Semester: VII **Class / Branch:** BE DS

Academic Year: 2024-25

Group No: 15

Guide Name: Prof Anagha Aher & Prof. Ashwini Rahude

Group Members: Riya Sawant, Rutuja Patil, Sneha Sabat, Tanvi Panchal

Title: Data-Driven AI Fitness Trainer

Project Proposal

Abstract:

Fitness trainers often struggle to address individual needs and manage extensive data for precise recommendations. Traditional methods, reliant on manual tracking and generic advice, may fall short of meeting specific user requirements. The AI Fitness Trainer overcomes these challenges by automating and personalizing recommendations, providing tailored advice that aligns with each user's unique fitness profile and goals. Content-based and collaborative filtering (CF) are utilized to deliver highly accurate and personalized recommendations based on user input. The AI trainer incorporates MediaPipe and OpenCV for advanced pose estimation and real-time analysis, while a voice assistant provides instant feedback on posture. Additionally, users can view weekly progress through a detailed dashboard and keep track of performance on a dynamic leaderboard. This comprehensive system ensures a tailored fitness experience, combining precise recommendations, real-time feedback, and progress tracking to enhance user engagement and motivation.

Objectives:

1. To provide real-time feedback on exercise form, gesture, posture, and accuracy percentage, as well as to detect and track exercises performed, calculate calories burned, and address user slacking off during workouts using deep learning-powered human pose estimation, computer vision technologies, convolutional neural networks (CNNs), recurrent neural networks (RNNs), and deep learning behavior detection models.
2. To provide personalized workout routines based on the user's health conditions, age, fitness

goals, height, and weight using collaborative and content-based filtering algorithms in a hybrid recommendation engine.

3. To create a dynamic and customizable diet plan tailored to the user's health conditions, age, preferences, height, weight, and allergies using collaborative and content-based filtering algorithms in a hybrid recommendation engine.
4. To generate comprehensive weekly performance reports by integrating data from workouts and diet recommendations using data aggregation, descriptive statistics, and data visualization techniques, and to enhance user engagement and motivation through a system that allows users to log their progress and participate in leaderboards.

Technology Stack:

1. **Front-end**
    - HTML5
    - CSS3
    - JavaScript
2. **Back-end**
    - Django - 5.0.7
    - SQLite - 3.46.0
    - Flutter - 3.7.1
    - AWS DynamoDB
3. **AI Fitness Trainer**
    - MediaPipe - 0.10.14
    - OpenCV - 4.10.0
    - Tensorflow - 2.16.1
    - FaceNet OpenCV - 0.1.0

- Convolutional neural networks (CNNs)
- Recurrent neural networks (RNNs)

4. **Recommendation Engine**
    - Collaborative Filtering
    - Content-based Filtering
5. **Subscription, Reports and Leaderboard**
    - Machine Learning: TensorFlow - 2.16.1, PyTorch - 2.4, scikit-learn - 1.5.1
    - Data Visualization: D3.js - 7.9.0, Chart.js - 4.4.3, Plotly - 5.23.0
    - Reporting: ReportLab - 4.2.2, jsPDF - 2.5.1
    - Authentication: Auth0 - 4.7.0, Firebase Authentication, or custom JWT-based authentication.
    - Payment Processing: Stripe, PayPal, or Braintree.
    - Database: PostgreSQL (persistent storage), Redis (real-time leaderboard data)

Scope:

The Data-Driven AI Fitness Trainer (AIFT) is designed to cater to a wide range of users, from fitness enthusiasts and beginners to professional athletes and individuals with specific health needs. Its transformative technology revolutionizes the exercise experience by providing refined personalization, adaptive workout plans, and diet plans. By leveraging cutting-edge machine learning algorithms, AIFT analyzes user preferences and fitness goals to deliver tailored workout plans, diet recommendations, and real-time feedback. This makes it beneficial for anyone seeking a customized fitness regime. These features underscore AIFT's commitment to advancing the fitness domain through innovative AI-driven solutions, making it a valuable tool for a diverse audience aiming to achieve their fitness goals efficiently and effectively.