AI Based Personal Trainer

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Abstract— **Inactivity is one of the main causes of obesity which has affected many people worldwide. Studies show that fitness is an important goal for a healthy lifestyle and has been used as a measurement for health-related quality of life. A fitness trainer can motivate and teach users to do exercise daily and stay fit and healthy. However, to use a fitness trainer might involve a huge cost and sometimes is not suitable for a certain setting. Exercises are very beneficial for personal health, but they can also be ineffective and truly dangerous if performed in an incorrect method by the user. There are lot of mistakes made during a workout when user workout alone without supervision like wrong form which could result fatal for user as they can pull a hamstring or even fall due to it. In our project, we introduce AI Trainer, an application that detects the user's exercise pose and provides personalized, detailed recommendations on how the user can improve their form. Pose Trainer uses the state of the art in pose estimation module known as "Blaze Pose" tool from "Media Pipe" to detect a user's pose, then evaluates the pose of an exercise to provide useful feedback. An AI fitness trainer is a computer application that utilizes the capabilities of Python, OpenCV, and Media Pipe to guide users through physical fitness routines. The application uses computer vision techniques provided by OpenCV to track the user\'s movements and provide feedback on form and technique. Media Pipe is used to process video data and provide real-time analysis. The application also utilizes machine learning algorithms to provide personalized fitness recommendations and progress tracking. The combination of these technologies provides a highly interactive and effective way for users to improve their physical fitness.**

Keywords:- **Deep learning, Classification, Convolutional neural networks, Image segmentation, OpenCV, Artificial Intelligence Adaptive learning methods.**

I. INTRODUCTION

The use of computer vision techniques provided by OpenCV allows the application to track the user's movements, providing feedback on form and technique in real-time. Media Pipe processes the video data, providing fast and efficient analysis to support the application's real-time feedback capabilities. In addition to real-time feedback, the AI fitness trainer utilizes machine learning algorithms to provide personalized fitness recommendations based on the user's abilities and goals. This allows the application to evolve and adapt to the user's needs over time, providing a highly personalized fitness experience. With the capability to track the user's progress, the application enables users to monitor their achievements and determine the extent of their progress towards achieving their fitness objectives. The combination of these technologies provides a unique and highly interactive way for users to improve their physical fitness. The AI fitness trainer offers real-time feedback and guidance that is both accurate and personalized, making it an effective tool for people of all fitness levels. Whether you're a beginner just starting out or an experienced fitness enthusiast looking to take your training to the next level, this application provides the tools you need to achieve your goals. In conclusion, the AI fitness trainer built using Python, OpenCV represents a major step forward in the field of fitness training, offering a highly personalized and interactive experience that is not possible with traditional methods.[1]

II. LITERATURE SURVEY

1. Title: Deep Learning for Exercise Detection and Counting in Health Applications
Authors: Shah, P., Kandhway, K., & Merchant, S.
Abstract: This research explores the use of deep learning techniques, particularly convolutional neural networks (CNNs), for recognizing and counting exercises from video input. Such technology could be integrated into AI personal

trainers to assess exercise form and intensity.

2. Title: A Review on AI Techniques for Predictive Analytics in Sports

Authors: Manoharan, G., & Lopez, D.

Abstract: While not specifically focused on personal training, this review discusses how AI techniques are used in sports analytics, which includes areas related to training and performance improvement. It provides insights into potential applications of AI in personal training.

3.Title: Personalized Exercise Coaching with Wearable Sensors

Authors: Sasaki, H., Sugiura, K., & Hara, T

Abstract: This study delves into the use of wearable sensors and machine learning to provide personalized exercise coaching. It discusses how AI can analyze data from wearables to offer real-time feedback and tailored guidance during workouts.

4.Title: AI in Mobile Health: AI-Based Personalized Workout Recommendation for Home-Based Training

Authors: Teng, X., Zhang, Z., & Luo, X

Abstract: This work explores the application of AI in recommending personalized home-based workouts. It highlights the potential of AI to consider factors like user preferences, fitness levels, and equipment availability to generate effective routines.

