.watsonAssistantChatOptions = {
integrationID: "2d723f1c-6a3b-41bb-86a8-86eba26b492e", // The ID of this integration.
region: "au-syd", // The region your integration is hosted in.
serviceInstanceID: "80fba3ec-33ea-44ac-9c4b-60bc5c51988c", // The ID of your service instance.
onLoad: function(instance) { instance.render(); }
};
setTimeout(function(){
const t=document.createElement('script');
t.src="https://web-chat.global.assistant.watson.appdomain.cloud/versions/" +
(window.watsonAssistantChatOptions.clientVersion || 'latest') +
"/WatsonAssistantChatEntry.js";
document.head.appendChild(t);
});
</script>
<!-- partial:index.partial.html -->
<div class="signup__container">
<div class="container_child signup_thumbnail">
<div class="thumbnail__logo">
<img src="../static/images/logo.png" alt="logo" style="height: 50px; width:50px;"/>
<h1 class="logo__text">We Nutrio</h1>
```

```
</div>
<div class="thumbnail__content text-center">
<h1 class="heading--primary">Welcome to We Nutrio</h1>
<h2 class="heading--secondary">Are you ready to join this nutrio journey <!DOCTYPE
html></h2>
</div>
<div class="signup__overlay">
<img class="regPic" src="../static/images/registerImage2.png" alt="logo" />
</div>
</div>
<div class="container_child signup_form">
<form action="{{ url_for('register') }}" method="POST">
<div class="form-group">
<label for="username">Name {{ msg }} </label>
<input class="form-control" type="text" name="username" id="username" required />
</div>
<div class="form-group">
<label for="email">Email</label>
<input class="form-control" type="text" name="email" id="email" required />
</div>
<div class="form-group">
<label for="password">Password</label>
<input class="form-control" type="password" name="password" id="password"
required />
</div>
<div class="form-group">
<label for="passwordRepeat">Repeat Password</label>
<input class="form-control" type="password" name="passwordRepeat"
id="passwordRepeat"required />
```

```
</div>
<div class="m-t-lg">
<ul class="list-inline">
<li>
<input class="btn btn--form" type="submit" value="Register" />
</li>
<li>
<a class="signup__link" href="{{ url_for('login') }}">I am already a member</a>
</li>
</ul>
</div>
</form>
</div>
</div>
<!-- partial -->
</body>
</html>
```

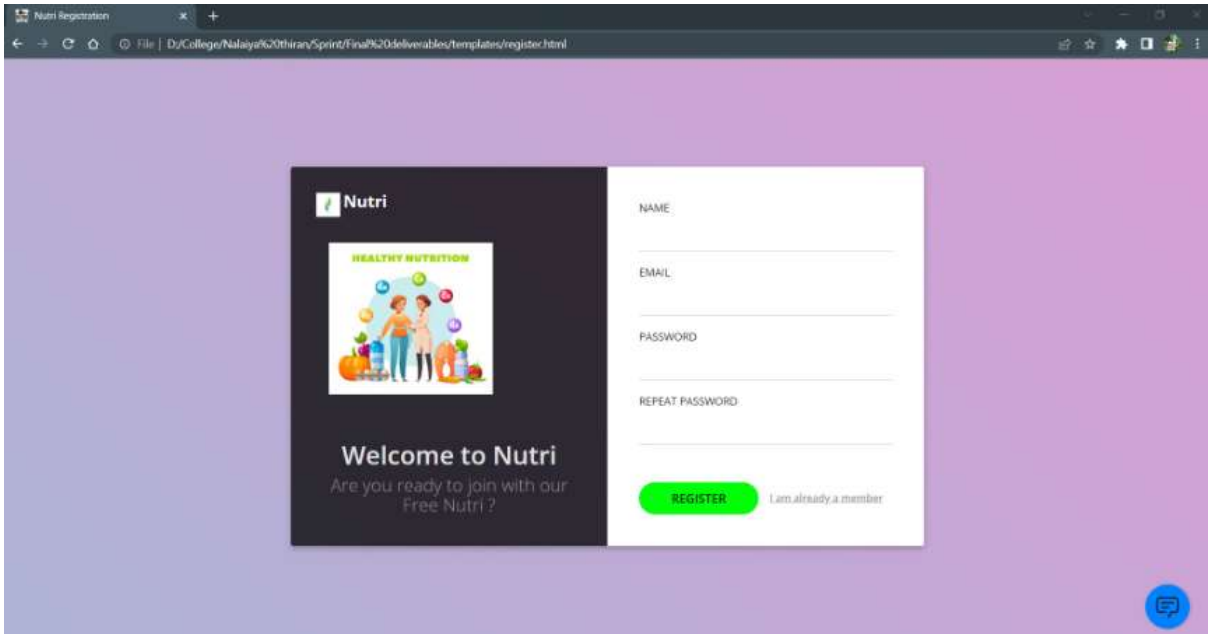
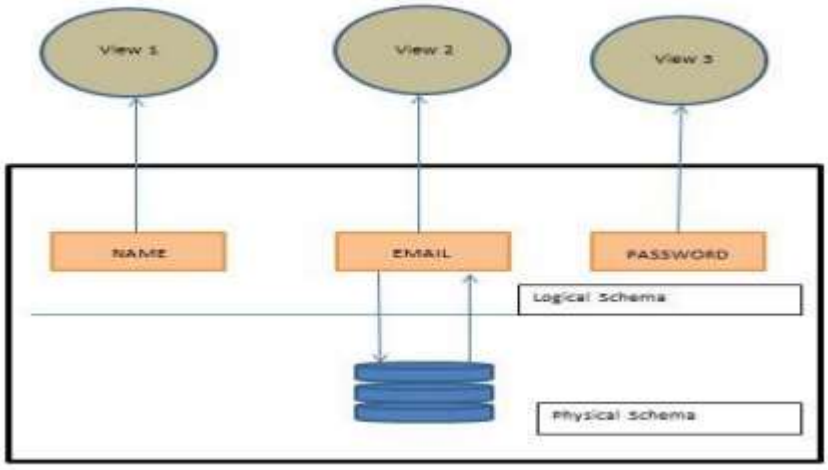


Fig 7.2. Register

7.3. Database Schema:



8. TESTING

8.1. TEST CASES :

1. Login button click with wrong credentials entered.

2. Signup with already registered mail ID.

3. Signup with wrong form data entered.

4. Entering home page with logged out session.

5. Clicking home page buttons with logged out session.

6. Invalid data entered in change password page and requested for change in password.

8.2 USER ACCEPTANCE TESTING

S.NO	TEST CASE	REQUIRED OUTPUT	RESULT OUTPUT	STATUS
