NUTRIVISION AI POWERED NUTRITION ANALYSER

A PROJECT REPORT

Submitted by

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BONAFIDE CERTIFICATE

Certified that this Thesis titled **"NUTRIVISION - AI POWERED NUTRTION ANALYZER"** is the bonafide work of **"DHARUN PRASANTH S (210701056), BHUVANESHWARI S (210701043)"** who carried out the work under my supervision. Certified further that to the best of my knowledge the work reported here in does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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ABSTRACT

Create an AI-powered nutrition analyser for fitness enthusiasts, dietary tracking and personalized nutrition insights to achieve health and fitness goals. By using AI technology, the solution offers tailored nutrition recommendations, enhancing user's ability to regulate overall fitness efficiently. By providing real-time feedback and personalized insights, the platform advised individuals to make informed dietary choices, leading to improved health outcomes and fitness performance. With good user interfaces and comprehensive data analysis, the AI-powered nutrition analyser provides a valuable tool for individuals seeking to achieve their fitness goals effectively and maintain a healthy lifestyle.

ACKNOWLEDGMENT

First, we thank the almighty god for the successful completion of the project. Our sincere thanks to our chairman **Mr. S. Meganathan B.E., F.I.E.,** for his sincere endeavor in educating us in his premier institution. We would like to express our deep gratitude to our beloved Chairperson **Dr. Thangam Meganathan Ph.d.,** for her enthusiastic motivation which inspired us a lot in completing this project and Vice Chairman Mr. Abhay Shankar Meganathan B.E., M.S., for providing us with the requisite infrastructure.

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TABLE OF CONTENTS

CHAPTER NO.	TITLE	PAGE NO.
	ABSTRACT	**iii**
	LIST OF TABLES	**v**
	LIST OF FIGURES	**vii**
1.	**INTRODUCTION**	**1**
	1.1 RESEARCH PROBLEM	
	1.2 PROBLEM STATEMENT	
	1.3 SCOPE OF THE WORK	
	1.4 AIM AND OBJECTIVES OF THE PROJECT	
	1.4 RESOURCES	
	1.5 MOTIVATION	
2.	**LITERATURE SURVEY**	**4**
	2.1 SURVEY	
	2.2 PROPOSED SYSTEM	
	2.3 NEAT ALGORITHM	
	2.4 INFERENCE MECHANISM	

3. SYSTEM DESIGN 6

3.1 GENERAL

3.2 SYSTEM ARCHITECTURE DIAGRAM

3.3 DEVELOPMENT ENVIRONMENT

3.3.1 HARDWARE REQUIREMENTS

3.3.2 SOFTWARE REQUIREMENTS

4. PROJECT DESCRIPTION 11

4.1 METHODOLOGY

4.2 MODULE DESCRIPTION

4.2.1 SIGNUP AND LOGIN

4.2.2 FORGET PASSWORD

4.2.3 NUTRITION ANALYZER

4.2.4 DIETS

4.2.5 DIET PLANNER

4.2.6 CALORIE BURN TRACKER

5. RESULTS AND DISCUSSIONS 25

5.1 FINAL OUTPUT

5.1.1 WELCOME PAGE

5.1.2 SIGN UP PAGE

5.1.3 SIGN IN PAGE

5.1.4 HOME PAGE

5.1.5 NUTRITION ANALYSIS

5.1.6 DIET PLANNER

5.1.7 CALORIE TRACKER

5.1.8 DIETS

5.2 RESULT

6. CONCLUSION AND FUTURE ENHANCEMENT 29

6.1 CONCLUSION

6.2 FUTURE ENHANCEMENT

REFERENCES 31

LIST OF FIGURES

FIGURE NO	TITLE	PAGE NO
1	SYSTEM ARCHITECTURE	5
2	SYSTEM MODULES	6
9	OUTPUT	8

LIST OF TABLES

TABLE NO	TITLE	PAGE NO
1	HARDWARE REQUIREMENT	5

CHAPTER 1

INTRODUCTION

In today's fast-paced society, the pursuit of health and fitness has become increasingly important for individuals hoping to live happy, fulfilling lives. However, it may be hard to navigate the complex world of exercise and nutrition, and it usually leads to confusion and discontent. In light of the need for a comprehensive strategy to address these challenges, we are excited to introduce our state-of-the-art health and fitness platform.

Our project's mission is to empower users on their path to optimum well-being by offering a selection of innovative modules that inspire, inform, and assist people in reaching their fitness and health objectives. Our platform seeks to transform the way people approach fitness and nutrition by utilizing cutting-edge technology and professional insights, making it simpler and more accessible for everyone to lead a better lifestyle.

Our platform's core consists of hundreds of interesting and educational articles that have been carefully chosen by fitness and nutrition specialists. Our articles address a broad range of subjects to inform and encourage readers on their journey toward wellness, from the most recent scientific findings to useful hints and recommendations. With just a few clicks, users of our nutrition analyzer module can learn important information about the nutritional value of various foods. Users can obtain comprehensive information about the macronutrient and micronutrient makeup of any food item by simply typing in its name. This information enables users to make well-informed dietary decisions that support their fitness and health objectives.

Use our user-friendly diet planner to take charge of your nutrition. Our personalized meal planning function makes it simple to prepare balanced, nutritious meals that are targeted to your dietary requirements and preferences, whether your goal is to gain muscle, lose weight, or just eat healthier overall.

A nutritious diet is not enough to help you reach your fitness goals; you also need to exercise consistently. Users can determine how many calories they will burn during an exercise based on their height, weight, gender, heart rate, and duration of activity by using our calorie burn calculator. This practical tool allows users to accurately track their caloric expenditure and adjust their exercise routines for optimal results.

1.1 PROBLEM STATEMENT

The challenge entails creating an Al-powered nutrition analyzer for fitness enthusiasts, revolutionizing dietary tracking and personalizing nutritional insights to optimize health and fitness goals effectively. The primary objective is to enable the AI with people to effectively fulfill their fitness and health goals by using this technology, which addresses the challenges of food tracking and provides personalized nutritional insights. Using AI technology, the platform will offer personalized insights, real-time feedback, and specific nutritional recommendations.

1.2 SCOPE OF THE WORK

By providing a comprehensive toolkit that enables users to attain optimal well-being, the health and fitness platform seeks to transform the concept of wellbeing. The website offers a wealth of information to help people make educated decisions about their diet and activity, including carefully chosen articles, a nutrition analyzer, a diet planner, and a calorie burn calculator.

