INTERNATIONAL JOURNAL OF LATEST TECHNOLOGY IN ENGINEERING, MANAGEMENT & APPLIED SCIENCE (IJLTEMAS)

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue VIII, August 2025

Smart Diet Planning Integrating Body Metrics and Lifestyle Attributes

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DOI: https://doi.org/10.51583/IJLTEMAS.2025.1408000014

Abstract: In recent years, the growing awareness of nutrition and personalized health care has driven the need for intelligent diet planning systems. This paper presents the design and implementation of a web-based Diet Recommendation System using the Django framework. The system accepts user inputs such as Body Mass Index (BMI), age, and specific health goals—including weight loss, muscle gain, or maintenance—to generate a personalized diet plan [1]. The backend features an admin-controlled nutrition database containing categorized food items with detailed macronutrient information. Based on the user profile, the system intelligently maps appropriate meal options [3] and suggests a balanced diet that aligns with the user's goals. The platform also allows scalability to include real-time nutritional analytics, food logging, and PDF report generation [2]. By leveraging Django's modular architecture and relational database capabilities, the system ensures flexibility, security, and ease of use. This project demonstrates the potential for technology to assist in promoting healthier lifestyles through intelligent dietary planning.

I. Introduction

In today's health-conscious society, personalized diet planning has become increasingly important in maintaining a balanced lifestyle and preventing nutrition-related diseases. However, determining an appropriate diet based on individual factors such as age, body composition [5], and specific health goals can be a complex and time-consuming task, particularly for those without access to professional dietary guidance.

To address this challenge, this project introduces a web-based Diet Recommendation System developed using the Django framework. The is implemented to assist users in generating a customized meal plan based on inputs such as Body Mass Index (BMI) [4][6], age, and health objectives—whether it is weight loss, muscle gain, or general maintenance. Using these inputs, the application categorizes users and recommends appropriate food items from an admin-managed nutrition database [1], which contains detailed information on macronutrients and caloric values.

The use of Django provides robust features for user input handling, form validation, and secure database interactions [3]. The admin panel allows authorized personnel to add, update, or remove food items and adjust plans as dietary guidelines evolve [5]. The modular architecture also supports future integration of advanced features like real-time analytics, machine learning-based plan optimization, or mobile app extensions. This system not only aids in promoting healthier eating habits but also serves as a foundation for developing intelligent nutrition platforms that can be deployed in hospitals, fitness centers, wellness applications, or educational environments [7]. It bridges the gap between automated digital tools and personalized healthcare, demonstrating how technology can empower individuals in making informed dietary decisions.

Keywords: Diet Recommendation System**,** Body Mass Index (BMI)**,** Personalized Nutrition**,** Health Goals**,** Food Category Suggestion**,** Nutrition Database**,** Rule-Based System**,** Admin Panel**,** Django Web Application**,** Intelligent Healthcare System

II. Related Work

In recent years, personalized diet recommendation systems have gained significant attention due to their potential to support healthier lifestyles. Many of these systems are designed using user-specific factors such as Body Mass Index (BMI) [3], age, and individual health goals to generate suitable dietary suggestions. Early solutions were primarily rule-based systems, where predefined nutritional guidelines were used to suggest food portions or daily calorie intake [8]. These systems typically employed conditional rules linked to user inputs like BMI and age. While easy to implement, such systems often lack flexibility and adaptability when handling diverse health goals or changing dietary needs.

With the growing availability of health data, machine learning-based systems have emerged as powerful tools for personalized nutrition. Some studies have applied clustering techniques to group users based on health parameters, followed by classifiers to suggest suitable diets [6]. These methods offer better personalization and can adapt over time, making them more effective than static rule-based models [8].

