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SmartFit Rule-Based Fitness and Diet Planning System

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***Abstract*- SMARTFIT – Fitness & Diet Planner is a web application based on rules that provides personalized recommendations on fitness and diet taking into account some details about the user and person daily activities. The application uses basic details provided by the user, including age, gender, height, weight, daily activity, fitness goal, and food preferences. These details are used to work out the user's BMI and BMR and to estimate the daily calorie requirement. The system then uses its rule base to produce a suggestion for an initial diet and exercise plan in accordance with the chosen fitness goal. A notable feature of the system is that it continuously adjusts the daily plan in light of the user's activities. For instance, suppose the system suggests that the user have dal with two rotis for lunch, but instead the user eats pizza; the system will take this into consideration and alter the diet plan for the remainder of the day in accordance with its rules. The same applies to the exercise component: if the user fails to carry out the exercises that the system has arranged for him or only does them in part, changes will be made to the exercise plan. Hence, a rule-based system can offer a solution that is not static and does not adhere to a general plan, but instead changes dynamically in response to the user's current activities. The system proposed has among its features a food database, six kinds of exercises, the ability to track both planned and actual food and exercise intake, a feature that allows the user to compare planned and actual activity levels, the capability to modify the plan in light of new information and rules, progress monitoring and dashboards. Moreover, the system has a YouTube finder which displays relevant videos to assist the user with exercises and recipes. SMARTFIT is a system which does not make use of technologies such as Artificial Intelligence or Machine Learning, instead it operates on a series of rules and calculations in order to give the user the appropriate information immediately. The paper demonstrates how such a system can be used to develop a web application for fitness and diet planning.**

Keywords: SMARTFIT, Fitness and Diet Planner, Rule-Based System, Personalized Recommendation, BMI, BMR, Activity Tracking, Dynamic Plan Adjustment.

1. INTRODUCTION

For a lifestyle it is important to keep a balance between diet, exercise and daily activities. Many people struggle to stick to diet and exercise plans. This is often because the plans are chosen without considering details like age, height, gender, body mass, activity level, fitness goals and food preferences. Also changes in life make it hard to follow a set routine. That is why a system that adapts to each user's traits and current behaviour is needed.

SMARTFIT – Fitness & Diet Planner is a web application developed to help users manage their fitness and diet in a simple way. It uses information such as age, gender, height, weight, activity level, fitness goals and food preferences. With this data it can calculate values like BMI (Body Mass Index) BMR (Basal Metabolic Rate) and the daily calorie needs. These numbers, along with a set of rules help the system suggest a diet and exercise plan based on the user's goals.

The system includes six types of exercises and a food database. This allows it to make recommendations that match the user's tastes and needs. One key feature is the ability to compare planned activities with progress. If the user changes their routine the system updates the plan accordingly. This means the advice stays accurate and relevant without following a daily schedule.

This tool can help people who want to live healthier lives. Its main function is to plan and suggest diet and exercise routines that fit each person's situation.

Now the system does not use Artificial Intelligence or Machine Learning. Instead, it works based on a rule-based system. This means it follows instructions for every situation. The benefit is reliable results without complex calculations.

2. PROBLEM STATEMENT

People often think that a healthy way of life comes from a diet, regular exercise and good daily habits. Not everyone can follow the same diet or exercise routine because every person has different needs and likes. Things such as age, height, weight the amount of activity, fitness goals and the kind of food a person chooses can change what plan is best, for that person.

A healthy life needs a diet and healthy exercise but that is not always easy. Also, when daily routines change it can be hard to keep a fixed plan because people often alter what they do each day. Nevertheless, some diet and exercise tracking systems fail to take these factors into account when giving recommendations. It is therefore necessary to have a dynamic and personalised system which recommends diets and exercises based on the user's characteristics and on his current activities.

