

To Design Fitness and Nutrition Recommendation System Using AI

Yogita More¹, Abhinav Raskar², Rohit Pawar³, Pushpak Ganganmale⁴, Yogesh Rathod⁵

¹Professor, SRCOE, Department of Computer Engineering, Pune, Maharashtra, India.

^{2,3,4,5} Student, SRCOE, Department of Computer Engineering, Pune, Maharashtra, India.

To Cite this Article: Yogita More¹, Abhinav Raskar², Rohit Pawar³, Pushpak Ganganmale⁴, Yogesh Rathod⁵, "To Design Fitness and Nutrition Recommendation System Using AI", Indian Journal of Computer Science and Technology, Volume 05, Issue 02 (May-August 2026), PP: 390-399



Copyright: ©2026 This is an open access journal, and articles are distributed under the terms of the [Creative Commons Attribution License](#); Which Permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abstract The Fitness and Nutrition Recommendation System is an intelligent mobile application designed to deliver personalized health guidance through artificial intelligence and deep learning. The system combines fitness tracking and nutrition management into a single, user friendly platform. It utilizes a Convolutional Neural Network (CNN) model, implemented with TensorFlow Lite, to analyze users' body images and classify their body composition as healthy or overweight. Based on this analysis, along with personal parameters such as BMI, age, and health goals, the app generates customized workout and diet plans tailored to each individual. Beyond personalized recommendations, the system integrates several interactive features such as an AI-powered chatbot, progress tracking, and goal management tools to enhance user engagement. It also includes an e-commerce component for purchasing fitness equipment and nutritional supplements. By performing AI inference locally on the device, the application prioritizes data privacy while maintaining high-speed performance. This project aims to bridge the gap between fitness technology and healthcare analytics, promoting a data-driven approach to health improvement. Although the app relies on user input for accurate results and internet access for updates, it offers a practical, accessible, and efficient way for users to manage their fitness and nutrition goals in an integrated environment.

Key Words: AI, CNN, Fitness, Nutrition, BMI, Mobile Application, TensorFlow Lite

I. INTRODUCTION

The maintaining a healthy lifestyle has become increasingly challenging. With busy schedules and limited access to professional fitness trainers or dietitians, many people struggle to find reliable and personalized guidance for their fitness and nutrition goals. The growing awareness about health, wellness, self-care has led to a surge in mobile applications offering fitness tracking or diet management. However, most of these applications work in isolation, focusing either on workout tracking or meal planning, without considering the user's body composition, personal health data, and specific goals in a unified manner.

The Fitness and Nutrition Recommendation System aims to address this gap by integrating artificial intelligence and deep learning technologies to create a single platform that provides comprehensive health recommendations. The system leverages Convolutional Neural Networks (CNNs) to analyze user images and determine body composition, such as healthy or overweight categories. Based on this analysis, along with other key factors like BMI, age, and user preferences, the application generates customized workout routines and diet plans. Unlike traditional systems that rely solely on static inputs, this project introduces an adaptive, AI-driven model capable of evolving with user progress. It also integrates an AI chatbot for real-time interaction, progress tracking for motivation, and a goal management module for consistent performance monitoring. Additionally, the application incorporates an e-commerce feature to offer relevant fitness equipment and nutritional supplements, making it a one-stop platform for health and wellness.

This project not only highlights the potential of AI in healthcare analytics but also emphasizes privacy and efficiency by deploying TensorFlow Lite for on-device inference. Overall, the system represents a step forward in creating accessible, personalized, and intelligent solutions for improving human health and well-being through technology.

II. PROBLEM STATEMENT

To Design Fitness and Nutrition Recommendation System Using AI.

III. OBJECTIVES

- To create a user-friendly mobile app with secure login and profile management.
- To analyze body composition using CNN and health metrics like BMI.
- To generate customized workout and nutrition recommendations.
- To integrate an AI chatbot and goal-tracking features for user engagement.
- To include e-commerce support for fitness products and ensure data privacy through on-device AI processing.

IV. LITERATURE REVIEW

Zhao et al. (2019) in “A Fitness Landscape Analysis for the No-Wait Flow Shop Scheduling Problem with Factorial Representation” examined the no-wait flow shop scheduling problem (NWFSP), an important optimization model in manufacturing systems. The study analyzed the fitness landscape of factorial representation using makespan as the optimization criterion. By applying encoding and decoding schemes, the authors transformed permutation domains into integer domains for analysis. Their findings revealed the existence of multiple “big valleys” in the fitness landscape, offering valuable insights into optimization behavior and adaptive search strategies. Although focused on scheduling systems, the concept of fitness landscape analysis is relevant to intelligent fitness applications, where adaptive algorithms can optimize personalized exercise planning and performance recommendations.

Luhanga et al. (2018) in “Identifying and Evaluating User Requirements for Smartphone Group Fitness Applications” investigated how social support features influence user engagement in mobile fitness systems. Through a mixed-methods study, the authors identified essential user requirements for group fitness applications and developed a prototype system called *MyFitness Team*. A six-week field study showed that users strongly preferred informational and emotional support features, as these helped maintain motivation and adherence to physical activity goals. The study emphasized the importance of social interaction, group accountability, and motivational support in designing effective smartphone-based fitness applications.