Another promising direction is the use of hybrid approaches, combining logic-based rules with learning algorithms. These models are able to offer both transparency in recommendations and dynamic learning capabilities. For example, using blurred logic in conjunction with neural networks has shown improved performance in tailoring diet plans to user-specific goals such as weight loss, muscle gain, or managing chronic conditions. Some platforms also integrate mobile or web applications, making it easier for users to access their personalized diet plans. These systems may take additional inputs such as activity level, health history, and food preferences [8]. A common feature in many advanced systems is the inclusion of a nutrition database maintained by healthcare experts or system administrators. This ensures that food information is accurate, up-to-date, and suitable for specific health

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue VIII, August 2025

conditions [4]. The system proposed in this work aims to build on these advancements by incorporating user inputs—namely BMI, age, and health goals—and using them to recommend a diet categorized by food groups. A key feature is the use of an admin-controlled nutrition database [2], which allows for ongoing updates to food information, making the system reliable and suitable for practical use.

III. Methodology

The proposed Diet Recommendation System is designed using a modular architecture consisting of user input processing, goal matching, food categorization [3], and an admin-managed nutrition database.

The approach is structured in the following manner:

Data Collection. Nutritional data is collected from verified sources such as government dietary guidelines and nutrition databases. This data includes information on food items, their nutritional values (calories, proteins, fats, carbohydrates), and health benefits [5]. The collected data is stored in a structured database accessible only to the system administrator for updates and validation.

User Input Module The system prompts users to provide the following details: Age (in years), Height and Weight, from which BMI is automatically calculated Health Goal, such as: Weight Loss, Weight Gain, Muscle Building, Diabetes Management, General Fitness

Recommendation Engine Based on the BMI category (underweight, normal, overweight, obese) and the selected health goal, the system classifies the user into a nutritional profile [2][3]. Each profile has predefined macro and micronutrient needs derived from dietary guidelines. Using this profile, the system selects appropriate food categories and lists suggested items. For example, a user with a goal of weight loss and a high BMI may receive a recommendation focused on high-fiber vegetables, lean proteins, and low-calorie foods [5]. A muscle gain user may be recommended a protein-rich and calorie-dense diet with healthy fats.

Admin Nutrition Database The system includes an admin panel where a registered administrator can: Add, update, or remove food items, Modify nutritional values. Categorize food items based on use-cases (e.g., diabetic-friendly, high-protein, low-carb). This ensures that the system remains current and medically relevant.

Output The final output is a user-friendly diet plan structured by food groups. It does not suggest specific meals but instead provides a list of recommended foods under each category (e.g., vegetables, fruits, grains, proteins) that the user can include in their daily meals based on personal preferences [7].

System Architecture

The proposed Diet Recommendation System follows a client-server architecture designed for scalability and reliability. The system is developed using Django as the backend framework, with a MySQL database for storing user information and nutritional data [2]. The front-end interface is built using HTML, CSS, and JavaScript for a user-friendly experience.

Modules

User Module allows individuals to register, log in, and input their personal details such as height, weight, age, and health goals automatically computes the BMI using the user's height and weight.

Recommendation Engine: Processes the user’s BMI category and health goal to generate a diet plans. admin Panel provides administrative access to manage the nutrition database [3], ensuring accurate and up-to-date food categories and nutrient values.

Workflow:

The user submits age, height, weight, and selects a health goal.

BMI is calculated and used to classify the user's nutritional needs.

The recommendation engine matches the user profile with suitable food categories.

The output is a diet plan structured around food groups, not specific recipes, giving flexibility to users.

The admin can update food entries, keeping the system current and clinically relevant.

IV. Results and Discussion

The system was tested with multiple stoner biographies representing different BMI situations and health objects. The generated diet plans showed thickness with general salutary guidelines [3]. For case, Light druggies with a thing to gain weight were recommended calorie-rich and protein-rich food orders. Fat druggies seeking weight loss entered recommendations centered on high fiber vegetables, low-fat proteins, and whole grains [2][5].

Druggies aiming for muscle gain were guided toward balanced inputs of carbohydrates, proteins, and healthy fats. the modular design of the system allowed easy updates to the food database and improved rigidity for unborn advancements. Feedback collected

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue VIII, August 2025

from test druggies indicated that the order based plan gave them freedom to choose recipes grounded on preference, while still aligning with health pretensions.