1.3 AIM AND OBJECTIVES OF THE PROJECT

The project's goal is to create a nutrition analyzer using AI that is specifically designed for exercise lovers. It aims to offer individualized nutritional insights using cutting-edge algorithms, enabling users to successfully enhance their fitness and health objectives.

In order to achieve this goal, the project outlines a number of important goals. Its primary goal is to compile an extensive database of dietary data. It then aims to use AI algorithms to nutritional data analysis and interpretation, offering customized suggestions. The project's final goal is to provide an intuitive user interface enabling accessible and easy interaction.

1.4 RESOURCES

This project has been developed through widespread secondary research of accredited manuscripts, standard papers, business journals, white papers, analysts' information, and conference reviews. Significant resources are required to achieve an efficacious completion of this project.

The following prospectus details a list of resources that will play a primary role in thesuccessful execution of our project:

- A properly functioning workstation (PC, laptop, net-books etc.) to carry out desired research and collect relevant content.
- Unlimited internet access.
- Unrestricted access to the university lab in order to gather a variety of literature including academic resources (for e.g. Prolog tutorials, online programming examples, bulletins, publications, e-books, journals etc.), technical manuscripts, etc.

1.5 MOTIVATION

The AI-powered nutrition analyser project is primarily driven by the increasing significance of fitness and health in modern society. People frequently experience uncertainty and disappointment when attempting to navigate towards optimal well-being due to the complicated nature of nutrition and exercise. The project uses cutting-edge technology and expert insights to accelerate the road to wellness in response to these difficulties.

CHAPTER 2

LITERATURE SURVEY

A man is only able to withstand malnutrition for so long. For people to lead fulfilling lives, they must consume a nutritious, well-balanced diet. To combat infectious diseases, humans need a strong immune system, particularly in light of the COVID-19 pandemic. One of the primary duties of a client is to identify items that are nutritious. Classifying agricultural products is vital to differentiate between conventional food and food that is high in nutrients because many of them are stored in large retail spaces. The real-time decision will inform the client by predicting items that are high in nutrients.[1]

The image-based AI nutrition analysis platform proposed in this research consists of two components: the food nutrition analysis system and the food picture collection system. The platform allows for the analysis of the nutrients in food contained in compartment trays. The food image collection system combines a depth camera and a Raspberry Pi microprocessor to gather images and depth information. Following collection, the information is moved to a cloud database so it may be analyzed.[2]

The article highlights a cutting-edge smartphone app that combines diet planning and personal health assistant functions. People's standard of living could be considerably raised by the application field. The idea of building services on top of smart space technology is beginning to gain traction within academic and industry communities. These services contribute to the realization of traditional humans' desire for a simpler, easier life in terms of work, recreation, and housekeeping. The current smart space solution pilots streamline the management of corporate conferences and meetings, allowing attendees to concentrate on the core topic and purpose of the gathering.[3]

To prevent disease and death and to promote optimal health, it is essential to eat a diet high in nutrients, with the right proportion of macronutrients (fat, protein, and carbs) and the right amount of calories based on individual energy expenditure. This study suggested creating a web-based meal planner software called "Plan-Cook-Eat" that employs a parallel-iterative design technique to generate personalized diet plans based on the requirements of each user.[4]

Being fit is another reason why people ride bicycles. Fitness monitors that are sold commercially assist cyclists in monitoring their caloric expenditure and mileage. The issue with these fitness trackers is that their location and acceleration are primarily determined by smartphone sensors. This article suggests creating a digital speedometer for bicycles that incorporates safety features including location monitoring, speed alerts, and calorie counting. Any bicycle may be equipped with the system, which can also communicate data with a mobile phone via Bluetooth communication. The suggested system's architecture and design are covered in this paper. Tinkercad software was used to simulate the system.[5]

After restless pandemic lockdowns, many people were reminded of the significance of physical activity for both mental and physical health. As obesity has spread around the world and is already a pandemic in many places, even in the absence of lockdowns, it is now essential to assist people in managing their weight. [6]

Residents are becoming increasingly conscious of the significance of eating a balanced diet, which has brought attention to the catering issue. Dietary suggestions based on nutrients can provide workable solutions for the aforementioned issues. This work presents a dietary planning approach to determine the lowest dietary expenditure as long as diabetic patients' daily

nutritional needs are satisfied and their nutrient intake stays within the upper limit. Using a robust mathematical model, we generate feasible plans for various socioeconomic classes and food types in order to provide as many feasible suggestions as possible.[7]

Sedentary lifestyles and obesity have become major global health concerns. This system offers a Diet Plan and Home Exercise Recommendation System (SYP) to address these problems. It creates tailored diet plans and exercise recommendations based on pathology information and user data from smartwatches. [8]

Although self-tracking of food intake has been extensively investigated, there are still several obstacles to overcome. Users of current systems frequently have to exert a great deal of effort, and attempts to lessen this effort have often produced poor accuracy or delays. [9]

Concerns regarding our appearance and fitness fanatics in today's society have surfaced recently. If one consumes more food than they need each day, they will eventually put on weight. The artificial intelligence (AI) model for calorie consumption regulation is presented in this inquiry. The AI model recommends the right amount of food and the exercises that should be done in order to burn off the excess calories. This inquiry has led to the conclusion that people can continue to consume any diet and engage in the daily physical activity required to maintain good health.[10]

CHAPTER 3

SYSTEM DESIGN

3.1 GENERAL

In this section, we would like to show how the general outline of how all the components end up working when organized and arranged together. It is further represented in the form of a flow chart below.