Wang et al. (2020) in the study “Relationship Between Health Status and Physical Fitness of College Students from South China” applied data mining techniques to examine the relationship between physical fitness indicators and health conditions among college students. Data collected from fitness tests and medical examinations of 214 students were analyzed using a machine learning model with a novel loss function to address soft labels. The results demonstrated strong correlations between physical fitness measures and overall health status, showing that data-driven approaches can effectively support personalized health monitoring, fitness assessment, and early risk detection in intelligent fitness systems.

Gong et al. (2009) in “Surrogate Models Based on Individuals Interval Fitness in Interactive Genetic Algorithms” proposed an interactive genetic algorithm enhanced by surrogate models using individual interval fitness. The study employed two radial basis function (RBF) neural networks to estimate upper and lower fitness bounds, reducing user evaluation fatigue during optimization. These surrogate models were updated continuously throughout the evolutionary process, improving both efficiency and prediction accuracy. This work is significant in the context of AI-based fitness systems, as surrogate modeling can reduce computational cost while enhancing adaptive recommendation and optimization performance.

Turney (2020) in “Symbiosis Promotes Fitness Improvements in the Game of Life” explored the role of cooperative and symbiotic interactions in improving adaptive performance within computational systems. Using the Immigration Game as a simulation platform, the study demonstrated that symbiotic interactions among evolving entities improved population fitness and supported open-ended evolution. The findings suggest that cooperative computational models can improve adaptive complexity and efficiency. In AI-driven fitness systems, this concept can be related to collaborative modules such as recommendation engines, conversational assistants, and predictive analytics working together to improve personalization, user engagement, and system intelligence.

V. SOFTWARE/HARDWARE REQUIREMENTS

Hardware Requirements

- Processor: Intel i5
- Ram: 8GB
- Hard desk: 40 GB min

Software Requirements

- Operating System: Windows 10 / 11
- IDE: Android
- Programming Language: Java + Kotlin

VI. SYSTEM ARCHITECTURE/DATA FLOW DIAGRAM

1. System Architecture

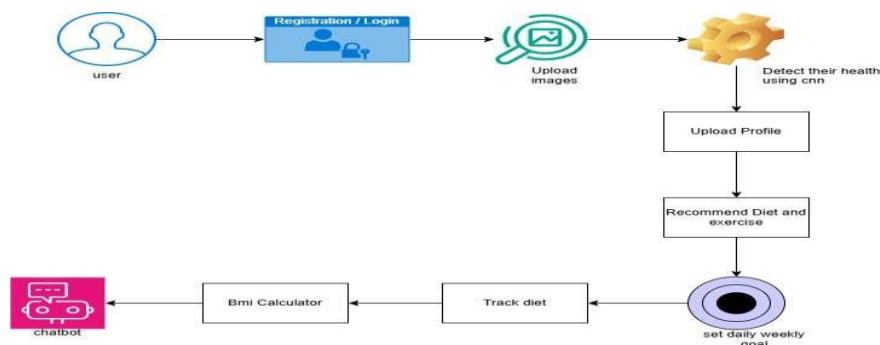


Fig 1: System Architecture

The proposed system architecture represents a smart health and fitness recommendation system that helps users monitor and improve their health. The process begins with user registration and login, followed by uploading images and personal profile details. The uploaded images are analyzed using a CNN model to detect the user’s health condition and fitness status. Based on the analysis and profile information, the system recommends suitable diet plans and exercise routines. Users can also set daily or weekly fitness goals and track their diet and activities regularly. A BMI calculator is included to measure the user’s body fitness level. Additionally, a chatbot provides instant health guidance and answers user queries. Overall, the system integrates AI, health tracking, and personalized recommendations to support a healthy lifestyle.

2. Data Flow Diagram:

In Data Flow Diagram, we Show that flow of data in our system in DFD0 we show that base DFD in which rectangle present input as well as output and circle show our system, In DFD1 we show actual input and actual output of system input of our system is text or image and output is rumor detected like wise in DFD 2 Present operation of user as well as admin.



Fig 2: Data Flow(0) diagram



Fig 3: Data Flow(1) diagram

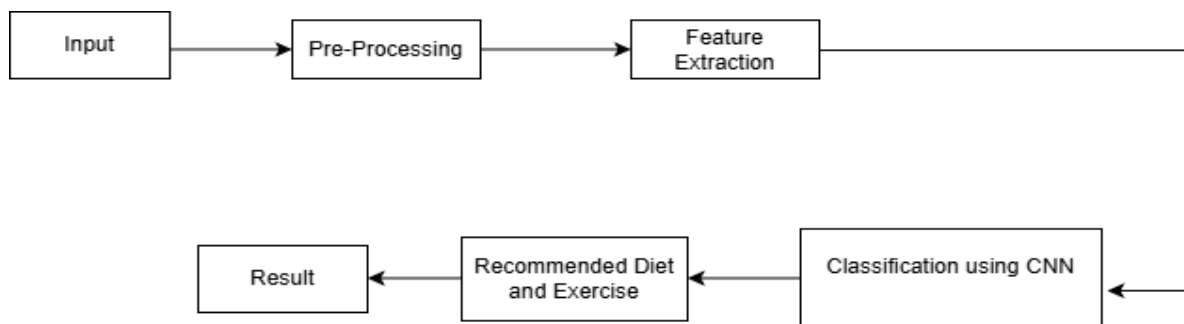


Fig 4: Data Flow(2) diagram

VII.UML DIAGRAM

Unified Modeling Language is a standard language for writing software blue prints. The UML may be used to visualize, specify, construct and document the artifacts of a soft ware intensive system. UML is process independent, although optimally it should be used in process that is use case driven, architecture-centric, iterative, and incremental. It helps in visualizing, specifying, constructing, and documenting software systems. UML is process independent, meaning it can be used with any software development process.