SMARTFIT – Fitness & Diet Planner is a rule based web application, developed to meet the needs of each user. It calculates the body mass index (BMI), the basal metabolic rate (BMR), and the number of calories needed each day using characteristics such as age, gender, height, weight, activity level, fitness goals and food preferences. The system then selects a diet and exercise plan according to the fitness goals that have been chosen by the user.

For the purpose of making recommendations in accordance with the user's preferences, the system includes six types of exercise and a food database. The special feature of the system is that it compares the user's actual activities and adjusts the plan in light of the new information obtained. Because of this feature, accurate recommendations can be given regarding both diet and exercise, without the need for a general daily plan.

3. OBJECTIVES

The objective of this project is to design and implement a rule based web application to provide personalized diet and exercise recommendations for individuals according to their characteristics and activities. The system looks at details, like age, gender, height and weight. It also considers how active a person is, what their fitness goals are and what foods they like. With all this information the system can figure out the BMI, the BMR and how calories a person should eat each day. The rule base of the system allows making initial recommendations for diet and exercise according to the selected fitness goals.

Additional objectives include:

- development of initial diet and exercise plans that include six types of exercises.
- allowing the user to track actual food consumption, exercises, and steps.
- comparing actual and planned activities and changing the remaining part of the day according to the new information received.
- displaying this information on a dashboard to monitor activities.
- providing the ability to find relevant videos on YouTube to help the user with exercises and recipes.
- making recommendations that are clear and transparent without using such technologies as Artificial Intelligence or Machine Learning.

4. LITERATURE REVIEW

It is known that for a lifestyle it is important to maintain a balance between diet, exercise and everyday activities. However, it is often difficult to adhere to diet and exercise plans because they are usually selected randomly without considering characteristics such as age, height, gender, body mass, activity level, fitness goals and food preferences. The use of technologies, as Artificial Intelligence or Machine Learning makes it possible to individualize diet and exercise recommendations according to the individual characteristics of the user.

However, some researchers have proposed a solution that is based on knowledge representation and rule-based reasoning. Such an approach makes it possible to receive clear and transparent recommendations without complex calculations and processing of a large amount of information. Studies on nutrition recommendation systems show that many different things need to be considered. These include age, body type, how the body is made up how active someone's what they like to eat. This is because a good and healthy diet and the right kind of exercise depend on these things. So, it is important to look at details like age, height, gender and weight.

It is also important to know how active someone is, what they want to achieve with fitness and what they like to eat when making suggestions. Calculating

numbers, like BMI and BMR helps figure out how calories a person needs each day. The study used the Mifflin–St Jeor equation to calculate the user's daily energy expenditure. Studies on diet and exercise planning and tracking systems indicate the importance of diet and activity tracking for a healthy lifestyle and the individualization of recommendations.

5. RESEARCH GAP

Existing fitness and diet recommendation systems have been created to help users manage what they eat how much they move how calories they need and what their fitness goals are. Many of these systems give advice based on user details like age, weight, how active they are and what they want to achieve. The advice is often given as a set plan and not much thought is given to what the user actually does, throughout the day. When the user's food intake or exercise differs from the planned schedule, the original plan may not be adjusted accordingly.

Another gap is the limited use of planned-versus-actual comparison in simple rule-based fitness applications. For example, if a user is provided with dal and two rotis for lunch but actually consumes pizza, the difference between the planned and actual intake can affect the remaining calorie allowance for the day. Similarly, skipping or partially completing a planned exercise can change the remaining activity requirement. A system that records these changes and adjusts the remaining daily plan using predefined rules can provide a more responsive approach without requiring Artificial Intelligence or Machine Learning.

SMARTFIT is proposed to address this gap by combining personalized initial planning, daily activity tracking, planned-versus-actual comparison, and rule-based adjustment within a single application. The system does not attempt to replace professional dietary or fitness guidance; instead, it demonstrates how predefined rules can be used to make a fitness and diet plan more responsive to actual daily behaviour. This approach also provides a transparent decision process because the changes made by the system can be traced back to predefined conditions and rules.

