

A Mini Project Synopsis on

Nutriplan: Smart Diet and Wellness:

A Revolution in Personalized Nutrition and Wellness

T.E. – Computer Science and Engineering-Data Science

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CERTIFICATE

This is to certify that the Mini Project report on “Nutriplan: Smart diet and Wellness: A Revolution in Personalized Nutrition and Wellness” has been submitted by Shreyas Patil (21107061), Ridhvik Thakur (21107056), Prathamesh Babar (21107058), Montu Suthar (21107052) who are bonafide students of A. P. Shah Institute of Technology, Thane, Mumbai, as a partial fulfillment of the requirement for the degree in **CSE(DATA SCIENCE)**, during the academic year **2023-2024** in a satisfactory manner as per the curriculum laid down by the University of Mumbai.

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Chapter 1

Introduction

In today's modern world people all around the globe are becoming more interested in their health and lifestyle. But just avoiding junk food and doing exercise is not enough, we require a balanced diet. A balanced diet based on our height, weight, and age can lead a healthy life. Combined with physical activity, your diet can help you reach and maintain a healthy weight, reduce your risk of chronic diseases (like heart disease and cancer), and promote your overall health. A balanced diet is one that gives your body the nutrients it needs to function correctly. Calories in the food are the measure of the amount of energy stored in that food.

Our body uses calories for basically everything like breathing, walking, running, etc. On average a person needs 2000 calories per day but specifically, intake of calories depends upon a person's physical aspects like weight, height, age, and gender. So, your food choices each day affect your health and how you feel today, tomorrow, and in the future. Thus, a proposed system recommends a diet plan based on your physical aspects and your end goal.

Various studies depict that inappropriate and inadequate intake of diet is the major reason for various health issues and diseases. A study by WHO reports that inadequate and imbalanced intake of food causes around 9% of heart attack deaths, about 11% of ischemic heart disease deaths, and 14% of gastrointestinal cancer deaths worldwide. Moreover, around 0.25 billion children are suffering from Vitamin-A deficiency, 0.2 billion people are suffering from iron deficiency (anemia), and 0.7 billion people are suffering from iodine deficiency. The main objective of this work is to recommend a diet to different individuals.

The recommender system deals with a large volume of information present by filtering the most important information based on the data provided by a user and other factors that take care of the user's preference and interest. It finds out the match between user and item and imputes the similarities between users and items for recommendation based on their physical aspects (age, gender, height, weight, body fat percentage), and preference (weight loss or weight gain).

1.1 Purpose

In the rapidly evolving landscape of technology, the advent of artificial intelligence (AI) and machine learning has ushered in a new era of innovation and transformation. AI, a field that seeks to imbue machines with the ability to learn and make decisions akin to human intelligence, has found applications across diverse industries. From autonomous vehicles navigating complex roadways to virtual assistants enhancing productivity, AI is reshaping our daily lives. Machine learning, a subset of AI, empowers systems to improve their performance through experience and data, enabling them to recognize patterns, make predictions, and automate tasks. As AI and machine learning technologies continue to advance, they hold the potential to revolutionize healthcare by enhancing diagnostics, treatment, and drug discovery. Moreover, in the world of finance, they're being leveraged to optimize investment strategies and detect fraudulent activities with unprecedented accuracy. In essence, AI and machine learning are not just cutting-edge technologies but the cornerstone of the fourth industrial revolution, offering boundless opportunities and challenges as they redefine how we work, live, and interact with the world around us.

1.2 Objectives

Tailoring recommendations to each individual's unique needs and goals is a fundamental objective for a smart diet recommendation app. This customization ensures that users receive dietary guidance that aligns with their specific requirements and aspirations. Whether the aim is weight loss, muscle gain, or enhanced energy levels, the app's recommendations can be fine-tuned to support these objectives effectively.

The app can offer a multifaceted approach to help users attain their health and fitness goals. For those seeking weight loss, it can provide calorie-controlled meal plans, portion-control suggestions, and low-calorie recipe options. On the other hand, individuals aiming for muscle gain may receive recommendations for protein-rich meals and muscle-building nutrition. Those looking to improve energy levels can benefit from guidance on nutrient-dense foods and energy-boosting meal ideas.