3.2 SYSTEM ARCHITECTURE

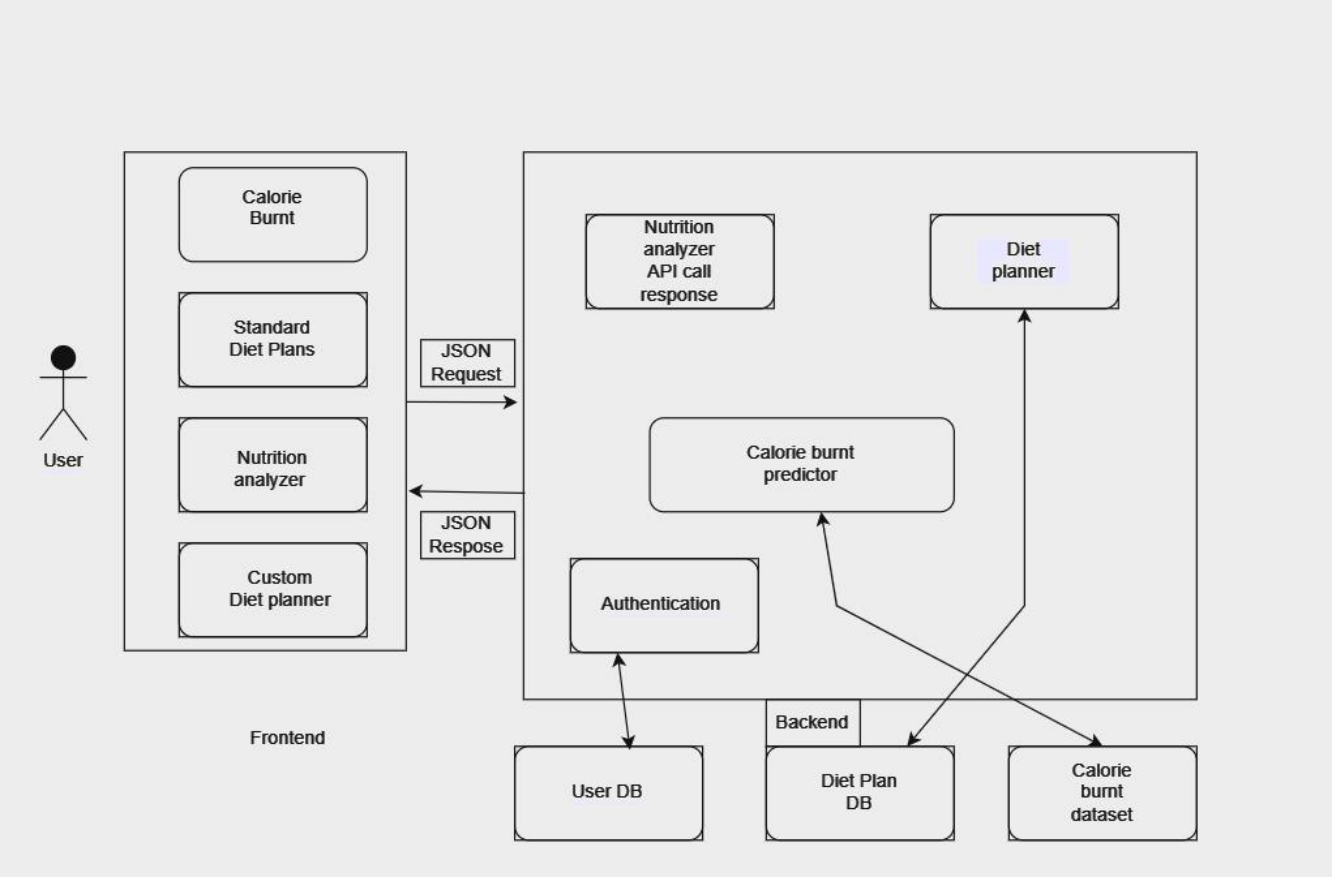

Fig 1 System Architecture.

3.3 DEVELOPMENTAL ENVIRONMENT

3.3.1 HARDWARE REQUIREMENTS

The hardware requirements may serve as the basis for a contract for the system's implementation. It should therefore be a complete and consistent specification of the entire system. It is generally used by software engineers as the starting point for the system design.

Table. 1 Hardware Requirements

COMPONENTS	SPECIFICATION
PROCESSOR	Intel Core i5
RAM	8 GB RAM
GPU	NVIDIA GeForce GTX 1650
MONITOR	15" COLOR
HARD DISK	512 GB
PROCESSOR SPEED	MINIMUM 1.1 GHz

3.3.2 SOFTWARE REQUIREMENTS

The software requirements document is the specifications of the system. It should include both a definition and a specification of requirements. It is a set of what the system should rather be doing than focus on how it should be done. The software requirements provide a basis for creating the software requirements specification. It is useful in estimating the cost, planning team activities, performing tasks, tracking the team, and tracking the team's progressthroughout the development activity.

Eclips IDE, and **chrome** would all be required.

CHAPTER 4
PROJECT DESCRIPTION

4.1 METHODOLODGY

Our AI-powered Nutrition Analyzer for fitness enthusiasts was developed using a technique that aims to provide users with individualized nutrition insights to help them reach their fitness and health objectives. Motivated by the developments in artificial intelligence (AI), especially in the area of driverless vehicles, we concentrate on utilizing cutting-edge algorithms to evaluate food information and provide customized suggestions.

Our method involves gathering a diverse dataset of nutritional data from multiple sources, guaranteeing coverage of a broad spectrum of foods and dietary patterns frequently experienced by athletes. Our AI models are trained on this information, which enables them to analyze nutritional data and offer individualized insights.

Additionally, our technique highlights how crucial thorough data analysis is to guaranteeing the dependability and accuracy of the Nutrition Analyzer's recommendations. We want to be able to better help customers manage their overall fitness by gleaning useful insights from complex dietary data through the application of advanced algorithms.

Our ultimate objective is to provide a useful tool that helps people reach their fitness objectives and keep up a healthy lifestyle. Our Nutrition Analyzer uses artificial intelligence (AI) to provide customers with individualized advice and practical insights, enabling them to make decisions that will improve their fitness levels and overall health.

4.2 MODULE DESCRIPTION

4.2.1 Sign up and login.

The SignUp module enables users to create accounts by providing essential details such as username, email, and password. It ensures data security through password encryption techniques and includes verification steps like email confirmation for account validity.

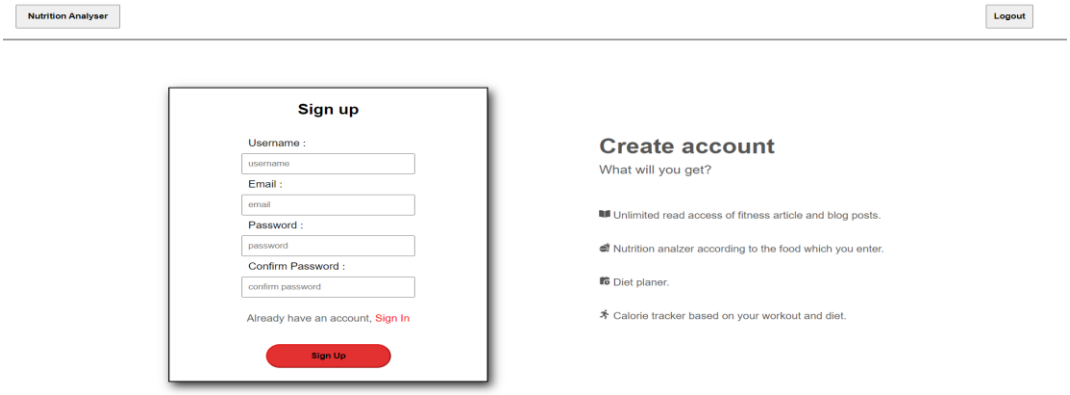

Fig 2

The login module facilitates user authentication, allowing registered users to access their accounts securely. It verifies user credentials, such as username/email and password, against stored data in the system's database.

