NutriSense AI: A Rule-Based Web Platform for Personalized Nutrition, BMI Analysis, and Exercise Recommender

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***Abstract*—These instructions give you guidelines for preparing papers for the International Journal of Innovative Research in Technology (IJIRT). Use this document as a template if you are using Microsoft Word 6.0 or later. Otherwise, use this document as an instruction set. The electronic file of your paper will be formatted further at International Journal of Innovative Research in Technology. Define all symbols used in the abstract. Do not cite references in the abstract. Do not delete the blank line immediately above the abstract. Unhealthy dietary habits, physical inactivity, and limited awareness of personalized nutrition have contributed to a rise in lifestyle-related health issues, particularly among students and young adults. This paper presents NutriSense AI, a web-based health analysis and recommendation system that evaluates basic user health data and generates personalized nutrition and exercise suggestions. The system collects user inputs such as age, gender, height, weight, activity level, dietary preference, and self-reported nutritional deficiencies, and applies standard health formulas together with rule-based logic to compute Body Mass Index (BMI) and estimate daily calorie requirements using the Mifflin-St Jeor equation. Based on this analysis, NutriSense AI recommends food items suited to address specific nutritional deficiencies and suggests relevant exercise-related video content. The platform is intended for health awareness and educational purposes rather than clinical diagnosis, and demonstrates how foundational artificial intelligence concepts, combined with standard web technologies, can be used to build accessible, low-cost health-advisory tools.**

***Index Terms*—NutriSense AI, nutrition analysis, BMI calculation, health recommendation system, exercise suggestion, rule-based system, web application.**

I. INTRODUCTION

In today's fast-paced world, maintaining good health and proper nutrition has become a major challenge, especially among students and working individuals. Irregular eating habits, lack of physical activity, increased screen time, and limited awareness of nutritional deficiencies often lead to lifestyle-related health issues such as obesity, weakness, vitamin deficiencies, and stress-related problems. While medical consultation remains essential for diagnosis and treatment, many individuals primarily need quick, accessible guidance to understand their general health status and improve daily habits.

With the rapid advancement of Artificial Intelligence (AI) and web technologies, intelligent health-recommendation systems have gained significant research attention, since AI-based platforms can analyze user input data and provide personalized suggestions [3, 4, 5]. Such systems support preventive healthcare by promoting healthy eating habits, regular exercise, and overall wellness, and have been shown to improve accessibility and affordability of basic health guidance.

NutriSense AI is a lightweight, web-based health-analysis platform designed to address this need. The system collects basic user health information — age, gender, height, weight, activity level, dietary preference, and self-reported nutritional deficiencies — and analyzes it using predefined logic and standard nutritional references, after which it produces personalized food and exercise recommendations to help users improve their lifestyle.

The primary focus of NutriSense AI is health awareness and guidance rather than medical diagnosis. The platform is designed to be simple and

approachable, particularly for students and first-time users, and integrates online exercise resources, including YouTube-based workout suggestions, so that users can follow structured routines at home.

This paper demonstrates how basic AI concepts, combined with standard web-development technologies — HTML, CSS, JavaScript, and Python (Flask) — can be applied to real-world, health-related problems. The remainder of this paper is organized as follows: Section II reviews related work; Section III describes the system architecture; Section IV presents the methodology; Section V lists the tools and technologies used; Section VI presents results and discussion; Section VII discusses limitations; Section VIII outlines future scope; and Section IX concludes the paper.

A. Key Contributions

- Personalized health-data analysis based on user-entered parameters.
- Nutrition-deficiency-based food recommendations.
- Exercise suggestions delivered through curated online video content.
- A simple, interactive, and accessible user interface for students and general users.

B. Target Audience

- Students
- General users
- Health-conscious individuals
- Educators and academic reviewers

C. Aim of the Project

- To analyze basic health parameters entered by the user.
- To calculate BMI and estimate daily calorie requirements.
- To provide nutrition suggestions based on selected deficiencies.
- To recommend suitable exercise-related content.
- To deliver a user-friendly platform for health awareness.

II. LITERATURE REVIEW

AI-powered health and nutrition recommendation systems have been widely explored as tools for preventive healthcare and lifestyle management. Iwendi et al. [3] proposed an IoMT-assisted patient diet recommendation system that applies machine-learning models to generate individualized dietary guidance, while Yera Toledo et al. [4] designed a food recommendation system that incorporates both nutritional information and user preference data through an optimization-based meal-planning phase. Mokdara et al. [5] demonstrated the use of deep neural networks for personalized food recommendation, illustrating how data-driven models can be layered on top of user profile information. Collectively, these studies show that AI-based platforms improve awareness of dietary habits and support healthier lifestyle choices, particularly among students and young adults.

The present work adopts a lighter-weight, rule-based approach rather than a trained machine-learning model, prioritizing transparency, ease of implementation, and suitability for educational and awareness-oriented use cases. The system collects age, gender, height, weight, BMI, physical activity level, dietary preference, and self-reported nutritional deficiencies, and maps this information to food and exercise recommendations using predefined rules and standard nutritional references.

