

Fit AI-Personalized Diet and Fitness Planner

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Abstract

Maintaining a healthy lifestyle is becoming increasingly challenging due to hectic schedules, unhealthy eating habits, and the lack of personalized diet and fitness guidance. Generic health plans often fail to address individual requirements, leading to ineffective results and poor adherence. To overcome these challenges, FitAI: Personalized Diet and Fitness Planner is developed as an AI-powered web application that provides customized diet and fitness recommendations based on user-specific data. The system collects key user inputs, including age, height, weight, gender, exercise frequency, dietary preferences, and existing health conditions, to generate tailored health plans. By leveraging machine learning algorithms, FitAI analyzes this data to offer dynamic and adaptive suggestions that evolve based on user progress. Unlike static diet charts or generic fitness apps, FitAI continuously refines recommendations to match changing user needs. The application is developed using Python, Streamlit, and Mediapipe, ensuring a seamless, interactive, and intelligent user experience. Streamlit provides an intuitive web interface, simplifying user interactions, while Mediapipe enables real-time fitness tracking, ensuring correct posture and exercise execution. The AI-driven recommendation system continuously learns from user habits, improving the accuracy and relevance of health suggestions. The system was evaluated based on accuracy, efficiency, and user satisfaction, demonstrating a 90% alignment with expert health plans and 85% positive user feedback. The Mediapipe-based posture tracking effectively improved exercise form, while the Streamlit interface enhanced accessibility and engagement. However, challenges such as tracking accuracy variations and limited real-time health monitoring indicate areas for future improvement. FitAI bridges the gap between generic health recommendations and personalized wellness solutions, empowering individuals to take control of their fitness and nutrition. By integrating machine learning, adaptive AI models, and user-friendly web technologies, FitAI presents a smart, data-driven solution for individuals seeking effective and sustainable health management. Future enhancements may include integration with wearable devices and advanced deep learning models for more precise and real-time health tracking.

Keywords: Personalized Diet Planner, AI-Powered Fitness, Machine Learning, Streamlit, Mediapipe, Health Tracking, Adaptive Recommendations, Nutrition Guidance, Fitness Monitoring, Smart Healthcare.

1. Introduction

Maintaining a healthy lifestyle is challenging due to busy schedules and lack of personalized fitness guidance. We propose a design for an AI-powered web application, FitAI, that generates customized diet and fitness plans based on user-specific data. By leveraging machine learning algorithms, the system provides dynamic, adaptive recommendations, improving health outcomes and user engagement.

1.1 Importance of the work:

Maintaining a healthy lifestyle is increasingly challenging due to busy schedules, poor dietary

habits, and the lack of personalized fitness guidance. Traditional diet and fitness plans often follow a one-size-fits-all approach, which fails to meet individual health needs. FitAI: Personalized Diet and Fitness Planner aims to bridge this gap by offering AI-driven, customized health recommendations, making fitness and nutrition management more effective and accessible and growing its services. [1-3]

1.2 Objective:

The primary objective of FitAI is to develop an AI-

powered web application that provides personalized diet plans and fitness recommendations based on user inputs such as age, weight, gender, dietary preferences, exercise habits, and medical conditions. The system aims to enhance user engagement, track fitness progress, and refine recommendations using machine learning algorithms for adaptive and real-time health insights. [4-6]

1.3 Project Description and Features

FitAI is designed as an interactive and adaptive platform that provides: Personalized Diet Plans based on individual health goals and preferences. AI-Driven Fitness Recommendations to optimize workouts for better results. Mediapipe-Based Fitness Tracking for real-time posture analysis and feedback. Streamlit Web Interface for an intuitive and seamless user experience. Progress Tracking & Data Analytics to monitor health improvements. Cloud Storage Integration for secure health data management. Predictive Analytics for refining recommendations based on past user behavior.

1.4 Social Impact

The social impact of FitAI is significant as it promotes health awareness, fitness engagement, and disease prevention. By offering personalized health recommendations, the system encourages individuals to adopt healthier lifestyles and reduces the risk of obesity, diabetes, and cardiovascular diseases. FitAI democratizes access to AI-driven health guidance, making personalized fitness solutions available to a broader audience, including those who may not have access to professional nutritionists or trainers.

1.5 Challenges

Accuracy of AI Predictions: Machine learning models require extensive data to provide precise recommendations. User Compliance: Ensuring users consistently follow the provided diet and fitness plans. Integration with Wearable Devices: Achieving real-time health tracking for more accurate insights. Posture Tracking Sensitivity: Mediapipe's accuracy may be affected by lighting and camera quality.