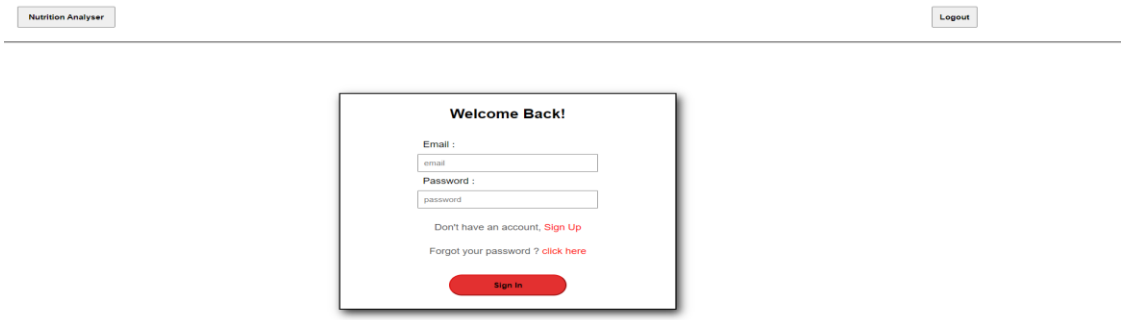

Fig 3

4.2.2 Forgot password.

Enter the email address associated with your account. Check your inbox for an email from us with instructions on how to reset your password. If you don't see it, be sure to check your spam or junk folder. Click on the password reset link provided in the email.

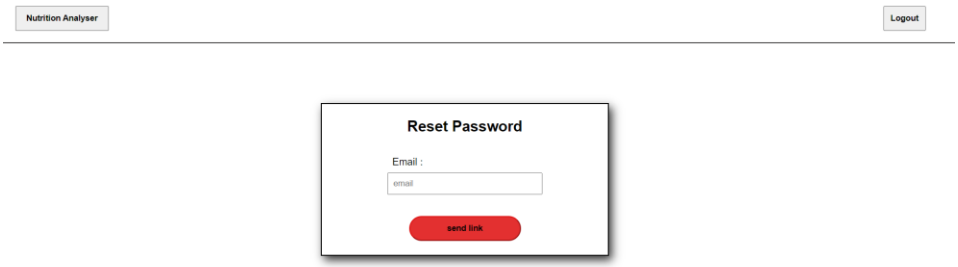

Fig 4

4.2.3 Nutrition analyser.

The Nutrition Analyzer module processes user-input, food data to generate detailed nutritional values, including carbohydrates, protein, fat, and glucose levels.

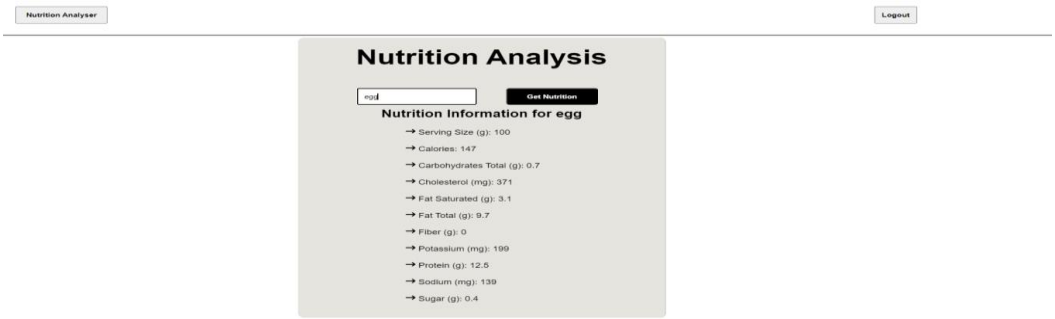

Fig 5

4.2.4 Diets

The Standard Diet Plans module presents users with a curated selection of established diet plans tailored for various health objectives, including weight gain, weight loss, and balanced nutrition

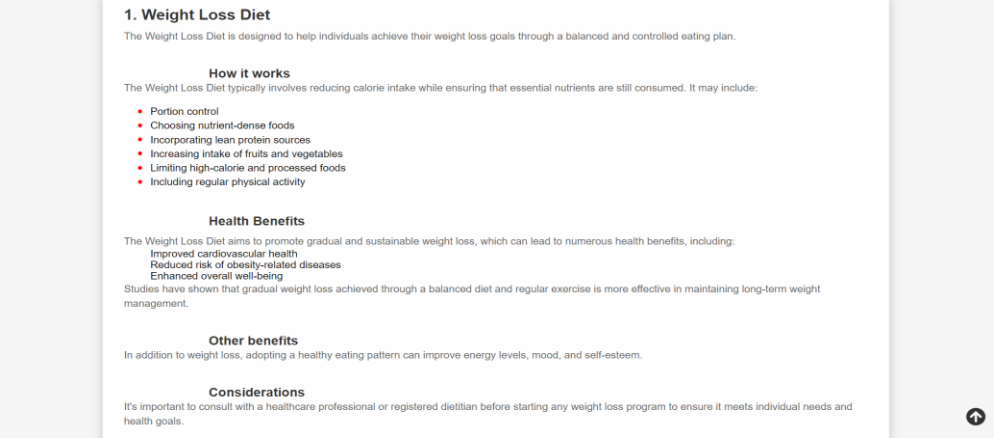

Fig 6

4.2.5 Diet Planner.

The Custom Diet Planner module empowers users to create personalized meal plans tailored to their preferences and dietary goals. Users can input their meal and snack preferences for each day of the week.