It works best when used in a process that is:

- Use case driven
- Architecture-centric, Iterative Incremental

Types of UML Diagrams

1. Class Diagram

- Represents the structure of a system.
- Shows classes, attributes, methods, and relationships (inheritance, association, etc.).

2. Use Case Diagram

- Describes system functionality from the user’s perspective.
- Shows actors and their interactions with the system.

3. Activity Diagram

- Represents the flow of activities or workflow in a system.
- Useful for modeling business processes or logic flow.

4. Sequence Diagram

- Shows interaction between objects over time.
- Focuses on the order of messages exchanged.

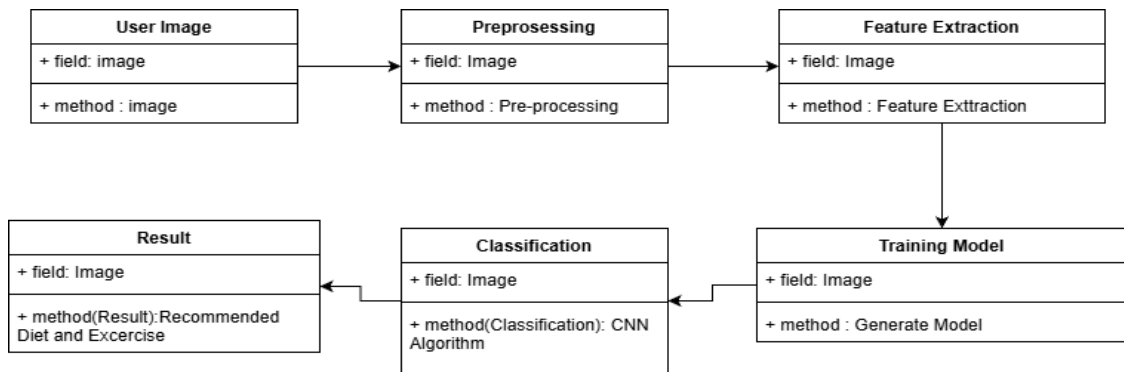


Fig 5 Class Diagram

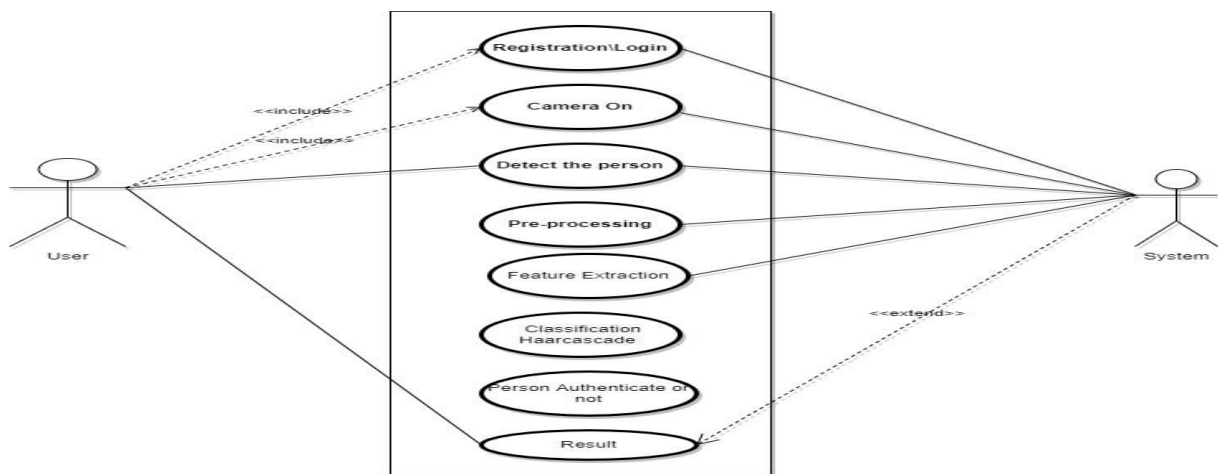


Fig 6: Use case Diagram

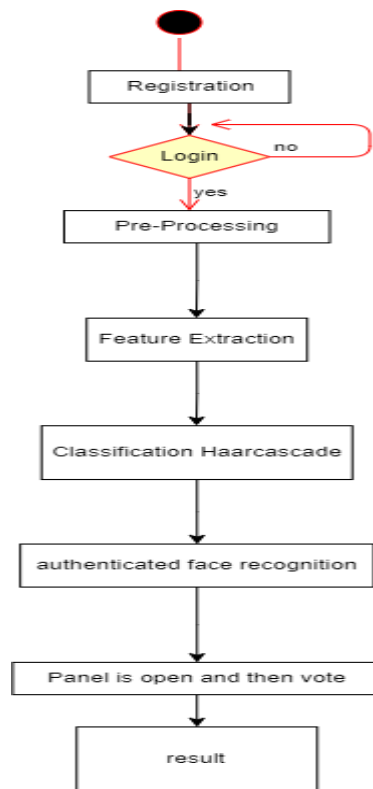


Fig 7: Activity Diagram

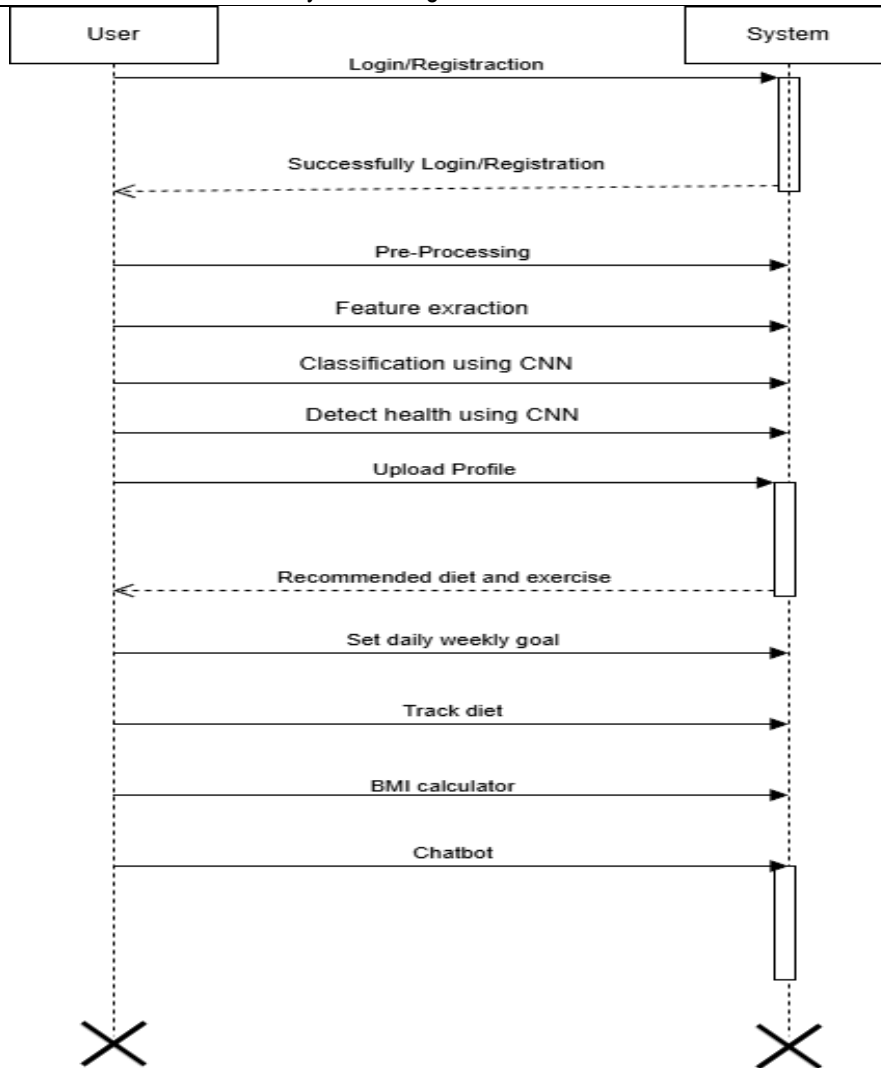


Fig 8: Sequence Diagram

VIII.ENTITY RELATIONSHIP DIAGRAM

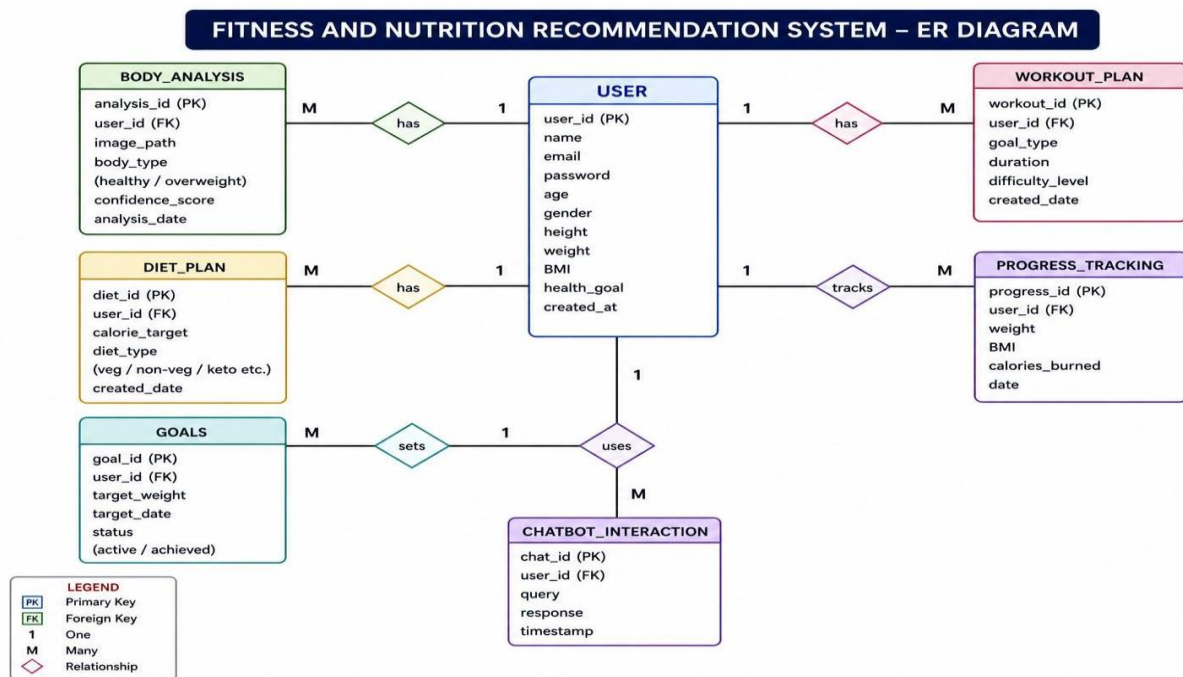


Fig 9: ER Diagram

IX.RESULT

