AI-Powered Fitness Routine Planner Based on User Preferences

Proposal

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***Abstract*—This proposal outlines the development of an AI-powered fitness planner that leverages a fine-tuned large language model (LLM) to generate personalized workout routines. The system will be trained on custom fitness data to provide tailored exercise recommendations based on user preferences, fitness levels, and goals. By utilizing the natural language processing capabilities of the LLM, the planner will interpret diverse user inputs and offer dynamic, context-aware workout plans. This approach simplifies the development process by focusing on the adaptability of the LLM rather than complex machine learning architectures. Evaluation metrics will include user satisfaction, adherence to the proposed routines, and progress tracking over time, with data sourced from public fitness repositories to enhance the model's accuracy.**

I. Literature Review

This section reviews relevant studies on the application of AI in fitness development, focusing on their research questions, methods, datasets, accuracy metrics, and contributions to personalized fitness recommendations.

A. Using AI for Fitness Development

Authors: Illia Yermolenko
Research Problem: This research investigates the impact of AI on fitness applications, focusing on user motivation, engagement, and health outcomes.
Methods: The study employs a literature analysis, user surveys, and statistical data processing to identify trends and correlations.
Dataset: User survey data and statistical reports on fitness app usage.
Accuracy Metrics: Common metrics include user engagement rates, retention rates, and user satisfaction scores.
Contributions: It identifies motivational factors and explores AI integration for personalized experiences, addressing data privacy challenges, and optimizing fitness app functionality for healthier lifestyles.

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B. ML Based Smart Workout Recommendation System

Authors: Aditi Palange, Aditya Pawar
Research Problem: This study examines how advanced ML algorithms can provide personalized workout recommendations based on health conditions and preferences.
Methods: The research utilizes ML algorithms (decision trees, random forests, SVM, deep learning), data collection from user input, fitness trackers, and preprocessing techniques.
Dataset: User data from demographics, health history, exercise preferences, and performance metrics.
Accuracy Metrics: Typical metrics may include precision, recall, F1 score, and recommendation accuracy based on feedback.
Contributions: It develops a comprehensive intelligent workout recommendation system, enhancing accuracy with real-time data from wearable technology and addressing gaps in traditional exercise guidance.

C. AI Digital Fitness Trainer and Meal Guide (Trainensor)

Authors: Temitope Adegoke
Research Problem: This paper explores how AI tools like Trainensor can improve body posture and health through personalized fitness and nutrition plans.
Methods: It includes the design of a knowledge base, AI-powered training models, and a personalized dashboard using big data analytics.
Dataset: Survey responses related to fitness routines and diet collected from individuals.
Accuracy Metrics: Data analysis used SPSS for descriptive statistics and regression models.
Contributions: It contributes to AI-powered applications that offer personalized diet and exercise recommendations and real-time feedback for safer home workouts.

D. AI-Based Workout Assistant and Fitness Guide

Authors: Gourangi Taware, Rohit Agarwal, Pratik Dhende, Prathamesh Jondhalekar, Prof. Shailesh Hule
Research Problem: This research examines how AI workout assistants can improve exercise form and provide personalized

feedback for home workouts.
Methods: Implementation of pose estimation, computer vision techniques, and convolutional neural networks (CNNs) for real-time feedback.
Dataset: A dataset of 60,000 images and 25,000 frames for exercise pose detection.
Accuracy Metrics: COCO accuracy metrics (0.665 with single-scale inference and 0.687 with multi-level inference).
Contributions: The study introduces Fitcercise, which provides personalized exercise guidance and highlights AI's effectiveness in improving fitness outcomes.

E. Using Artificial Intelligence for Exercise Prescription in Personalized Health Promotion: A Critical Evaluation of OpenAI's GPT-4 Model

Authors: Ismail Dergaa, Helmi Ben Saad, Abdelfatteh El Omri, Jordan M. Glenn, et al.
Research Problem: This study investigates whether OpenAI's GPT-4 can generate effective exercise prescriptions for individuals with diverse health conditions.
Methods: The study generates exercise programs for five hypothetical patient profiles assessed by experts for adherence to exercise principles.
Dataset: Simulated profiles based on age, sex, BMI, health conditions, medications, and fitness goals.
Accuracy Metrics: Expert evaluation based on program adherence to guidelines and customization for health conditions.
Contributions: It demonstrates GPT-4's potential for generating structured exercise programs but emphasizes the need for human expertise and further AI development for individualized prescriptions.

TABLE I
SUMMARIZING TABLE

Paper	Method	Data Set	Evaluation
[1] Using AI for Fitness Development	Literature analysis, user surveys, statistical data processing	User survey data and statistical reports on fitness app usage	Engagement rates, retention rates, user satisfaction scores
[2] ML Based Smart Workout Recommendation System	Decision trees, random forests, SVM, deep learning	User data from demographics, health history, exercise preferences	Precision, recall, F1 score, recommendation accuracy
[3] AI Digital Fitness Trainer and Meal Guide (Trainensor)	AI-powered training models, big data analytics	Survey responses on fitness routines and diet	Descriptive statistics, regression models
[4] AI-Based Workout Assistant and Fitness Guide	Pose estimation, computer vision techniques, CNNs	Dataset of 60,000 images and 25,000 frames for exercise pose detection	COCO accuracy metrics
[5] Using Artificial Intelligence for Exercise Prescription	Generating exercise programs	Simulated profiles based on age, sex, BMI, health conditions	Expert evaluation based on adherence to guidelines

II. DATA SET

This project will make use of several publicly available datasets from Kaggle, which provide a diverse range of fitness-related data. These datasets contain detailed information on exercises, user fitness metrics, and workout routines, making them ideal for training machine learning models that can generate personalized fitness plans.

- **Gym Exercises Dataset** (Ambarish Deb): This dataset consists of a comprehensive list of gym exercises with various attributes such as exercise type, difficulty level, and target muscle groups.
- **Exercise and Fitness Metrics Dataset** (Aakash Joshi): Contains fitness metrics like calories burned, exercise duration, and repetitions for different exercises, including personal attributes such as age and weight.
- **Ultimate Gym Exercises Dataset for All Levels** (Peshimaa Ammuzammil): Provides exercise routines for beginner, intermediate, and advanced levels, categorized by body part and workout type.
- **Gym Exercise Data** (Niharika): Contains user workout records with details on exercise type, intensity, and performance metrics.

These datasets will be used to build a fitness recommendation engine that creates custom workout plans based on the user's profile and preferences.

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