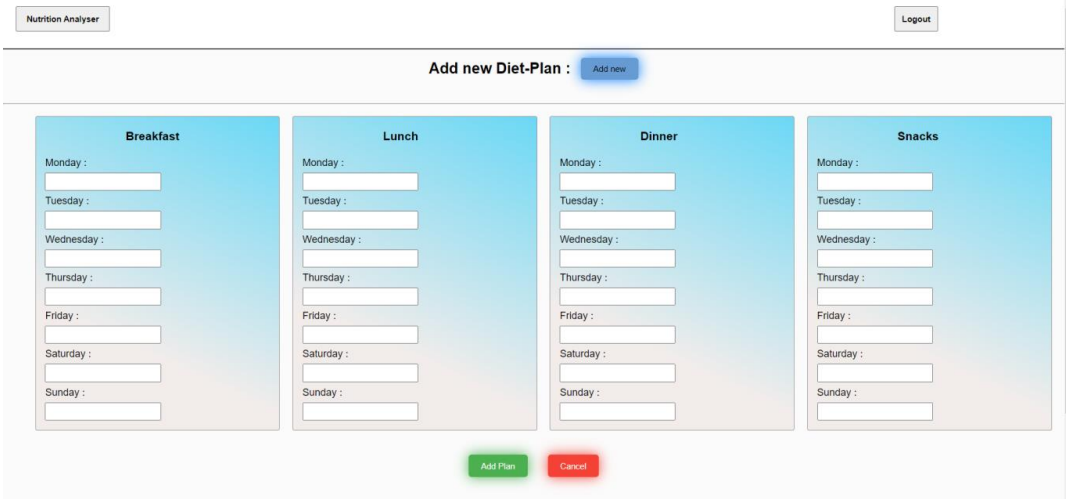

Fig 7

4.2.6 Calorie tracker

The Calorie Burn Predictor module employs the XGBoost Regressor (XGBRegressor) algorithm to estimate calorie expenditure during exercise.

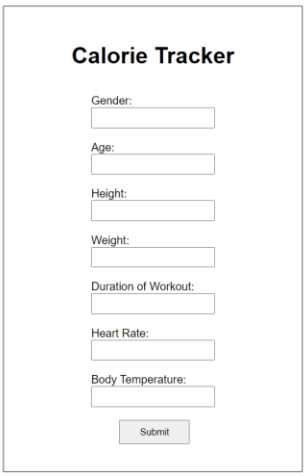

Fig 8

CHAPTER 5

RESULTS AND DISCUSSIONS

5.1 RESULT

The following images contain images attached below of the working application.