In addition to offering personalized dietary advice, the app can simplify the tracking of calorie intake and nutrient consumption. Users can easily log their daily food and beverage

consumption, making it effortless to monitor their progress and stay accountable to their goals. By providing detailed insights into nutrient intake, users can gain a better understanding of their diet's nutritional quality and make informed adjustments as needed.

1.3 Scope

A smart diet recommendation app has the potential to revolutionize how individuals approach their dietary choices and health goals. By taking into account essential user-specific factors like height, weight, and activity level, the app can craft personalized diet plans. This personalization is key, as it ensures that each user's unique circumstances and needs are considered when offering dietary recommendations.

The inclusion of a comprehensive food database within the app is another invaluable feature. This database should encompass a wide range of foods, dishes, and snacks, each with detailed nutritional information. This wealth of data empowers users to make informed choices about what they eat. Whether users are planning their meals, shopping for groceries, or dining out, the app provides them with the necessary information to make health-conscious decisions.

User-friendliness is a crucial aspect of the app's design. An intuitive and easy-to-navigate interface ensures that users can seamlessly incorporate the app into their daily routines. This simplicity is vital for encouraging consistent use, as making healthy dietary choices is an ongoing process that requires daily commitment.

The personalized plans generated by the app, factoring in variables like height, weight, and activity level, go a long way in promoting effective dietary recommendations. By providing users with calorie targets that align with their unique profiles, the app helps prevent overeating or undereating, contributing to better nutrition management.

Considering activity levels further enhances the app's effectiveness. It allows users to receive recommendations that match their energy expenditure, which is particularly important for individuals seeking to maintain or enhance their fitness and energy levels.

The app's user-friendly interface also simplifies the process of tracking daily food intake. Users can easily log their meals, monitor calorie intake, and keep tabs on nutrient consumption.

Chapter 2

Problem Definition

The Nutriplan project seeks to address the pressing issue of one-size-fits-all diet recommendations and the challenges individuals face in adopting and maintaining a healthy lifestyle. Current diet plans often disregard the unique attributes of each person, leading to suboptimal results and frustration. Moreover, the vast amount of conflicting dietary information available can be overwhelming for individuals trying to make informed choices. Nutriplan aims to tackle this problem by providing personalized diet recommendations based on individual characteristics, thereby promoting healthier eating habits, reducing the risk of health issues, and empowering users to take control of their nutrition. The adoption of the KNN machine learning algorithm enables Nutriplan to process and analyse user data to offer precise, tailored recommendations, thus addressing the significant problem of impersonal and ineffective dietary guidance. This project's core challenge is to create a user-focused, data-driven solution that makes personalized nutrition accessible and sustainable, revolutionizing the way we approach diet and wellness in our increasingly fast-paced world.

Chapter 3

Proposed System

The Nutriplan project's proposed system is nothing short of a game-changer in the field of nutrition and wellness. It harnesses the power of user-specific data, collected through input variables such as height, weight, gender, and activity level, to offer diet recommendations that are as unique as the individuals themselves. This user-centric approach is the antithesis of the one-size-fits-all dietary advice that has become all too common in today's world.

What sets Nutriplan apart is its groundbreaking use of the K-Nearest Neighbors (KNN) machine learning algorithm. KNN enables the system to process and analyze user data in a way that ensures unparalleled precision and personalization. By drawing upon a database of known profiles and comparing them with user input, Nutriplan delivers diet recommendations that are not only tailored but are constantly adapting and evolving as the user's needs change.

The core mission of the proposed system is to empower individuals to take control of their health and nutrition. It is a bridge to more informed choices, healthier dietary habits, and a heightened sense of self-sufficiency. Nutriplan does not just offer guidance; it offers education and insights that enable users to make proactive decisions about their nutrition, leading to long-term well-being.

3.1 Features and Functionalities

One of the key features of the smart diet recommendation app is its ability to offer meal suggestions. These suggestions are designed to educate users about the importance of diverse nutrient intake and guide them toward their specific health and fitness goals. The app can provide a variety of meal options that balance different food groups, ensuring that users receive a broad spectrum of essential nutrients, vitamins, and minerals. This not only contributes to overall well-being but also educates users about the importance of a balanced diet.

These meal suggestions are tailored to each user's unique goals, whether it's weight management, muscle gain, or improving energy levels. For example, if a user's goal is weight loss, the app may recommend meals that are lower in calories but still nutritionally rich. In contrast, for someone aiming to build muscle, the app might suggest protein-rich meals to support muscle growth.