1	Login button click with wrong credentials	Wrong credentials entered notification	Wrong credentials entered notification	ACCEPTED
2	Signup with already registered mail ID.	Email already registered notification	Email already registered notification	ACCEPTED
3	Signup with wrong form data entered.	Wrong credentials entered notification	Wrong credentials entered notification	ACCEPTED
4	Entering home page with logged out session.	Take user to login page	Take user to login page	ACCEPTED
5	Clicking home page buttons with logged out session.	Take user to login page	Take user to login page	ACCEPTED
6	Invalid data entered in change password page and requested for change in password.	Wrong form data entered notification	Wrong form data entered notification	ACCEPTED

9. RESULTS

9.1. PERFORMANCE METRICS:

1. Planned value : Rs.4000

2. Actual value : Rs.1300

3. Hours worked : 50 hours

4. Stick to Timelines : 100%

5. Stay within budget : 100%

6. Consistency of the product : 75%

7. Efficiency of the product : 80%

8. Quality of the product : 80%

10. ADVANTAGES AND DISADVANTAGES

ADVANTAGES :

1. Low cost.

2. Simple UI

3. Faster response due to single page web page.

4. Capability of adding many features with ease and less cost.

DISADVANTAGES :

1. Lack of efficiency .

2. Efficiency of the product needs to be improved.

3. Consistency of the product is not 100%.

4. Not a compact sized product. Size needs

11. CONCLUSION :

Dietary tracking is an essential task in chronic disease management andintervention. Food photo taking and image recognition significantly reducetheburden of food entering on personal mobile devices. In this work, wehavedeveloped a dietary tracking system that applies the deep-basedimagerecognition to accurately and efficiently log food and nutrition intake. Throughreal user food photo testing and user study, we found that laboratorymodelsform the foundation of the solution but miss out some of the key challenges. The diversity of real food photos is higher than the lab trained model. Aningredient based recognition is a promising way of tracking the free styleandhomemade food recognition problems in which training data is sparse andnotrepresentative. Moreover, the proposed photo based portion selectionmethodisshown to be more accurate and engages the users better than the existingmethods.

12.FUTURE SCOPE:

In future we'll be adding more features which will benefit the users. The ui/ux of the web application will be improved. Scaling the project for more use cases and customers. Implementing distributed computing for efficient processing.Making encryption standard for cloud storage.

13. APPENDIX

SOURCE CODE LINK :

https://github.com/IBM-EPBL/IBM-Project-49609-1660829494/tree/main/Final Deliverables

DEMO VIDEO LINK:

https://ginista249.s3.jp-tok.cloud-object-storage.appdomain.cloud/20221126160912.mp4