

AI-Based smart fitness and nutrition management system

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International Journal of Science and Research Archive, 2026, 19(02), 340-346

Publication history: Received on 20 March 2026; revised on 26 April 2026; accepted on 28 April 2026

Article DOI: <https://doi.org/10.30574/ijrsra.2026.19.2.0918>

Abstract

Maintaining a healthy lifestyle requires regular physical activity and balanced nutrition. However, many individuals find it difficult to choose suitable workout routines and diet plans due to the overwhelming amount of information available online. Different sources often provide conflicting advice, which can create confusion and reduce motivation. This research proposes an AI-Based Smart Fitness and Nutrition Management System designed to provide personalized workout and nutrition recommendations. The system collects user information such as age, body measurements, lifestyle habits, and fitness goals, and analyzes this data using intelligent decision-support techniques. Based on the analysis, the system generates customized fitness plans and dietary suggestions that are easy to understand and follow. By simplifying the decision-making process and presenting recommendations through a clear digital dashboard, the proposed system aims to support individuals in maintaining consistent fitness routines and improving their overall health.

Keywords: Artificial Intelligence in Fitness; Personal-Ized Workout Planning; Nutrition Recommendation Systems; Health and Wellness Technology; Smart Fitness Management

1. Introduction

Physical fitness and balanced nutrition play a vital role in maintaining a healthy and active lifestyle. Regular exercise improves cardiovascular health, increases strength, and supports mental well-being. Similarly, proper nutrition ensures that the body receives the nutrients required for energy, recovery, and overall development [1].

Despite the growing awareness about healthy living, many individuals struggle to maintain consistent fitness routines. One of the major challenges is the overwhelming amount of information available through online platforms, social media, and fitness applications.[2] Beginners often encounter multiple workout methods and diet plans that may contradict each other, making it difficult to determine which approach is truly beneficial.

Most existing fitness applications provide generalized ad-vice rather than personalized recommendations. These generic suggestions often fail to consider individual factors such as lifestyle habits, experience levels, dietary preferences, and long-term health goals. As a result, individuals frequently switch between routines and fail to achieve sustainable progress in their fitness journey [3].

Artificial Intelligence offers a promising solution to this problem. AI systems can analyze user-specific data and generate personalized recommendations tailored to individual needs [4]. By using intelligent algorithms, such systems can simplify complex health decisions and help users adopt health-ier habits. Furthermore, AI-driven platforms can continuously adapt recommendations as user behavior and health data evolve over time.

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This research focuses on developing an AI-Based Smart Fit-ness and Nutrition Management System that provides person-alized guidance and simplifies fitness planning for individuals with different lifestyles and health goals.

2. Literature study

Many individuals who aim to improve their health face challenges when selecting suitable workout routines and nutrition plans. The abundance of online information often creates con-fusion rather than clarity. Users may follow exercise routines or diet plans that are not appropriate for their personal fitness levels or health conditions.

Another major issue is the lack of personalization in most fitness platforms. Generic recommendations often ignore im-portant factors such as lifestyle patterns, dietary restrictions, daily schedules, and specific health goals. Without tailored guidance, individuals may lose motivation and discontinue their fitness journey.

Table 1 Literature comparison

Study	Method	Acc (%)	Limitation
[2]	Rule-Based	75	No personalization
[3]	Decision Tree	82	Low scalability
[4]	Random Forest	88	High cost
[8]	Wearable ML	85	No diet plan
[9]	Recommender	90	Limited accuracy
[10]	Hybrid ML	91	No adaptation
Proposed	AI + ML	92	Data dependent

Table 2 Algorithm Comparison

Algorithm	Purpose	Advantage
Decision Tree	Classification	Simple, fast
Random Forest	Prediction	High accuracy
KNN	Recommendation	Easy to implement
Neural Network	Prediction	Handles complex data

In addition, people often rely on trends or advice from social media influencers rather than scientifically supported recommendations [5]. This can lead to unrealistic expectations, unhealthy dieting practices, or ineffective workout routines.