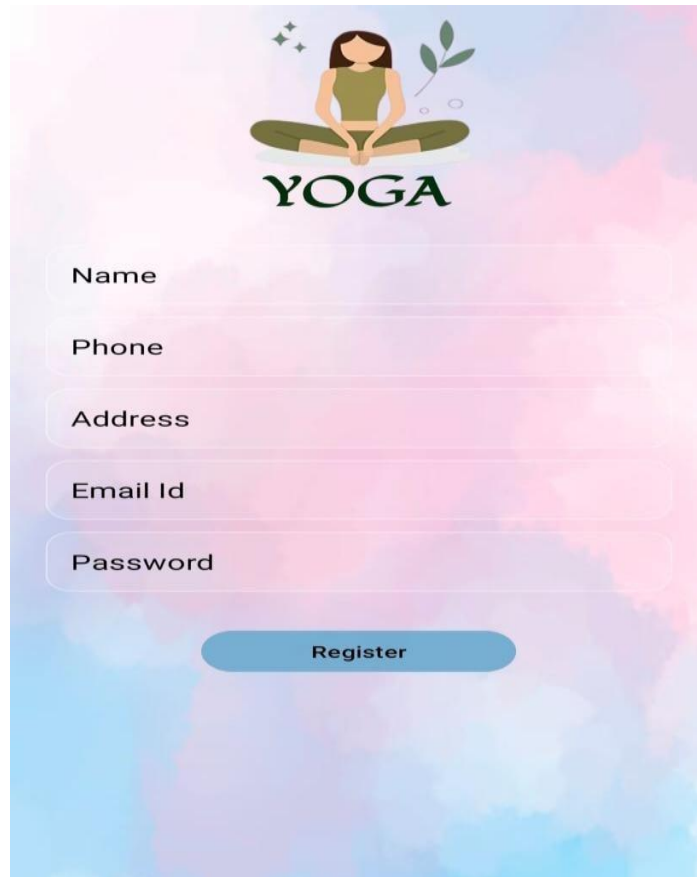


Fig 10: Sign In Page

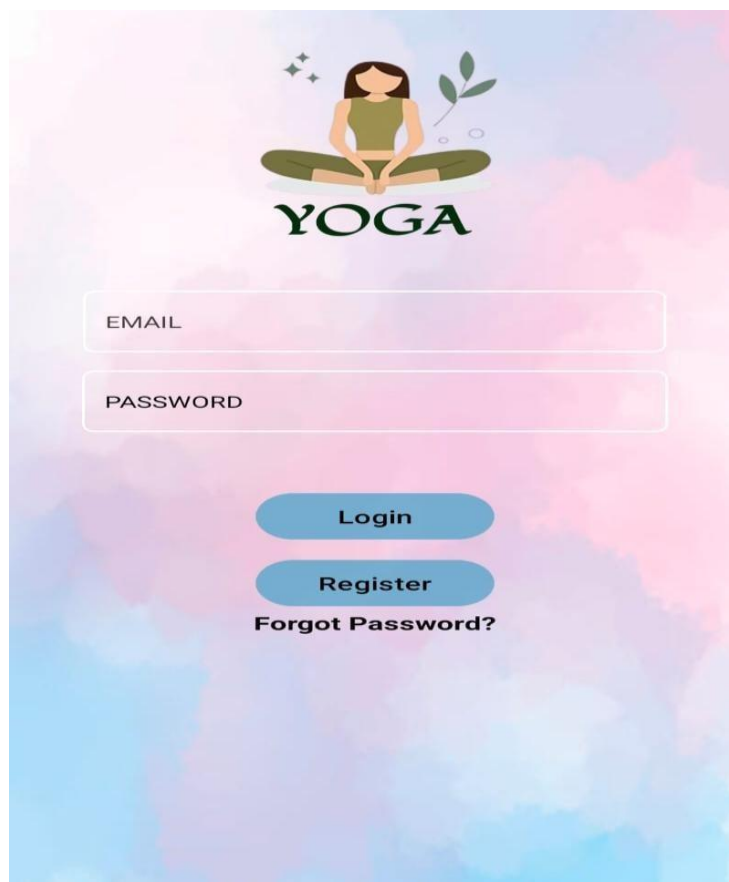


Fig 11: Login Page

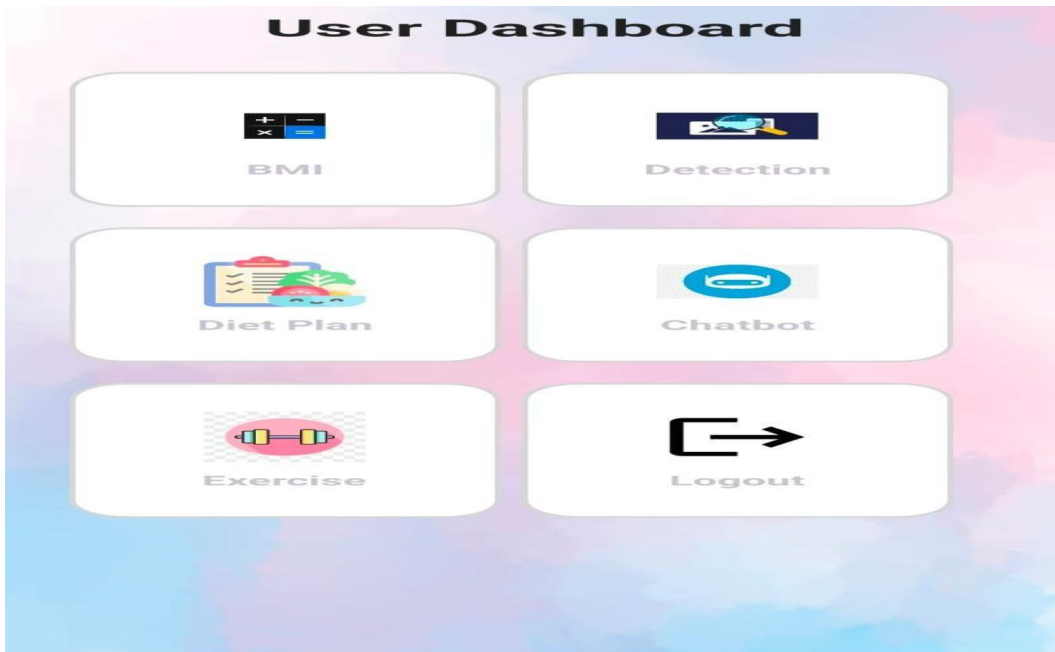


Fig 12: Dashboard

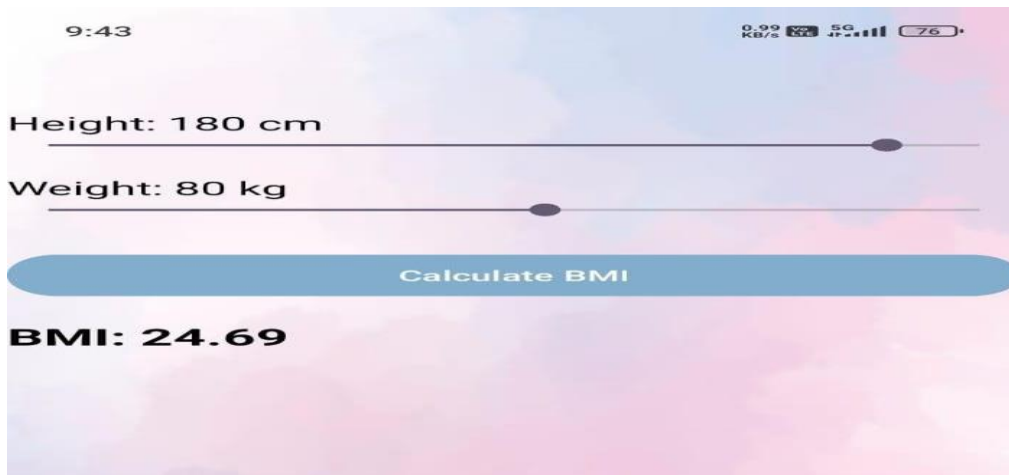


Fig 13: BMI Calculator

Upload Human Images , Object And Other Images Get Wrong Results

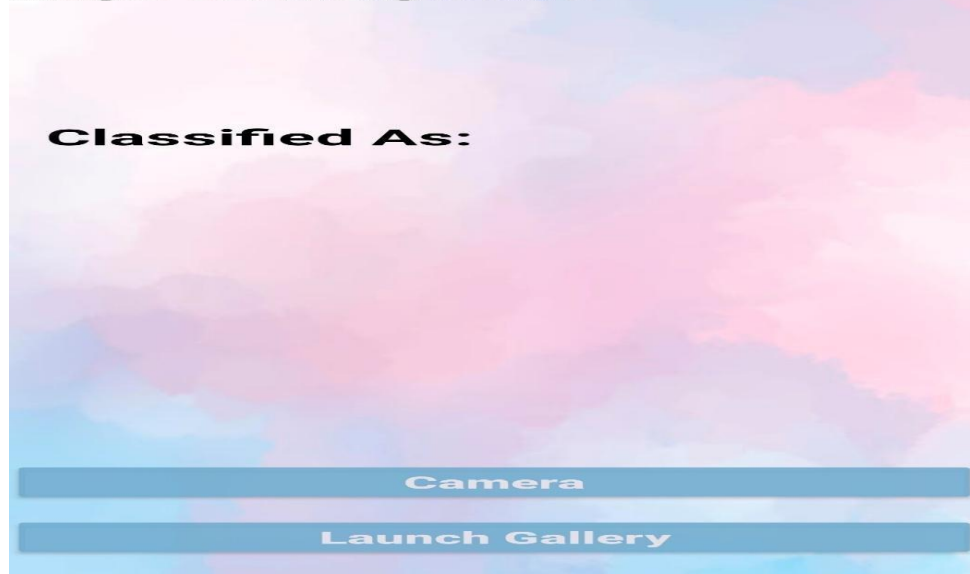


Fig 14: Image Analysis

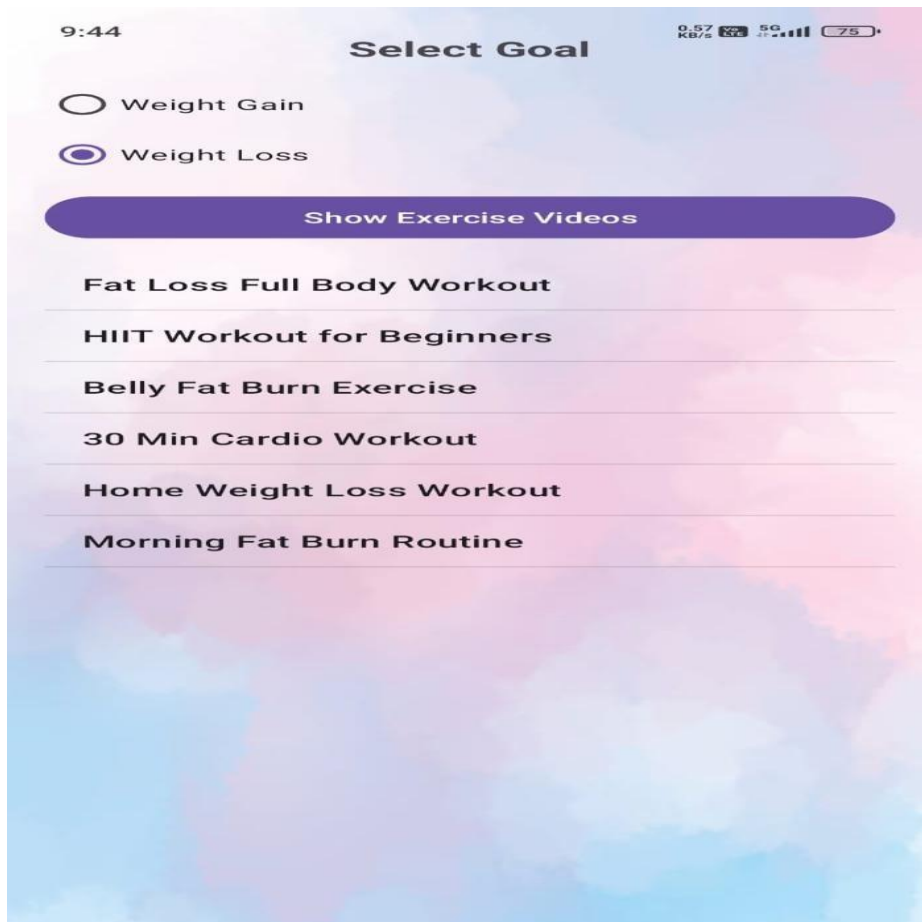


Fig 15: Goal



Fig 16: Diet Plan

X.ADVANTAGES

- Provides personalized fitness and diet recommendations based on user data.
- Uses CNN and AI for accurate body composition analysis.
- Acts as a unified platform for fitness, nutrition, and e-commerce.
- Ensures user privacy with on-device AI processing.
- Tracks user progress and motivates continuous improvement.
- Includes an interactive AI chatbot for instant assistance.
- Lightweight and fast due to TensorFlow Lite implementation.

XI.DISADVANTAGES

- Requires accurate user input for reliable recommendations.
- Needs internet access for updates and data synchronization.