6. RESEARCH METHODOLOGY

The research methodology is focused on designing and implementing a personal fitness and diet management application based on a rule-based approach.

6.1 Requirement Identification Identified requirements include collecting personal information, setting fitness goals, getting information about food preferences, determining activity level, estimating caloric needs, and providing mechanisms for diet and exercise planning and tracking, monitoring activities, and changing the plan if deviations occur.

6.2 Literature and Background Study A review of the literature and background study of related theories and concepts provided a solid foundation for the study. In particular, a review of the literature provided an overview of the concepts of individualization and knowledge representation, and a background study of related areas identified the importance of taking into account personal characteristics when making recommendations. In addition, a review of the literature provided an overview of methods for calculating the user's daily energy expenditure.

6.3 System Design The research methodology focuses on designing a system for tracking individual activities and making recommendations according to individual characteristics. Therefore, the methodology includes a system design that determines the flow of information from the user to the system and from the system to the user. Taking into account individual characteristics such as age, height, gender, and weight, activity level, fitness goals, and food preferences, calculating BMI and BMR, and making initial diet and exercise recommendations are some of the steps of the system design.

6.4 Rule Formulation The methodology focuses on a rule-based approach that clearly indicates what actions to take in each case. Therefore, rule formulation is an integral part of the methodology. Rules that take into account different fitness goals, activity levels, food preferences, and caloric needs were developed for the system.

6.5 Activity Tracking and Adjustment The system must track the user's activities and make adjustments if deviations occur. Therefore, the methodology focuses on developing this functionality and creating rules that make it possible to change the plan if the actual activities deviate from the planned activities.

6.6 Testing The methodology focuses on testing the application with different users and checking different cases. Testing the rule base, calculating BMI, BMR, and the number of calories needed per day, making initial diet and exercise

recommendations, and changing the plan if deviations occur are some of the steps of testing.

6.7 Evaluation Evaluation criteria include functional accuracy, rule formulation, calculation accuracy, record-keeping, activity tracking, and rule explanation.

7. SYSTEM ARCHITECTURE

The system architecture of SMARTFIT – Fitness & Diet Planner describes how the various components of the application interact to provide personalized diet and exercise recommendations. The architecture follows a structured flow in which user information is collected, processed through fitness calculations and predefined rules, and then used to generate and update daily plans.

The system has main parts. These include the User Interface, the Fitness Calculation Module, the Recommendation Module, the Activity Tracking Module, the Plan Adjustment Module, the Database and the Progress Monitoring Module. The user starts by entering information, like age, gender, height, weight, activity level, fitness goal and food preference. Using this information the system calculates BMI, BMR and the estimated number of calories needed each day. These values are then used by the rule-based recommendation module to generate an initial diet and exercise plan.

During daily use, food intake, exercises, and steps are recorded by the user. The recorded activities are compared with the planned activities. If any difference is found, predefined rules are applied to adjust the remaining diet or exercise plan for that day. The updated information is then displayed on the dashboard, allowing the user to view the current plan and progress. A structured database is used to store user details, food information, exercises, plans, activity records, and progress history.

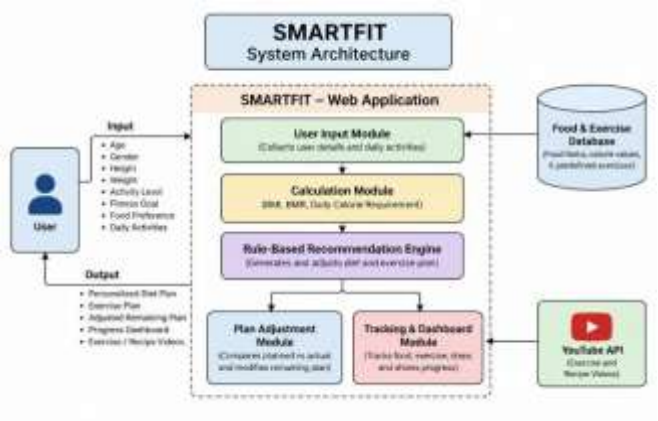


Figure 1: - system architecture of SMARTFIT

8. IMPLEMENTATION

The proposed system is designed as a set of interrelated modules that perform specific functions:

• **User Management Module:** manages users by providing the functionality of signing up, logging in, and managing a user account.