5.1.1 Welcome page

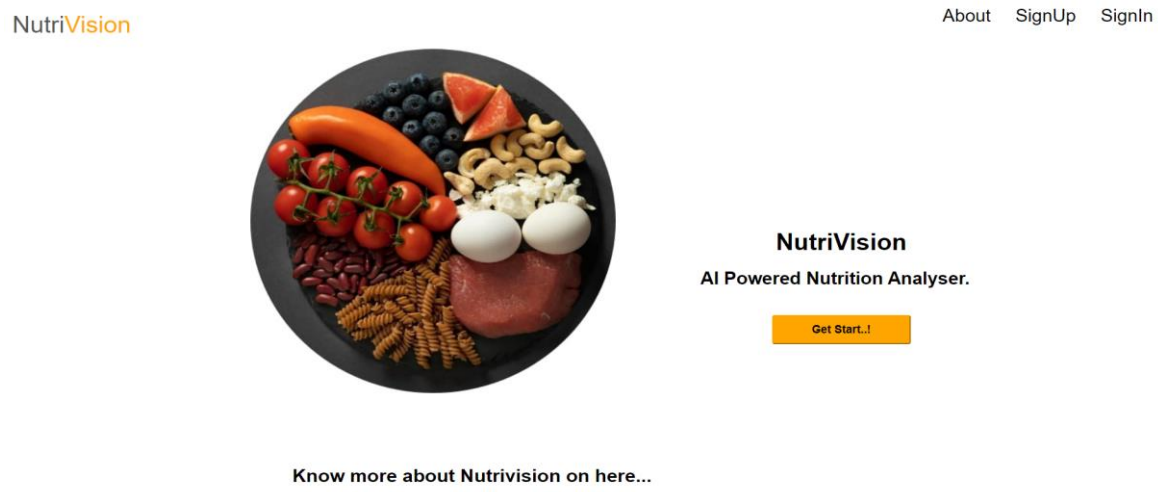

Fig 9

5.1.2 Sign up

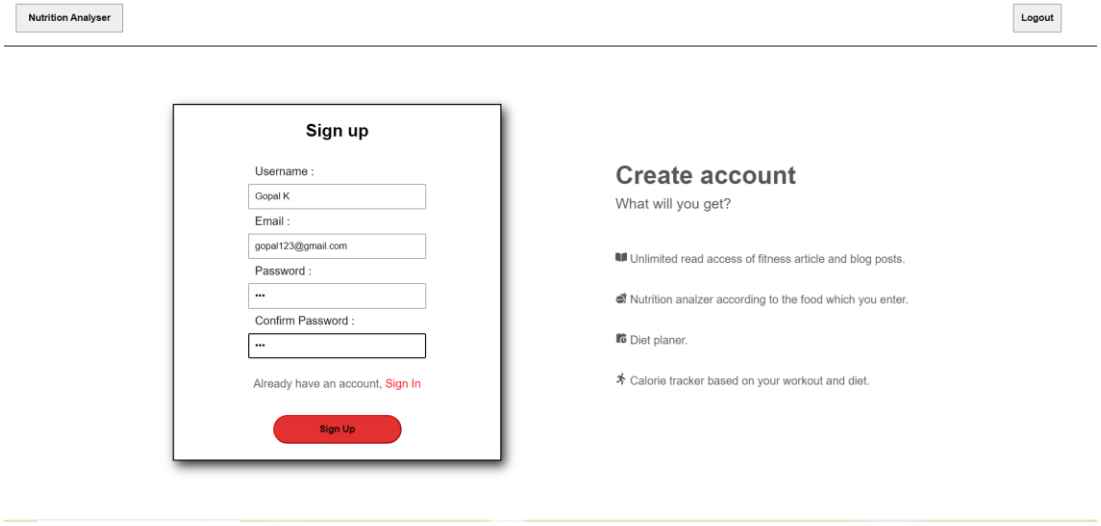

Fig 10

5.1.3 Sign page

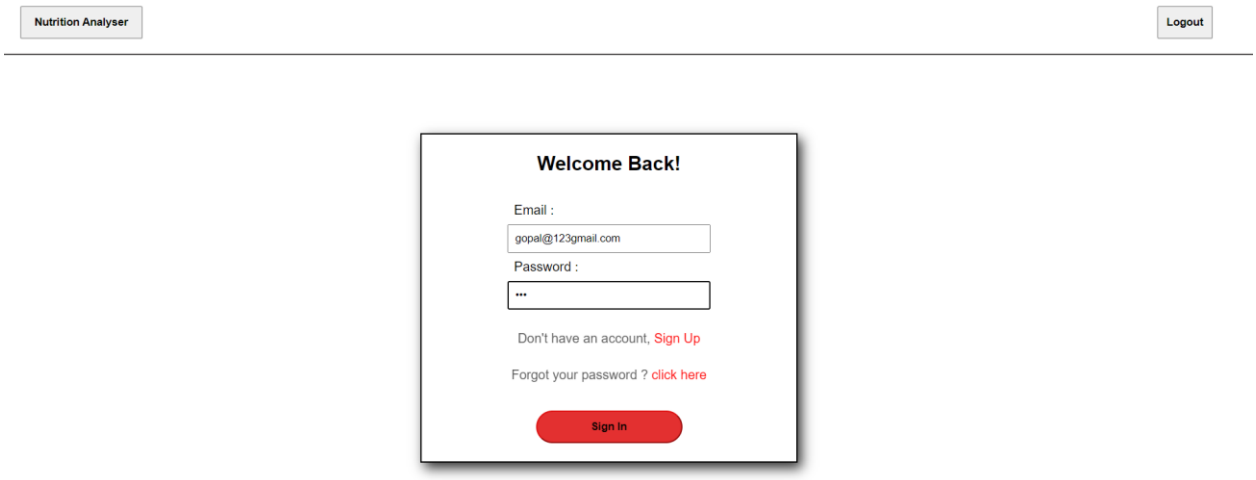

Fig 11

5.1.4 Home page

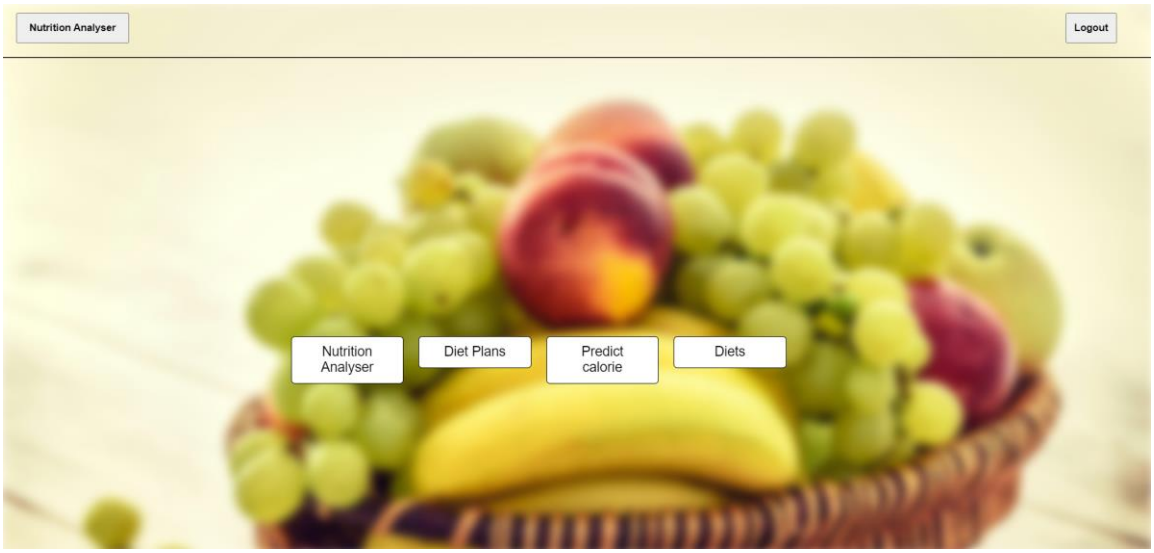

Fig 12

5.1.5 Nutrition analysis

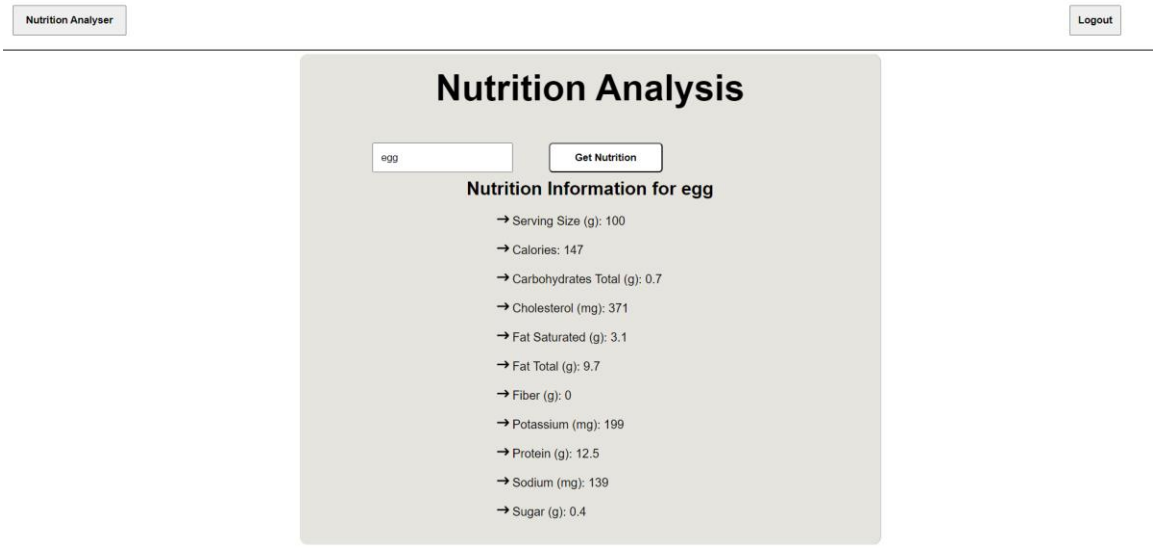

Fig 13

5.1.6 Nutrition analysis

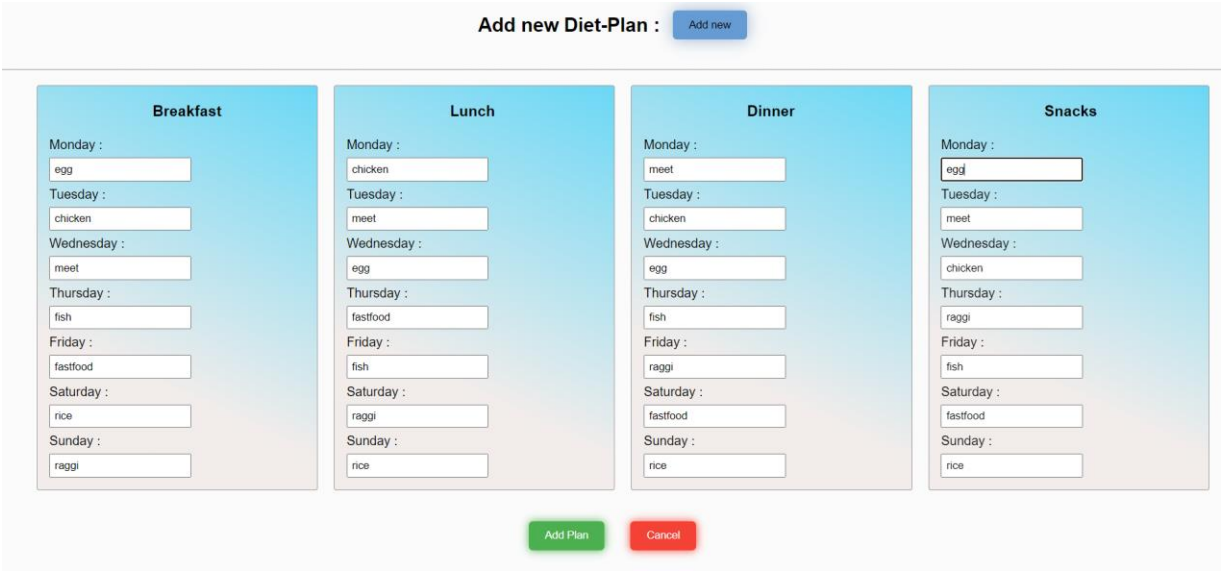

Fig 14

5.1.7 Nutrition analysis

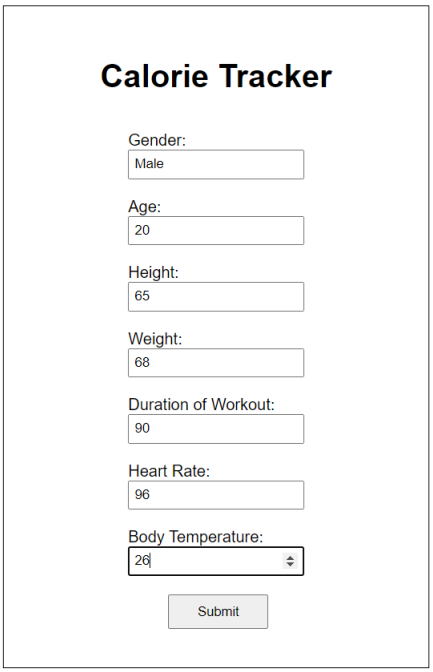

Fig 15

5.2 DISCUSSION

Fitness and health enthusiasts have seen life-changing results from our project's completion, an AI-powered nutrition analyzer. Our dynamic platform revolutionizes nutritional tracking by providing individualized insights and recommendations to users who are working towards their wellness objectives. This is achieved through the rigorous development and application of cutting-edge AI technology.

The platform has received an immense amount of recognition for its extensive functionality and user-friendly interface since its launch. Consumers claim notable changes in their health, such as better digestion, more energy, and better weight management. People have been given the ability to make educated food decisions, which has resulted in long-term adherence to healthy habits and sustainable lifestyle improvements, by utilizing the power of real-time feedback and individualized insights.

The AI-powered nutrition analyzer has not only revolutionized how people monitor and control their eating habits, but it has also generated an empowering and supportive community. We are dedicated to enabling users to realize their maximum potential for health and fitness, one personalized recommendation at a time, as we continue to improve and optimize the platform.

CHAPTER 6

CONCLUSION AND FUTURE ENHANCEMENT

6.1 CONCLUSION

In conclusion, our AI-powered nutrition analyzer is leading the way in improving food monitoring for people who are passionate about their health and fitness. Our platform goes beyond conventional approaches by combining modern artificial intelligence (AI) with customized insights to provide personalized nutrition recommendations based on goals and needs. Through the provision of complete data analysis and real-time feedback, users are enabled to make smart nutritional choices that perfectly match with their fitness goals.

Our system has advantages over just tracking meals, it promotes better health outcomes such as better digestion, more energy, and better weight management. In addition, people who manage their dietary intake also have increased fitness performance, which guarantees maximum efficiency during both workouts and rest periods. Our platform increases the effectiveness of goal achievement by making it easier to track progress and make dietary adjustments, which promotes long-term adherence to a healthy lifestyle.