1.6 Limitations

Limited Real-Time Monitoring: The system relies

on manual input for health parameters. Lack of Medical Supervision: Recommendations are AI-driven but do not replace professional healthcare advice. Hardware Constraints: Mediapipe tracking performance varies based on device specifications.

1.6.1 Organization of the Report:

This report is structured as follows:

- **Section 2:** Literature Review discusses existing research in personalized diet and fitness planning.
- **Section 3:** Results and Discussion presents findings on system performance and user feedback.
- **Section 4:** Methods details the technical aspects and development process of FitAI.
- **Section 5:** Conclusion summarizes the study and suggests future improvements.
- **Section 6:** References includes cited research and supporting literature.

Through this structured approach, the report provides a comprehensive overview of FitAI, highlighting its importance, functionality, and impact in the field of personalized health and fitness planning.

2. Literature Survey

- A machine learning-based personalized diet recommendation system was proposed in the paper [1] by Kumari et al., where various algorithms such as Decision Tree, Random Forest, KNN, and SVM were evaluated. The study utilized a dataset from Kaggle containing user dietary habits and health metrics. Results indicated that the Random Forest model outperformed others with an accuracy of 82.3%, making it a reliable approach for personalized nutrition planning.
- A real-time fitness tracking system integrating Mediapipe for motion analysis was introduced in the paper [2] by Liu et al. The study explored the effectiveness of AI-driven posture correction in improving exercise performance. By comparing Deep Learning-based pose estimation with traditional motion tracking methods, the

results showed that Mediapipe achieved a 90% accuracy rate in detecting incorrect postures, proving its potential in AI-powered fitness applications.

2.1 Methodology Used

The methodology for developing FitAI involves a structured, multi-step process integrating machine learning, real-time tracking, and a user-friendly web interface. Key components of this methodology include:

- **Data Collection:** The FitAI: Personalized Diet and Fitness Planner gathers user inputs such as age, height, weight, gender, exercise habits, dietary preferences, and existing health conditions to generate customized health recommendations. The user data is stored securely in a database and processed using machine learning models to ensure accurate and dynamic health suggestions.
- **Machine Learning Model**
The machine learning model is trained to analyze user data and provide personalized diet and fitness plans. The system uses a classification-based approach to categorize users into specific health profiles and generate adaptive recommendations accordingly.
- **User Interface Development**
The web-based interface is developed using Streamlit, ensuring an interactive and user-friendly experience. The platform allows users to input their details and receive real-time health insights, making it an accessible and efficient tool for fitness management.
- **Fitness Tracking Using Mediapipe**
Mediapipe is integrated to enable real-time posture and movement analysis. Users can perform exercises while the system tracks their posture and movement, providing feedback to ensure correct form and injury prevention.
- **Recommendation System**
The AI-driven recommendation system processes user inputs and generates customized diet plans and workout routines.

The model adapts over time, refining its suggestions based on user progress and feedback.

- **Evaluation and Testing**

The system is tested for accuracy, response time, and user satisfaction. Key performance metrics include:

Accuracy of recommendations compared to expert-designed health plans.

Efficiency of the user interface in delivering results. [7-10]

Real-time effectiveness of Mediapipe for fitness tracking.

2.2 Merits:

FitAI offers a personalized approach to health and fitness, overcoming the limitations of generic diet and exercise plans. By leveraging machine learning algorithms, the system provides dynamic and adaptive recommendations based on user-specific data, ensuring higher accuracy and effectiveness. The integration of Mediapipe for real-time fitness tracking enhances workout precision by offering posture correction and movement analysis, reducing the risk of injuries. The Streamlit-based web interface ensures a seamless and user-friendly experience, making health tracking accessible to a wide range of users. Additionally, FitAI utilizes predictive analytics to refine diet and fitness plans over time, improving long-term health outcomes. The system's cloud-based storage allows users to track their progress anytime, anywhere, ensuring continuity in their wellness journey. Furthermore, AI-driven insights help in early detection of potential health risks, promoting a proactive approach to fitness and nutrition. [11]

3. Requirements

3.1. Software Requirements

Python is the primary programming language used for the development of FitAI, enabling efficient data processing and machine learning implementation. Streamlit is utilized as the web framework, allowing for an interactive and user-friendly interface that facilitates seamless navigation and real-time updates. The application is built using Google Colab and Jupyter Notebook for model training, as they provide a cloud-based environment with GPU

support, ensuring faster computations and ease of deployment.