Reference guidelines used to inform the design include nutrition guidelines published by the World Health Organization (WHO) [1] and dietary-supplement fact sheets published by the U.S. National Institutes of Health (NIH), along with open-source nutrition databases and established health-education platforms. Early identification of common deficiencies — such as iron, vitamin D, calcium, and protein — is emphasized, as these are frequently reported among young individuals and are consistent with patterns discussed in prior recommendation-system literature [3, 4].

Parameters Considered

- Age (numerical)
- Gender (categorical)
- Height and weight (numerical)
- BMI (calculated)
- Activity level (categorical)
- Dietary preference (vegetarian / non-vegetarian)
- Nutritional deficiency type (categorical)

The health and nutrition references used in the system are drawn from currently available online guidelines and research published between 2019 and 2024, ensuring relevance to modern lifestyle and dietary patterns.

III. SYSTEM ARCHITECTURE

NutriSense AI consists of three major components, described below.

A. Frontend Layer

- Developed using HTML, CSS, and JavaScript.
- Collects user inputs through interactive forms.
- Displays health reports and recommendations.

B. Processing Layer

- Implements BMI and calorie-calculation logic.
- Analyzes user-selected nutritional deficiencies.
- Matches deficiencies with predefined food recommendations.

C. Back-end Layer

- Developed with Python Flask.
- Processes forms and generates results.
- Runs locally on the dev server (http://127.0.0.1:5000)

IV. METHODS

The system follows these steps:

- The user fills out the web form with basic health information.
- BMI is calculated using the standard formula defined by WHO: BMI = Weight (kg) / Height² (m^2)
- The Mifflin-St Jeor equation [2] is used to estimate Basal Metabolic Rate (BMR).
- The TDEE is calculated by multiplying the BMR by the user's activity level.
- The user chooses a potential nutritional deficiency from a pre-defined list.
- The system recommends food items with a high content of the chosen nutrient.
- YouTube videos about exercise are suggested according to the user's activity level.

The Mifflin-St Jeor equation was selected over other options such as the Harris-Benedict formula since comparative studies have shown that it more reliably predicts resting energy expenditure within 10% of measured values in healthy adult populations [2].

A. Operational Workflow

- Visit the website – the home page displays modules for Nutrition, Haircare, Skincare, Weight Loss and Weight Gain.
- Choose a health category to customize the analysis process.
- Enter user info (age, gender, height, weight, activity level, diet preference, specific concerns).
- Identify one specific health issue relevant to your chosen module.
- Analyze data submitted with the "Analyze" action.
- System does BMI calculation, lifestyle/diet evaluation, deficiency mapping and identification of suitable strategies .
- Personalized recommendations are presented to the user.
- For weight-management goals, suitable exercises and workout videos on YouTube are recommended.
- User reviews generated insights and may re-enter data or change modules to receive updated suggestions.

V. TOOLS AND TECHNOLOGIES USED

Table 1 shows various tools and technologies used for the development of this system:

Table 1: Tools and technologies used

Component	Technology
Frontend	HTML, CSS, JavaScript
Backend	Python, Flask
Development Tool	VS Code
Web Browser	Google Chrome
Operating System	Windows

VI. RESULTS AND DISCUSSION

NutriSense AI is an effective way to get instant, personalized health feedback. The BMI calculation helps users understand their health category and calorie estimation guides daily energy intake. Food suggestions based on deficiency promote balanced nutrition and exercise; video suggestions promote physical activity.

Evaluation usage data demonstrate that the majority of users are found in the normal and Overweight BMI categories, with smaller percentages classified as underweight or obese, highlighting the significance of

personalized nutrition and fitness guidance. The most frequently reported nutritional concern was Vitamin D and Iron deficiencies, which is in line with patterns reported in the iron nutrition awareness literature, followed by Calcium, Protein, and Vitamin B12. Module-usage data indicates the highest engagement was with the Weight Loss and Nutrition modules, followed by Skincare, Haircare and Weight Gain, indicating a strong interest in holistic wellness features.

Its simplicity makes it perfect for educational demonstrations and health-awareness programs. Users can communicate and interpret the generated recommendations with no technical background required on the platform.

VII. LIMITATIONS

- The system is not able to tell you what is wrong, with your health.
- You get to choose what you think you are lacking in terms of nutrition. This is not checked by a doctor.
- The system gives you advice based on rules not on what a computer has learned from a lot of data.
- You need to be connected to the internet if you want to watch videos about exercise.

VIII. FUTURE SCOPE

- Integration with real-time nutrition APIs.
- AI-based food-image recognition.
- User login and progress tracking.
- Mobile application development.
- Multilingual support (English and Marathi).
- Integration with wearable health devices.

IX. CONCLUSION

NutriSense AI is a tool that teaches people about health. It is a website that uses computer logic and basic web technology to help people understand how to be healthy. The website uses information from the World Health Organization about body mass index and an equation from Mifflin-St Jeor to figure out how calories people burn. It also uses a system that gives advice based on what other people have learned from studying nutrition with computers. The website is easy to use. Gives people simple tips on what to eat and how to exercise. This helps people make choices about their lifestyle. NutriSense AI is a tool, for students and researchers who want to learn more about using computers to help people be healthy.

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