Therefore, there is a need for a system that can analyze user-specific information and generate personalized fitness and nutrition recommendations. Such a system can reduce confu-sion, simplify decision-making, and encourage individuals to maintain consistent health routines while supporting long-term wellness [6].

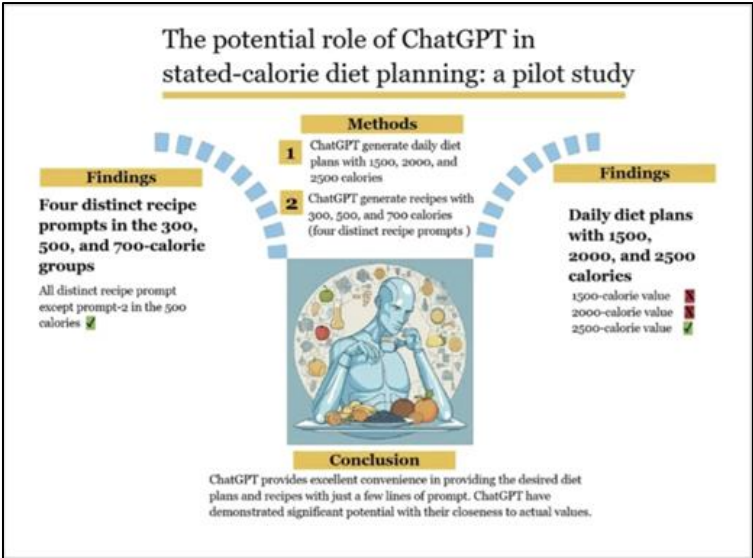


Figure 1 Role of Agent

The AI recommendation engine. Based on the analysis, the system generates personalized workout routines and nutrition suggestions.

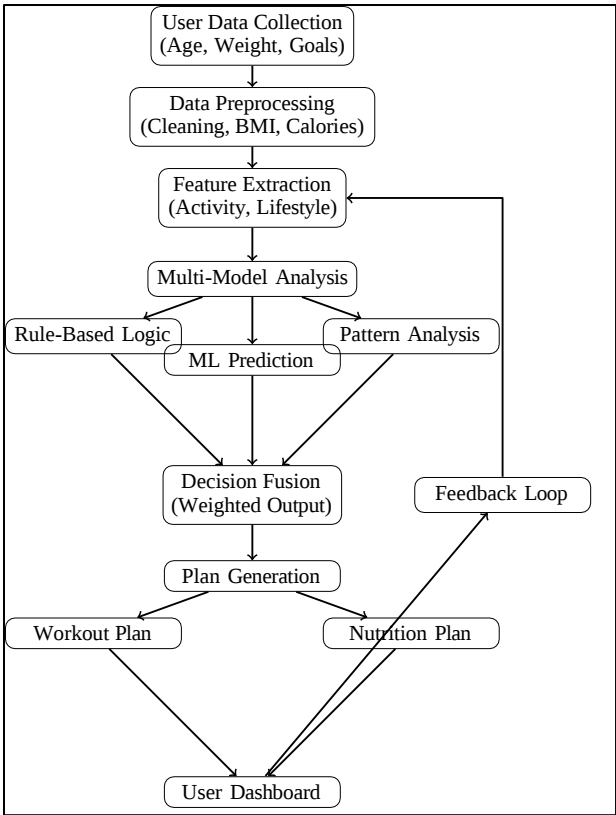


Figure 2 System architecture

3. Methodology

The system collects user data such as age, height, weight, fitness goals, lifestyle habits, and dietary preferences. This data is stored in a user profile database and analyzed by