It guides users on a path to holistic well-being by encouraging harmony and balance in their diet, level of fitness, and general health. By adopting the platform's user-friendly interface and practical insights, people can fully realize their potential for health and fitness and set off on a journey of self-discovery.

Personalized solutions are becoming more and more in demand, but our platform is a shining example of innovation, providing a useful tool for anyone looking to improve their eating habits and reach their fitness goals. Our AI-powered nutrition analyzer, with its user-centric design and excellent features, begins in a new era in the pursuit of wellbeing, enabling users to thrive in body, mind, and spirit.

6.2 FUTURE ENHANCEMENT

1. **Integration of Wearable Devices:** Additional information about users' activity levels, sleep habits, and general health state can be obtained by incorporating data from wearable devices, such as smart watches and fitness trackers. A more comprehensive approach for managing health and fitness will be made possible by integrating this data with the nutrition analyzer, which will provide individualized recommendations based on dietary consumption as well as individual activity levels and lifestyle choices.
2. **Genetic Analysis:** Nutrition advice can be made even more specifically by including genetic analysis into the platform, taking into account each person's unique genetic makeup. The technology is able to provide highly customized dietary programs that support specific fitness objectives and enhance health outcomes by determining genetic markers related to metabolism, nutrient absorption, and food sensitivities.
3. **Meal Planning and Recipe Suggestions:** The process of converting dietary recommendations into feasible, daily meals can be improved by adding meal planning features and recipe ideas to the platform. It is simpler for users to stick to their nutrition objectives while still enjoying tasty and nutritious meals thanks to the database of healthy recipes that are catered to their dietary preferences and limits.
4. **Behavioural Insights and Coaching:** The platform can improve user motivation and engagement by incorporating behavioural science principles. Users of the platform can overcome common barriers to adherence and sustainably adopt healthy eating habits by receiving individualized coaching based on behavioural insights. On their path to better health and fitness, customers can benefit from additional features like goal-setting, progress monitoring, and motivational prompts.
5. **Collaboration with Healthcare Professionals:** Forming alliances with healthcare professionals, such nutritionists, dietitians, and personal trainers, can improve the platform's efficiency and reliability. More individualized and coordinated care can be made possible by integration with electronic health records (EHRs), which can promote easy communication and data sharing between users and their healthcare professionals.