III.SYSTEM ARCHITECTURE

¬ Understand User Needs and Goals:

• Conduct user research to understand the target audience, their fitness goals, preferences, and pain points.

• Gather insights on their expectations from an AI-based fitness trainer to tailor the UI to meet their specific needs.

¬ Define Features and Functionalities:

• List down the features and functionalities the AI-based fitness trainer will offer, such as personalized workout plans, diet recommendations, progress tracking, and motivational alerts.

• Prioritize features based on user needs and technical feasibility.

¬ Create User Personas:

• Develop user personas based on the research to understand and empathize with different user segments. This helps in designing a UI that caters to various user profiles.

¬ Wireframing and Prototyping:

• Create wireframes to outline the layout and structure of the UI, ensuring easy navigation and accessibility. • Develop interactive prototypes to visualize how users will interact with the AI trainer, refining the design based on feedback.

¬ Design the Visual Interface:

• Define a cohesive design language, including color schemes, typography, icons, and imagery that align with the fitness brand and resonate with the target audience.

• Ensure a clean, uncluttered layout with a focus on usability and readability.

¬ Integrate AI Interaction Points:

• Design AI interaction points where users can communicate with the AI trainer, whether through voice commands, text input, or predefined options.

¬ Personalization and Adaptability:

• Implement personalization features that allow users to set their fitness goals, dietary preferences, and other relevant parameters to tailor the AI trainer's responses and recommendations.

• Ensure the AI trainer adapts and evolves based on user progress and feedback.

¬ Feedback and Progress Tracking: • Design a section for users to view their progress, receive feedback on their workouts, and track their achievements

• Use visual elements like graphs and charts to represent progress in an easily digestible format.

¬ Motivational Elements:

• Integrate motivational elements such as badges, achievements, encouraging messages, or challenges to keep users engaged and motivated throughout their fitness journey.

¬ Testing and Iteration:

• Conduct usability testing with a diverse group of users to gather feedback on the UI's effectiveness and user satisfaction.

• Iterate the UI based on the feedback received, aiming for continuous improvement and enhancement.

¬ Mobile Responsiveness and Accessibility:

• Ensure the UI is optimized for various devices, including smartphones, tablets, and desktops.

• Prioritize accessibility features to make the platform usable for all users, including those with disabilities.

¬ Launch and Continuous Improvement:
• Launch the AI-based fitness trainer, collect user feedback, and monitor user engagement and satisfaction.
• Continuously analyze data, user behavior, and feedback to make informed design decisions for ongoing improvements and updates.
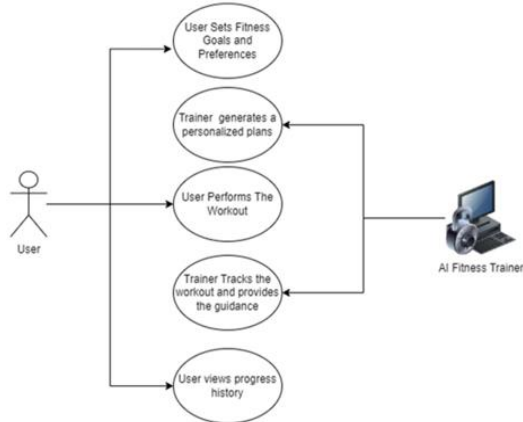

Fig: System Architecture

CONCLUSIONS

AI-based personal trainers represent a transformative development in the field of fitness and wellness. These intelligent systems leverage artificial intelligence and machine learning to provide personalized, accessible, and effective guidance for individuals seeking to improve their health and fitness. They offer a range of features, from customized workouts and nutrition recommendations to progress tracking and motivational support, all tailored to the unique needs and goals of users.

ACKNOWLEDGMENT

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