Another critical aspect of the app is its user interface. To ensure a positive user experience, the app should be intuitive and easy to navigate. A user-friendly design is essential to encourage users to interact with the app regularly and make it a seamless part of their daily routine. Users should find it simple to log their meals, access meal suggestions, and track their progress.

Intuitiveness extends to search functionality within the app, making it effortless for users to find foods, recipes, and meal plans. Clear and concise menus and icons should facilitate easy navigation, making it easy for users to engage with the app and access the information they need.

The app's web application takes personalization to the next level by tailoring diet recommendations based on individual user attributes, including height, weight, and activity level. By factoring in these essential variables, the app can provide highly customized diet plans that align with each user's specific needs and goals.

For example, the app can generate calorie targets and macronutrient ratios that are appropriate for an individual's height, weight, and activity level. Users can be confident that their dietary recommendations are precisely matched to their profiles, whether they're seeking to maintain a healthy weight, increase muscle mass, or boost their energy levels. This level of personalization enhances the effectiveness of the app and increases user trust in its recommendations.

Chapter 4

Project Outcomes

The outcomes of a "Nutriplan: Smart Diet and Wellness" project can have a significant impact on various stakeholders and contribute to enhancing accessibility and inclusivity. Here are some key project outcomes:

1. **Better Health Outcomes through Personalized Diet Plans:** The core objective of the app is to provide users with personalized diet plans. These plans are meticulously tailored to each user's unique characteristics, such as height, weight, and activity level. By following these personalized recommendations, users are more likely to experience better health outcomes. These plans can help users achieve a balanced and nutritious diet, reduce the risk of diet-related health issues, and manage their weight effectively.
2. **Reduced Risk of Diet-Related Health Issues:** One of the primary benefits of following personalized diet plans is the decreased risk of diet-related health problems. For instance, users looking to lose weight can receive calorie-controlled meal suggestions, which can help them shed excess pounds and reduce the risk of conditions like obesity, heart disease, and diabetes. Users with specific dietary restrictions can also receive recommendations that help them manage their conditions more effectively.
3. **Promoting Long-Term Wellness and Lifestyle Changes:** The app is not just about short-term fixes; it's focused on promoting long-term wellness. By offering sustainable, personalized diet plans, the app encourages users to adopt healthier eating habits as a part of their lifestyle. This long-term approach is essential for achieving lasting wellness, as it instills positive dietary behaviors that users can maintain over time.
4. **Sustainability and Habit Formation:** The app's recommendations aren't about extreme diets or temporary solutions. They aim to create lasting habits and behaviors that promote wellness. Users are more likely to continue these habits over the long term, contributing to their overall well-being. Whether it's weight management, muscle gain, or improved energy levels, these habits support a healthier lifestyle.
5. **Higher User Satisfaction:** As users experience improved health outcomes and long-term wellness, their satisfaction with the app is likely to be high. They'll appreciate the app's role in helping them achieve their dietary goals and improving their overall health. This satisfaction can lead to increased app usage and loyalty.
6. **Increased User Engagement:** The app's personalized approach and long-term focus can

boost user engagement. Users are more likely to stay engaged when they see consistent progress toward their wellness objectives. They'll actively use the app to track their dietary choices, explore meal suggestions, and monitor their health improvements.

7. **Achievement of Wellness Goals:** The app's approach ultimately leads to users achieving their wellness goals, whether it's weight loss, muscle gain, or increased energy. This achievement provides a sense of accomplishment and reinforces the value of the app in their lives.

Chapter 5

Software Requirements

Python 3.11.5: Python is the programming language that forms the foundation of this software stack. It's known for its simplicity and versatility, making it an excellent choice for data manipulation, algorithm implementation, and web application development.

Google Colab 1.1.2: Google Colab is a cloud-based platform that provides a collaborative environment for Python programming. It's a convenient choice for data analysis and machine learning tasks, offering access to powerful hardware resources and pre-installed libraries.

Dataset (calories.csv): The dataset, with its 68,234 rows and 9 columns, is a valuable resource for this project. It likely contains information related to calorie content and possibly other nutritional data, which is essential for the diet recommendation application.