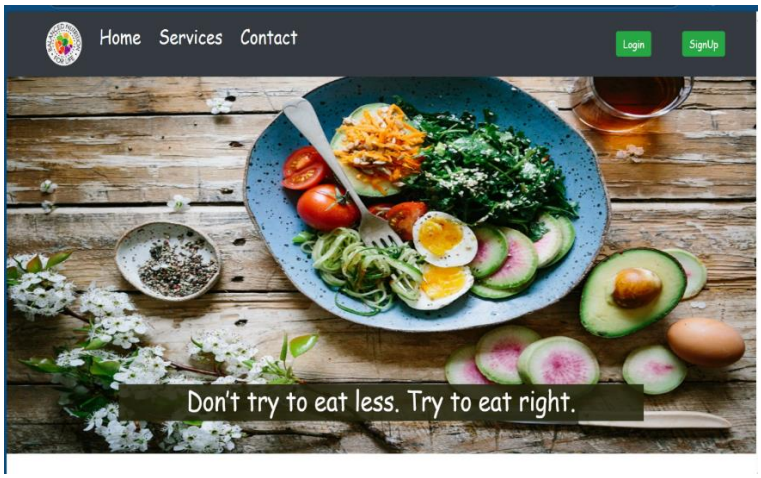

Figure 7.1: Home Page of the Diet Recommendation System

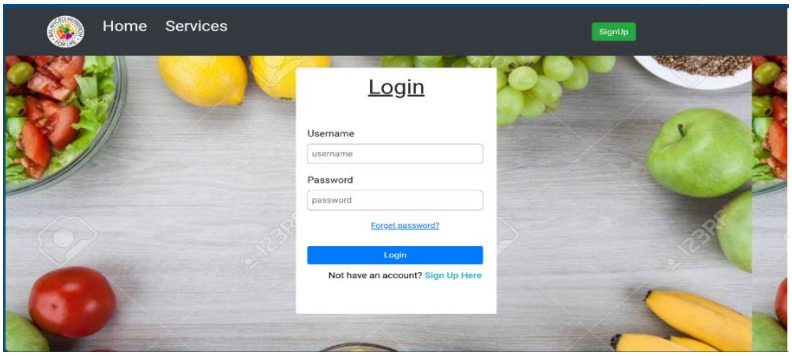

Figure 7.2: User Login Page of the system

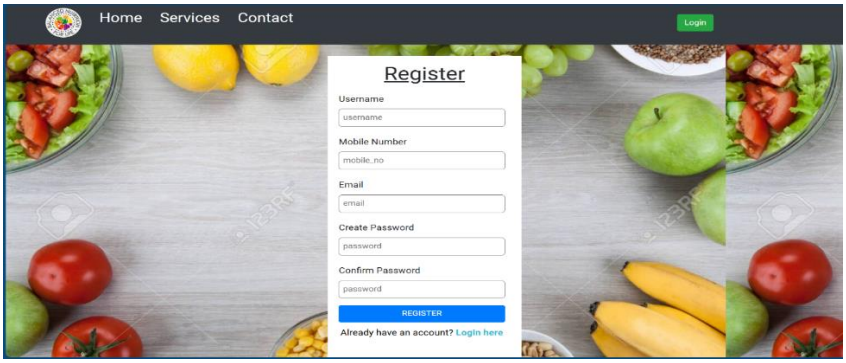

Figure 7.3: User Registration Form

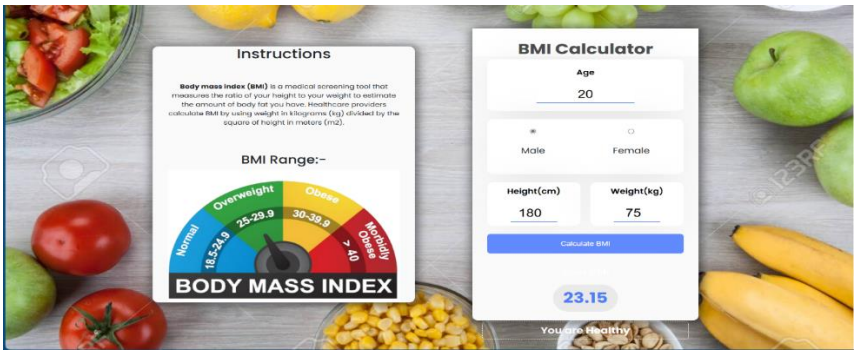

Figure 7.4: BMI Calculator

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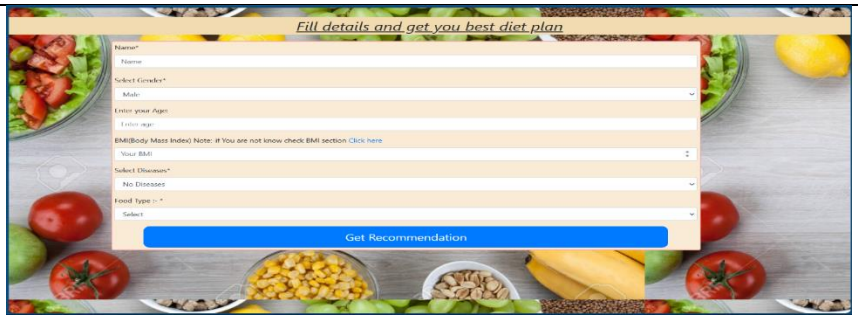

Figure 7.5: Form for user diet plan based on BMI

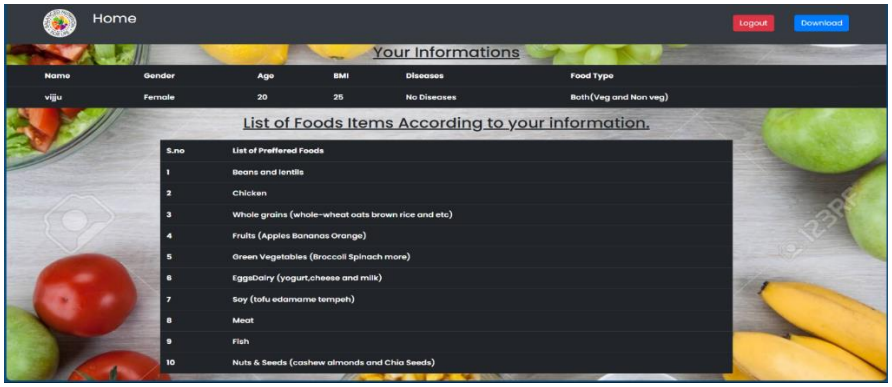

Figure 7.5: Suggesting best diet

V. Conclusion

This paper presents a flexible and intelligent Diet Recommendation System that uses BMI, age, and health goals to generate personalized dietary plans. By organizing recommendations into food categories, the system avoids rigid meal structures, allowing users more autonomy. The integration of an admin-controlled nutrition database ensures accuracy and clinical relevance.

Future work includes incorporating additional parameters such as physical activity level, allergies, and cultural food preferences, and enhancing the system with machine learning techniques to improve adaptability and recommendation accuracy over time.

Future Work

While the proposed system offers a structured and flexible approach to personalized diet planning, several enhancements can be incorporated in future developments:

Integration of Physical Activity Data: Including the user's daily physical activity level can help in generating more accurate calorie and nutrient requirements.

The system can be extended to allow users to specify food allergies, dietary restrictions (e.g., vegetarian, vegan), and cultural preferences.

Implementing machine learning models can improve personalization by learning user behaviour and feedback over time.

Meal Planning and Tracking: Future versions may provide full meal suggestions and allow users to track their daily intake against recommended targets.

Mobile Application Development: Creating a mobile-friendly version or a standalone app can increase accessibility and user engagement. Supporting multiple languages can improve usability across different regions and demographics. These improvements would further refine the accuracy and usability of the system, making it more suitable for deployment in real-world healthcare or fitness platforms.

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