• **Fitness Calculation Module:** calculates BMI, BMR, and the number of calories needed per day.

• **Diet Recommendation Module:** provides recommendations for a healthy diet and selects appropriate food items and plans from the database. The database contains information about food items from such resources as USDA Food Data Central.

• **Exercise Recommendation Module:** provides recommendations for exercises and selects appropriate exercises from the database. Six types of exercises were created for the system.

• **Activity Tracking Module:** provides the ability to track actual food intake, exercises, and steps and store this information in the database by date.

• **Planned-versus-Actual Module:** compares planned activities with actual activities and identifies deviations.

• **Dynamic Adjustment Module:** makes changes to the remaining activities for the day according to the new information received and the rules.

• **Dashboard Module:** provides an interface for displaying the user's information, making recommendations, comparing planned and actual activities, and displaying dashboards.

• **YouTube:** Finder provides the ability to find relevant videos to help the user with exercises and recipes.



Figure 2:- Dynamic Diet and Exercise Planning workflow

9. LIMITATIONS

SMARTFIT works by following a set of rules that were created during its development. These rules control what kind of advice the system can give. Now the system has a small list of foods and only six types of exercises. Because of this it might not cover all the eating habits, food choices, types of workouts or personal fitness goals. Also, the quality of the advice depends a lot on how users provide their information.

Another problem is that users have to type in all their data by hand. This includes what they eat the exercises they do and how steps they take each day. If the information is missing or wrong it can create a difference between what the system plans and what actually happens. This makes the analysis of behaviour less accurate. Also, SMARTFIT does not use Artificial Intelligence or Machine Learning so it cannot change on its own or learn from the actions of users.

SMARTFIT is meant to be a learning tool for people who want to manage their fitness and diet. It should not be used of help from doctors, nutritionists or trainers. Future plans, for SMARTFIT could involve adding foods and exercises to the list supporting more types of user needs connecting with devices that track activity and making the rules more advanced.

10. FUTURE SCOPE

Potential enhancements for SMARTFIT include expanding the food and exercise databases, adding exercises with varying complexity, increasing food variety, and refining the rule engine to accommodate more user profiles and activity patterns.

Additional features could encompass water and sleep tracking, mobile application development, notification systems, and wearable device integration for automated data collection. While the system currently relies on rule-based methods future research could look into approaches that combine advanced recommendation techniques with the systems transparent foundation.

Improving reports, charts and tools for making changes can make the experience much better for users. These changes can help people understand the system and work with it easily. Making reports clearer and visuals accurate helps users feel more in control. Working with the system becomes simpler when tools are easier to use. The goal is to make everything clearer and more straightforward, for everyone.

The same idea applies again—future work should focus on blending recommendations with clear explainable rules. Better reporting, clearer visuals and easier adjustments can all contribute to a more intuitive experience, for users.

11. CONCLUSION

SMARTFIT – the Fitness & Diet Planner – helps users plan and manage their daily fitness and diet based on a set of simple rules. The system can also adjust the plan according to the user's daily activities

and actual behaviour by using information specific to the user for calculating their BMI, BMR, and calorie requirements and by applying a set of predefined rules when producing and dynamically adjusting the daily plans. Its ability to compare planned versus actual activities and modify recommendations accordingly distinguishes it from static solutions, all while maintaining transparency and ease of understanding. SMARTFIT thus offers a robust foundation for further innovation in web-based health management applications.

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