- Limited accuracy if image quality is poor or unclear.
- Not a full substitute for professional medical or fitness advice.
- Initial setup and data collection may take some time.
- Performance may vary on low-end mobile devices.

XII.APPLICATION

- **Personal Fitness Management:** Individuals can use the application to get personalized workout routines and diet plans based on their body composition, BMI, and fitness goals.
- **Healthcare and Preventive Medicine:** The system can assist healthcare professionals in monitoring patients' fitness levels and suggesting preventive measures for lifestyle-related diseases such as obesity and diabetes.
- **Gym and Fitness Centers:** Trainers can use the system to provide customized fitness plans for clients, improving training efficiency and user satisfaction.
- **Corporate Wellness Programs:** Organizations can integrate this system into employee wellness programs to promote a healthy lifestyle and improve productivity.
- **E-learning and Fitness Education:** The application can be used as a learning tool for students and beginners to understand fitness, nutrition, and health management.
- **E-commerce Integration:** The system supports online purchasing of fitness equipment and nutritional supplements, making it a complete health solution platform.
- **Remote Health Monitoring:** With future integration of wearable devices, the system can support real-time health tracking and remote monitoring.

XIII.LIMITATIONS

- The system heavily depends on user-provided inputs such as images and personal data, which may lead to inaccurate recommendations if incorrect data is provided.
- The CNN model is trained on a limited dataset, which may reduce classification accuracy for diverse body types. Image-based analysis may be affected by lighting conditions, camera quality, and pose variations.
- The system currently provides general fitness and diet recommendations and does not replace professional medical or dietician advice.

Internet connectivity is required for updates, chatbot interaction, and synchronization, limiting offline usability. Performance may degrade on low-end mobile devices due to hardware Constraints.

XIV.CONCLUSION

The Fitness and Nutrition Recommendation System successfully integrates artificial intelligence and deep learning to provide personalized health guidance. By using CNN-based body analysis, the system generates customized fitness and nutrition plans that match individual user profiles, promoting a healthier lifestyle. The application offers a unified platform for fitness tracking, diet planning, progress monitoring, and e-commerce, all while ensuring data privacy through on-device AI processing. This project demonstrates how modern technology can enhance daily health management and make personalized fitness accessible to everyone. Although the system has some limitations, such as dependency on user input and internet access, it provides a strong foundation for intelligent and privacy-preserving health applications. Future enhancements, such as wearable integration and real-time health monitoring, can further improve its effectiveness and usability.