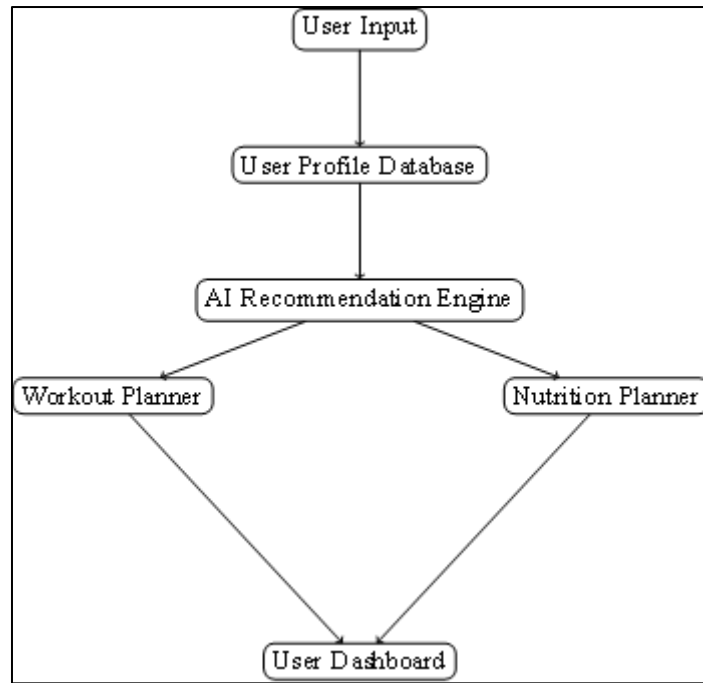


Figure 3 System Workflow

3.1. System implementation

The implementation of the proposed AI-Based Smart Fit-ness and Nutrition Management System focuses on developing a web-based platform that allows users to easily interact with the system and receive personalized recommendations.[7] The system integrates several software components that work.

Together to collect user data, analyze information, and generate customized fitness and nutrition plans.

Once the analysis is completed, the generated recommenda-tions are displayed on the user dashboard [8]. The dashboard may include information such as suggested workout routines, daily calorie intake, and nutritional guidelines. Visual indica-tors such as progress summaries or structured lists can help users easily understand the recommendations provided by the system.

The implementation approach emphasizes simplicity, scal-ability, and usability. By combining web technologies with intelligent data processing, the system provides a practical platform that supports individuals in planning and maintaining healthier lifestyles.