APPENDIX

1. Login & Sign up page;

```
import React, { useState } from 'react'
import axios from 'axios'
import './Signup.css'
import { useNavigate } from 'react-router-dom'
import { FaBookOpen } from "react-icons/fa";
import { IoFastFoodSharp } from "react-icons/io5";
import { RiCalendarScheduleFill } from "react-icons/ri";
import { FaPersonRunning } from "react-icons/fa6";

const Signup = () => {

   const navigate=useNavigate();
   const [errorMsg,setErrorMsg]=useState('');

   const [username,setUserName]=useState('');
   const [email,setEmail]=useState('');
   const [password,setPassword]=useState('');
   const [confirmPassword,setConfirmPassword]=useState('');

   const handleSubmit = (e)=>{
      e.preventDefault()
      if(password!=confirmPassword)
      {
```

```
        window.alert("password and confirm password must be same");
        return;
      }
      axios.post("http://localhost:4000/auth/signup",{
        username,email,password,confirmPassword
      }).then(res=>{
        console.log(res)
        if(res.data==="registered")
          navigate('/signin')
        else
          setErrorMsg(res.data)
      }).catch((err)=>{
        console.error(err);
      })
    }

  return (
    <div className='all'>
      <div className='signup'>
        <form className='signup-form' onSubmit={handleSubmit}>

          <center><h2>Sign up</h2></center><br />

          <label htmlFor="">Username :</label>
          <input type="text" required placeholder='username' value={username}
onChange={(e)=>setUserName(e.target.value)} autoComplete='off' />
```

```
        <label htmlFor="">Email :</label>
        <input type="email" required placeholder='email' value={email}
onChange={(e)=>setEmail(e.target.value)} autoComplete='off' />

        <label htmlFor="">Password :</label>
        <input type="password" required placeholder='password' value={password}
onChange={(e)=>setPassword(e.target.value)} autoComplete='new-password' />

        <label htmlFor="">Confirm Password :</label>
        <input type="password" required  placeholder='confirm password'
value={confirmPassword} onChange={(e)=>setConfirmPassword(e.target.value)}
autoComplete='new-password'/>
        <center><br /><p>Already have an account, <a href="/signin"
className='signin_anchor'>Sign In</a></p></center>
        {errorMsg?(<center><br></br><p
style={{color:'red'}}>{errorMsg}</p></center>):""}
        <br />  <button type='submit'>Sign Up</button>
      </form>
    </div>
    <div className='allContent'>
      <p className='content'>Create account</p>
      <p className='content2'>What will you get?</p><br /><br /><br />
      <p><FaBookOpen /><span>  </span>Unlimited read access of fitness article and
blog posts.</p><br /><br />
      <p><IoFastFoodSharp />  Nutrition analzer according to the food which you
enter.</p><br /> <br />
      <p><RiCalendarScheduleFill /> Diet planer.</p><br /><br />
      <p><FaPersonRunning /> Calorie tracker based on your workout and diet.</p><br
/>
```

```
    </div>
   </div>
  )} export default Signup
```

2. Nutrition analyser:

```
const Nutrition = () => {
  const [food, setFood] = useState('');
  const [nutritionData, setNutritionData] = useState([]);

  async function fetchData() {
    const options = {
      method: 'GET',
      url: 'https://nutrition-by-api-ninjas.p.rapidapi.com/v1/nutrition',
      params: {
        query: food
      },
      headers: {
        'X-RapidAPI-Key':
'57bdea98c8msh11726cb27834af0p12d8eejsn519597279ab3',
        'X-RapidAPI-Host': 'nutrition-by-api-ninjas.p.rapidapi.com'
      }
    };

    try {
      const response = await axios.request(options);
      setNutritionData(response.data);
```

```
  } catch (error) {
    console.error(error);
  }
 }

 function handleFood(e) {
  e.preventDefault();
  fetchData();
 }

 return (
  <div className='nutrition_analysis'>
   <h1 style={{color:'black'}} className='title'>Nutrition Analysis</h1>
   <form onSubmit={handleFood}>
    <label htmlFor="input" className='lable'  id="username"
name="username"></label>
    <br /><br />
    <input type="text" value={food} onChange={(e) => setFood(e.target.value)}
className='food-input' placeholder="Enter the Food :"/>
    <button type="submit" className='get-nutrition'>Get Nutrition</button>
   </form>
   {nutritionData.length > 0 && (
    <div className="nutrition-info">
     {nutritionData.map((item, index) => (
      <div key={index}>
       <h2>Nutrition Information for {item.name}</h2><br />
```

```
          <ul className='nutrition-info-list'>
            <li><FaArrowRightLong /> Serving Size (g): {item.serving_size_g}</li><br />
            <li><FaArrowRightLong /> Calories: {item.calories}</li><br />
            <li><FaArrowRightLong /> Carbohydrates Total (g): {item.carbohydrates_total_g}</li><br />
            <li><FaArrowRightLong /> Cholesterol (mg): {item.cholesterol_mg}</li><br />
            <li><FaArrowRightLong /> Fat Saturated (g): {item.fat_saturated_g}</li><br />
            <li><FaArrowRightLong /> Fat Total (g): {item.fat_total_g}</li><br />
            <li><FaArrowRightLong /> Fiber (g): {item.fiber_g}</li><br />
            <li><FaArrowRightLong /> Potassium (mg): {item.potassium_mg}</li><br />
            <li><FaArrowRightLong /> Protein (g): {item.protein_g}</li><br />
            <li><FaArrowRightLong /> Sodium (mg): {item.sodium_mg}</li><br />
            <li><FaArrowRightLong /> Sugar (g): {item.sugar_g}</li><br />
          </ul>
        </div>
      ))}
    </div>
  )}
 </div>
 );
};
```

3. Calorie tracker:

```
const CalorieTracker = () => {

   const [gender,setGender]=useState('');
   const [age,setAge]=useState('');
   const [height,setHeight]=useState('');
   const [weight,setWeight]=useState('');
   const [duration,setDuration]=useState('');
   const [hrt,setHrt]=useState('');
   const [temp,setTemp]=useState('');

   const [calorie,setCalorie]=useState('');
   const [showCal,setShowCal]=useState(false);
   const [length,setLength]=useState(false);
const handleSubmit = (event) => {
   event.preventDefault();
   if(gender.length>0 && age.length>0 && height.length>0 && weight.length>0
    && duration.length>0 && hrt.length>0 && temp.length>0)
      setLength(true);
   axios.post('http://localhost:4000/model',{
      gender,age,height,weight,duration,hrt,temp
   } )
   .then((cal)=>{
    setCalorie(cal.data);
```

```
    console.log("predicted calorie : ",cal.data)
  })
  .catch((err)=>{
    console.log(err);
  })
};
```

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