XV.FUTURE SCOPE

Integration with wearable devices (smartwatches, fitness bands) for real-time health monitoring. Implementation of real-time tracking for heart rate, calories, and activity levels. Development of a more advanced AI chatbot using NLP and large language models for better interaction. Use of cloud-based analytics and big data to improve recommendation accuracy and scalability. Expansion to include disease-specific diet plans (diabetes, obesity, etc.). Integration of social and community features to improve user motivation and engagement. Continuous improvement of the CNN model using larger and more diverse datasets for higher accuracy.

REFERENCES

1. Gupta, N., & Bansal, R. (2023). Integration of Chatbots in Fitness Applications Using Natural Language Processing. *International Journal of Artificial Intelligence Research*, 11(2), 75–83.
2. Chatterjee, S., & Mishra, P. (2023). AI-Driven Health Monitoring Applications Using Mobile Platforms and Cloud Services. *IEEE Access*, 11, 48516–48528. <https://doi.org/10.1109/ACCESS.2023.3257804>
3. Sharma, V., & Agarwal, S. (2022). Smart Health and Fitness Tracker Using AI and Android Platform. *International Research Journal of Engineering and Technology (IRJET)*, 9(6), 1224–1230.
4. Kumar, A., Singh, P., & Gupta, R. (2022). AI-Based Fitness and Health Monitoring System Using CNN and IoT. *International Journal of Innovative Research in Computer and Communication Engineering*, 10(4), 2456–2463.
5. Zhang, Y., Zhao, Z., Chen, X., & Li, J. (2021). Human Activity Recognition Using Deep Convolutional Neural Networks for Smart Fitness Applications.
6. Singh, R., & Chauhan, A. (2021). Artificial Intelligence in Fitness and Nutrition Management: A Review. *Journal of Emerging Technologies and Innovative Research (JETIR)*, 8(9), 654–661.
7. Neelam LabhadeKumar, Mangala S Biradar, Ashvini Narayan Pawale, "Reinforcement Learning-Based Deep FEFM for Blockchain Consensus Mechanism Optimization with Non-Linear Analysis" *Journal of Computational Analysis and Applications*, Vol. 33 No. 05 (2024)
8. Neelam Labhade-Kumar "Shot Boundary Detection Using Artificial Neural Network", *Advances in Signal and Data Processing. Lecture Notes in Electrical Engineering*, Springer, Vol 703. PP-44-55 Jan-2021
9. Neelam Labhade-Kumar Optimizing Cluster Head Selection in Wireless Sensor Networks Using Mathematical Modeling and Statistical Analysis of The Hybrid Energy-Efficient Distributed (HEED) Algorithm, *Communications on Applied Nonlinear Analysis*, ISSN: 1074-133X Vol 31 No. 6s (2024), PP-602-617 August 2024
10. Neelam Labhade-Kumar "Experimental Design of Electricity Theft Detection and Alert System Using Arduino Assisted Controller and Smart Sensors" 7th International Conference on Inventive Computation Technologies, IEEE Xplore Part Number : CFP24F70-ART ; ISBN : 979-8-3503-5929-9, 2024, PP-1961-1968
11. Dr. Neelam Labhade-Kumar "Novel Management Trends Using IOT in Indian Automotive Spares Manufacturing Industries", *Journal of Pharmaceutical Negative Results*, Vol. 13 ISSUE 09, PP 4887-4899, Nov-2022.
12. Dr. Neelam Labhade-Kumar "Adaptive Hybrid Bird Swarm Optimization Based Efficient Transmission In WSN", *Journal of Pharmaceutical Negative Results*, Vol. 14 ISSUE 02, PP-480-484, Jan-2023,
13. Neelam Labhade-Kumar "Combining Hand-crafted Features and Deep Learning for Automatic Classification of Lung Cancer on CT Scans", *Journal of Artificial Intelligence and Technology*, 2023
14. Neelam Labhade-Kumar "Enhancing Crop Yield Prediction in Precision Agriculture through Sustainable Big Data Analytics and Deep Learning Techniques", *Carpathian Journal of Food Science and Technology*, 2023, Special Issue, 1-18
15. Neelam Labhade-Kumar "Accident prevention and management system in urban VANET for improving slippery roads ride after rain" *Journal of environmental protection and ecology*, ISSN:1311-5065 Issue 2 volume 25, PP 586–599, 2024
16. Prof. Dr. Neelam Labhade-Kumar, An image processing method for kidney stone segmentation in CT scan images based on CNN-regularized extreme learning machine approach, *Hybrid and Advanced Technologies*, PP- 217-222, 202 [16]. Neelam Labhade-Kumar "Accident prevention and management system in urban VANET for improving slippery roads ride after rain" *Journal of environmental protection and ecology*, ISSN:1311-5065 Issue 2 volume 25, PP 586–599, 2024
17. Prof. Dr. Neelam Labhade-Kumar, An image processing method for kidney stone segmentation in CT scan images based on CNN-regularized extreme learning machine approach, *Hybrid and Advanced Technologies*, PP- 217-222, 202.