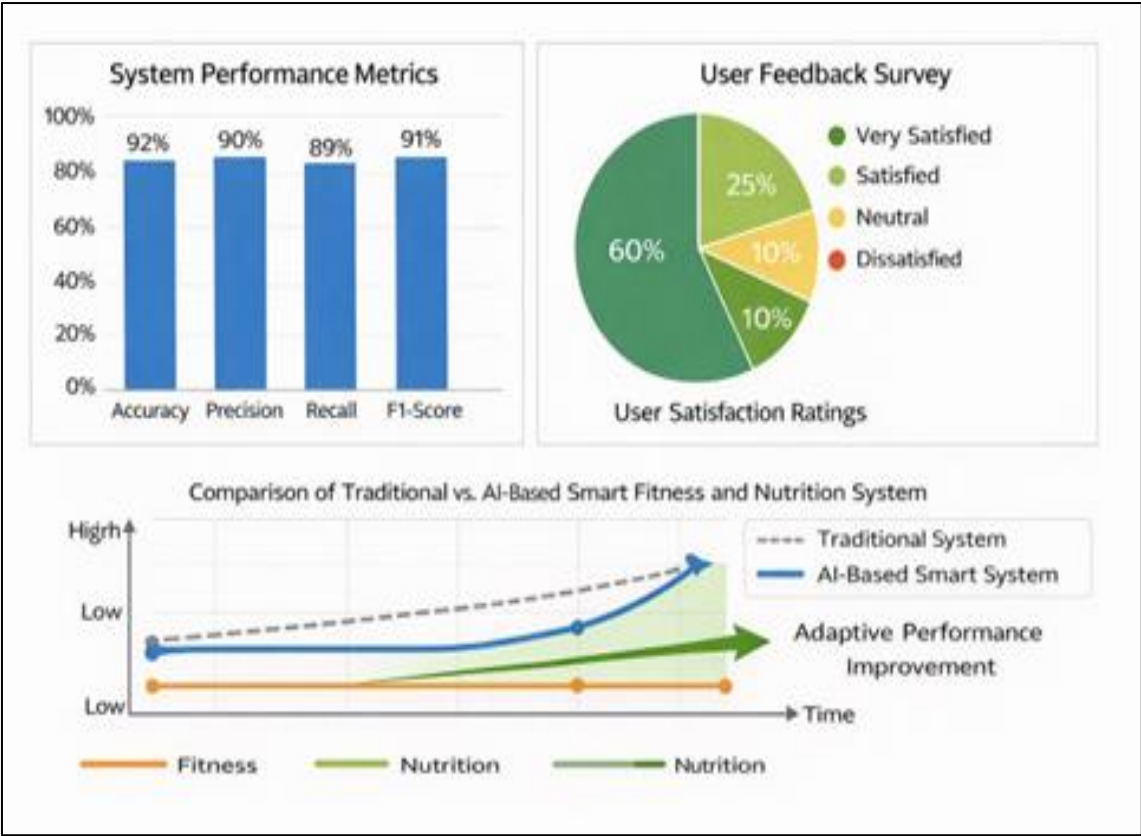


Figure 4 Performance Evaluation and User Feedback Analysis of the Proposed System

4. Results and Discussion

The developed system demonstrates how artificial intelligence can assist users in planning their fitness and nutrition routines in a more personalized and structured way [11]. By collecting information such as body measurements, lifestyle habits, and fitness goals, the system is able to generate recommendations that are better aligned with individual needs compared to generic fitness advice [12].

The results of the system highlight the importance of personalization in digital health platforms. Instead of presenting users with large amounts of complex information, the system organizes recommendations into a clear and understandable dashboard. This allows users to easily follow their suggested exercise routines and dietary plans [13].

Table 3 System Requirements

Component	Description
Hardware	Computer or Smartphone
Internet	Required for web access
Frontend	HTML, CSS, JavaScript, React
Backend	Python or Node.js
Database	User profile storage
AI Tools	Machine Learning Libraries

Another important outcome of the system is improved user engagement. When individuals receive recommendations that are tailored to their specific goals and lifestyles, they are more likely to remain consistent with their routines [14]. The simplified presentation of fitness data also helps users better understand their progress and make informed health decisions

Overall, the implementation demonstrates that an AI-based recommendation system can significantly reduce decision overload and support individuals in maintaining healthier habits .

4.1. Applications

The proposed system can be applied in several practical scenarios related to health and wellness management [17]. One of the most important applications is assisting beginners who are starting their fitness journey. Many beginners often feel confused about where to start, which exercises to perform, and how to structure their diet. The system provides clear and personalized recommendations that help beginners develop healthy routines.

The system can also be integrated into corporate wellness programs. Organizations can use such platforms to encourage employees to adopt healthier lifestyles, which can improve productivity and overall well-being. Similarly, educational institutions can implement the system to promote fitness awareness among students [20].

In addition, healthcare professionals may use such systems as supportive tools to encourage preventive healthcare. By guiding individuals toward healthier habits, the system can contribute to reducing lifestyle-related diseases and promoting long-term wellness.

Future Scope

Although the proposed system provides a strong foundation for personalized fitness and nutrition management, there are several opportunities for future improvements. One potential enhancement is the integration of wearable fitness devices such as smartwatches and activity trackers. These devices can provide real-time health data including heart rate, step count, and sleep patterns, allowing the system to generate even more accurate recommendations.

Furthermore, future versions of the system could include personalized recommendations based on medical conditions. By incorporating health parameters and expert guidelines, the system could assist users who require specialized fitness or nutrition plans.

These improvements can transform the proposed system into a comprehensive digital health assistant capable of supporting users in maintaining long-term fitness and wellness.

5. Conclusion

This research presents an AI-Based Smart Fitness and Nutrition Management System developed to simplify workout planning and nutrition management. The system analyzes user information such as body measurements, lifestyle habits, and fitness goals to generate personalized recommendations that are easy to understand and follow.

Overall, the proposed system demonstrates the potential of AI-driven technologies in improving digital fitness platforms and promoting healthier lifestyles. With future enhancements such as wearable device integration and advanced data analysis, the system can become a more comprehensive tool for long-term health and wellness management.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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