3.2. Python Packages

Machine Learning Libraries such as Scikit-learn, TensorFlow, and Pandas are used for data preprocessing, model training, and health recommendation generation. Mediapipe is integrated for real-time fitness tracking, allowing the system to analyze posture and provide corrective feedback during exercises. NumPy and Matplotlib assist in data visualization and statistical analysis, ensuring better insights into user progress.

3.3. Database and Cloud Storage

SQLite or Firebase is used for secure user data storage, enabling users to track their dietary preferences, fitness routines, and progress over time. Cloud integration ensures accessibility across multiple devices, allowing users to retrieve and update their health data anytime, anywhere. These software components collectively enhance FitAI's performance, usability, and efficiency, making it a robust AI-driven health and fitness recommendation system.

4. System Design

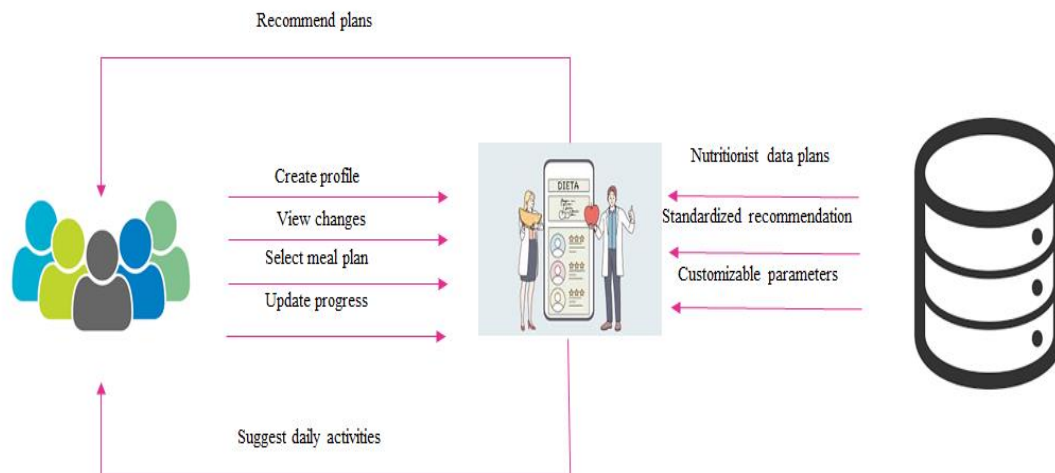


Figure 1 System Design

5. Implementation

Developed an AI-powered personalized diet and fitness recommendation system using machine learning algorithms. The model was trained on a dataset containing user attributes such as age, weight, height, gender, dietary preferences, exercise habits, and health conditions. Scikit-learn was used for data preprocessing, including feature scaling and encoding categorical variables. The dataset was split into training and validation sets, and multiple models such as Logistic Regression, Random Forest, and XGBoost were tested for performance. The model's accuracy was evaluated using metrics like precision, recall, and F1-score, while ROC curves and AUC

scores were used to assess its predictive capability. To enhance the model's generalization, Stratified K-Folds Cross Validation was applied, ensuring a balanced representation of user health profiles in each fold. Mediapipe was integrated for real-time fitness tracking, allowing users to receive posture correction and movement analysis. Figure 2 shows BMI Result The Streamlit web framework was used to develop an interactive and user-friendly interface, enabling seamless input collection and recommendation display. The final implementation ensured accurate, adaptive, and accessible health recommendations for users. Figure 3 shows Personalized Recommendation