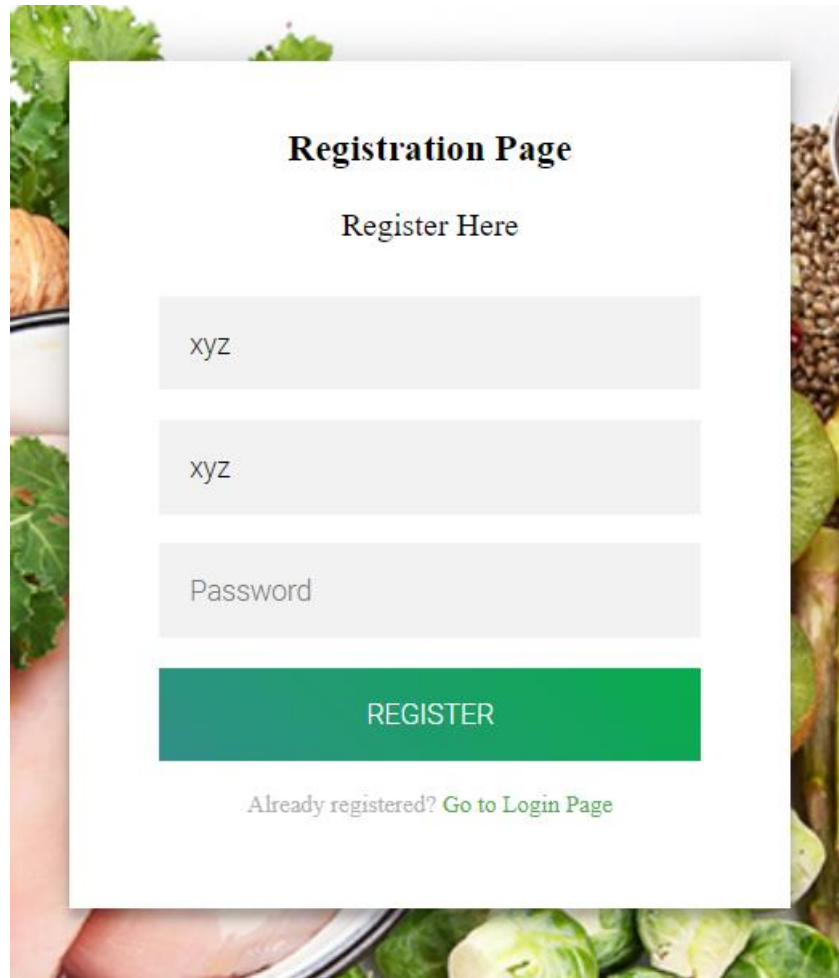
Front-end (HTML 5.0 and CSS 3.0): The front-end development stack consists of HTML 5.0 and CSS 3.0. HTML is the markup language used for structuring web content, while CSS is responsible for styling and layout. These technologies are crucial for creating an attractive and user-friendly user interface.

Back-end (SQL Lite 3.3.6 and Flask): The back-end of your application is powered by SQL Lite and Flask. SQL Lite is a lightweight relational database management system, suitable for smaller-scale applications. Flask is a web framework for Python, providing tools and libraries to build web applications, making it a solid choice for your project's backend needs.

Algorithms (KNN): The algorithm you've chosen, K-Nearest Neighbors (KNN), is often used for recommendation systems. In your context, it's likely used to analyze the dataset and make personalized diet recommendations to users based on their preferences, nutritional needs, and other factors.

Chapter 6

Project Design

A UI mockup of a registration page. The page is white with a green border. It features a title 'Registration Page' in bold black text, followed by the subtitle 'Register Here'. Below these are three input fields: the first two contain the placeholder text 'xyz', and the third is labeled 'Password'. A green button with the text 'REGISTER' in white is positioned below the input fields. At the bottom, there is a link that reads 'Already registered? Go to Login Page' in a smaller, lighter green font. The background of the mockup shows a blurred image of fresh vegetables like lettuce and tomatoes.