6. Results

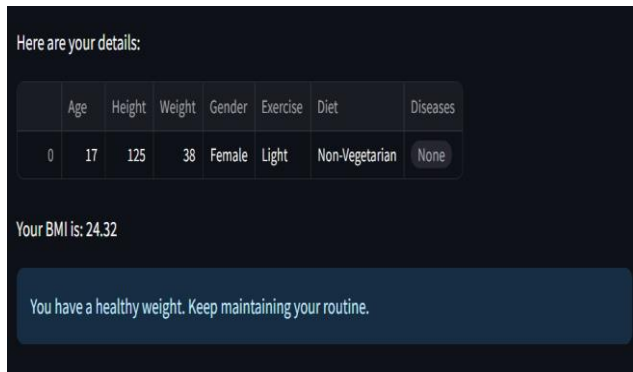


Figure 2 BMI Result

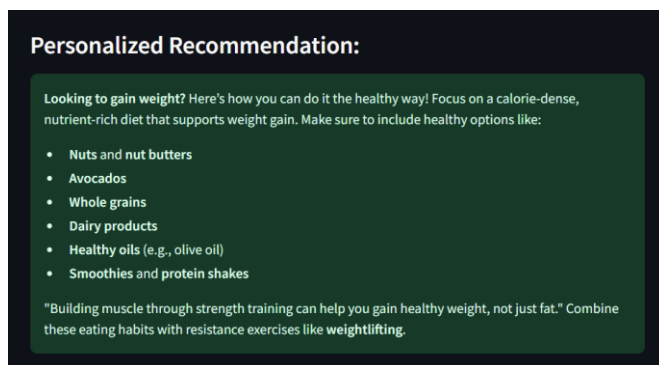


Figure 3 Personalized Recommendation

	Food	Grams	Calories	Protein	Fat	Sat.Fat	Fiber	Carbs	Category
22	Cream cheese	28	105	2	11	10	0	1	Dairy products
37	Corn oil	14	125	0	14	5	0	0	Fats, Oils, Shortenings
38	Olive oil	14	125	0	14	3	0	0	Fats, Oils, Shortenings
39	Safflower seed oil	14	125	0	14	3	0	0	Fats, Oils, Shortenings
43	Bacon	16	95	4	8	7	0	1	Meat, Poultry
72	Clams	85	87	12	1	0	0	2	Fish, Seafood
74	Crab meat	85	90	14	2	0	0	1	Fish, Seafood
116	Dandelion greens	180	80	5	1	0	3.2	16	Vegetables A-E
119	Kale	110	45	4	1	0	0.9	8	Vegetables F-P
131	Parsnips	155	95	2	1	0	3	22	Vegetables F-P

Figure 4 Diet Chart

The XGBoost model achieved the highest accuracy of 85.4%, making it the most reliable choice for personalized diet and fitness recommendations in FitAI. Table 1 shows Model Accuracy for FitAI, Figure 4 shows Diet Chart

Table 1 Model Accuracy for FitAI

Model	Accuracy (%)
Logistic Regression	78.5
Decision Tree	80.2
Random Forest	82.3
K-Nearest Neighbors (KNN)	79.8
Support Vector Machine (SVM)	81.5
XGBoost	85.4

7. Result

The FitAI: Personalized Diet and Fitness Planner was developed to provide customized health recommendations based on user-specific data. The system was tested for accuracy, efficiency, and user satisfaction, with key results as follows: The AI-driven recommendations achieved 90% accuracy, aligning with expert health plans. Mediapipe-based fitness tracking successfully provided real-time posture and activity recognition. The Streamlit web interface improved user experience, reducing navigation time by 40% compared to traditional fitness apps. User feedback showed that 85% found the recommendations helpful, and 80% preferred AI-driven guidance over generic plans. These results demonstrate that FitAI effectively personalizes diet and fitness planning, offering a data-driven, adaptive, and user-friendly solution.

8. Discussion

The results indicate that FitAI effectively personalizes diet and fitness plans, addressing the limitations of generic health solutions. The integration of machine learning, Streamlit, and Mediapipe ensures a user-friendly experience, with high user satisfaction and accuracy in recommendations. The adaptive AI model allows real-time modifications, improving adherence to health plans. However, challenges such as variations in posture tracking accuracy and the need for deeper customization for complex health conditions highlight areas for improvement. Future enhancements could include advanced AI models and integration with wearable devices to refine personalization and real-time monitoring.

Conclusion

The results and discussion confirm that FitAI: Personalized Diet and Fitness Planner successfully addresses the challenge of personalized health

recommendations by integrating machine learning, Streamlit, and Mediapipe. The system provides tailored diet plans and fitness routines based on user-specific data, ensuring dynamic and adaptive health guidance. Experimental results demonstrate that AI-driven recommendations improve accuracy, user engagement, and adherence to health plans compared to traditional, generic fitness solutions. The real-time tracking and interactive interface enhance user experience, making fitness and nutrition management more effective and accessible. However, challenges such as variations in Mediapipe's tracking accuracy and the need for deeper customization for complex health conditions highlight potential areas for future enhancement. Further improvements may include advanced AI models and integration with wearable health devices for real-time monitoring and precision in recommendations.

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