Registration Page

Register Here

xyz

xyz

Password

REGISTER

Already registered? [Go to Login Page](#)

Fig 1:Registration Page

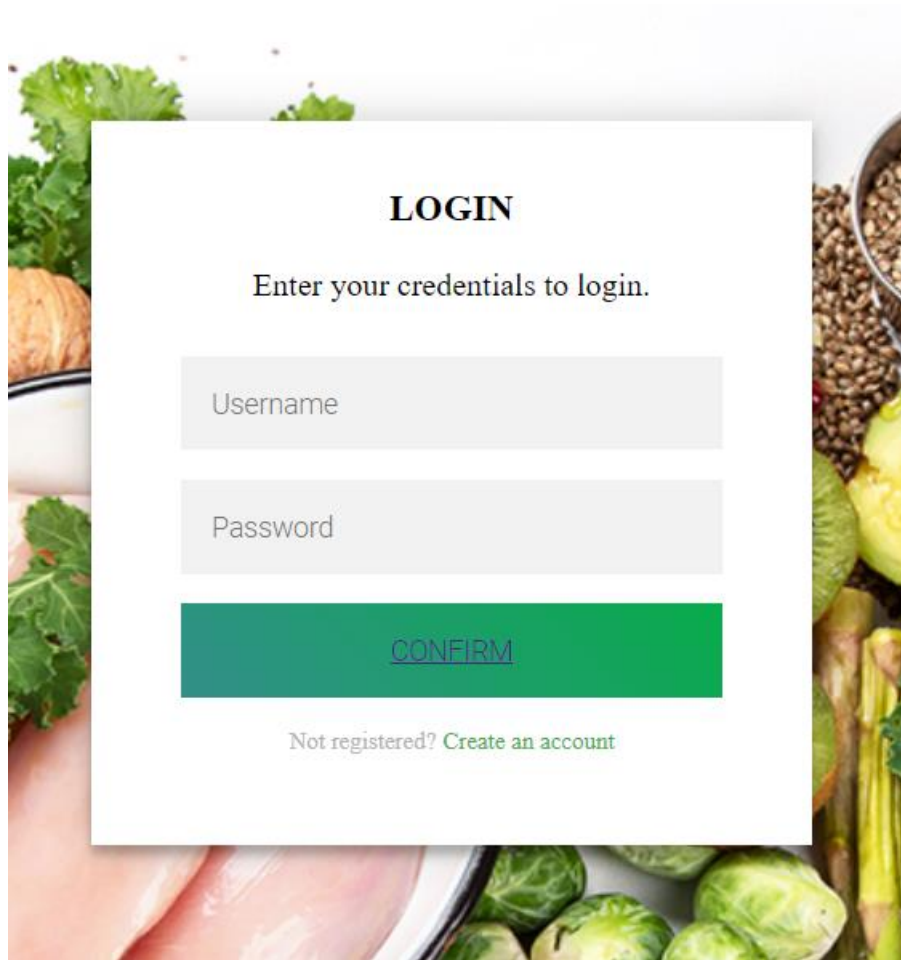


Fig 2 :Login Page

Diet Recommendation System

Age (in years):

Height (in cm):

Weight (in kg):

Gender (Male/Female):

Activity Level:

Weight Plan:

Fig 3 :User Input Page

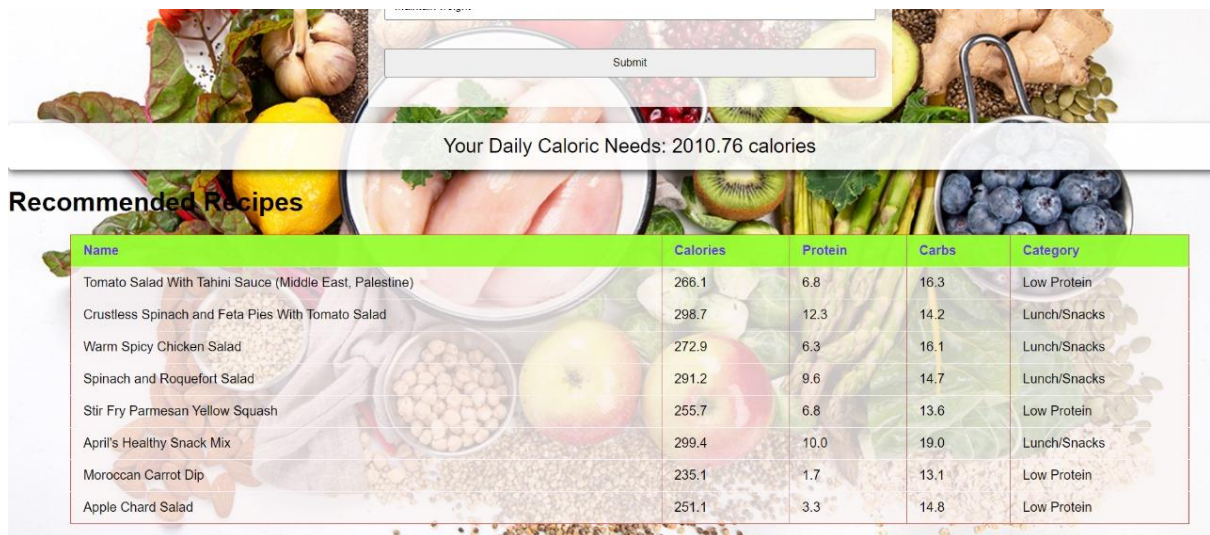


Fig 4 :Output

Chapter 7

Project Scheduling

Sr. No	Group Member	Time duration	Work to be done
1	Shreyas Patil	August-November	Implementing the machine learning algorithm required for the project.
2	Ridhvik Thakur	August-November	Implementing the machine learning algorithm required for the project.
3	Montu Suthar	August-November	Implementing the GUI of the project.
4	Prathamesh Babar	August-November	Implementing the GUI of the project.

WS NUMBER	TASK TITLE	TASK OWNER	START DATE	DUE DATE	DURATION (WEEKS)	PROGRESS (%)	PHASE ONE														PHASE TWO																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
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11	Group formation and Topic finalisation. Identifying the scope and objectives of the Mtn Project	Shiraz Pahlamoni	Solar Pahlamoni	7/27/23	7/28/23	2	100%																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							

The columns contain the duration of the task completed, the percentage of work completed, the number of weeks required to complete a particular task, the specific dates, and the team members who contributed towards the completion of tasks. The detailed explanation of the Gantt chart is explained below: The project conception and initiation task were executed by the July month end around 29/07/23. The task of initiation included many more sub-tasks such as group formation and topic finalization which was performed during the 1 week of project initialization. The group formed included 4 members Shreyas Patil, Ridhvik Thakur, Montu Suthar, and Prathamesh Babar, and the finalized topic was NutriPlan: Smart Diet and Wellness. Further, the upcoming week led to the task of identifying the scope and objectives of the mini-projects. This was during the time interval of 29/07/23 to 04/08/23. The next sub-task was to identify the functionalities of the project which was done by the two members Shreyas Patil and Ridhvik Thakur in a span of one week from 29/07/23 to 14/08/23. The discussion of the project topic with the help of a paper prototype was completed with equal contribution from all the group members within one week from 14/08/23 to 21/08/23. The next main task of Graphical User Interface (GUI) designing was completed by Montu Suthar and Prathamesh Babar within 2 weeks from 24/08/23 to 02/09/23. The next week from 24/08/23 to 07/09/23 the members worked on the preparation of Presentation I. The next major task was database design and implementation. It took all 5 weeks to complete the final implementation. The database Design and connectivity of all modules were done by Montu Suthar and Shreyas Patil during the course time of 2 weeks from 07/09/23 to 23/09/23. The integration of all modules and report writing was completed by all the group members from 23/09/23 to 15/10/23. The preparation of the final presentation II work was equally shared by all the group members in the time of 2 weeks from 15/10/23 to 20/10/23.

Chapter 8

Conclusion

The Nutriplan project stands as a beacon of innovation in the world of health and wellness. It represents the culmination of a vision to create a system that prioritizes individuals' unique attributes and needs when it comes to their dietary choices. The application of the KNN machine learning algorithm in Nutriplan has redefined how we approach nutrition, and the outcomes are nothing short of transformative.

Through the Nutriplan system, we have witnessed the power of personalized diet recommendations. Users no longer receive generic, one-size-fits-all advice but are presented with dietary guidance that aligns with their goals and preferences. This tailored approach empowers individuals to make informed choices about their nutrition, which is a fundamental step towards improved health and well-being.

Nutriplan's ability to calculate BMI adds another layer of empowerment. Users can monitor their physical health status and track their progress toward their wellness objectives. This feature equips individuals with the knowledge they need to make proactive decisions about their health and work towards achieving their goals.

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