AI VIRTUAL FITNESS COACH(PUSHUP)

INTRODUCTION-

With the growing interest in personal fitness and home workouts, monitoring exercise performance has become crucial for effective training. Traditional methods rely on manual counting or wearable devices, which can be inconvenient or inaccurate. The AI Fitness Virtual Push-Up Coach provides a computer vision-based solution that automatically detects and counts push-ups using a webcam, offering real-time feedback and post-workout performance reports. This tool aims to enhance user engagement, ensure proper form, and track progress over time without the need for specialized hardware

ABTRACT-

The AI Fitness Virtual Push-Up Coach is a Python-based application leveraging computer vision and machine learning to track push-up exercises. Using Mediapipe for pose estimation and OpenCV for real-time video processing, the system detects body posture, identifies repetitions, and calculates the range of motion. Users can visualize their performance live and receive a summary report detailing total reps, average speed, and consistency. This project demonstrates how AI can facilitate accessible, accurate, and interactive fitness monitoring, bridging the gap between professional coaching and home workouts.

TOOLS USED-

- Python: Primary programming language for implementation.
- OpenCV: For real-time video capture, frame processing, and visualization.
- Mediapipe: To detect human body landmarks and calculate joint angles for exercise evaluation.
- NumPy: For mathematical computations and angle calculations.
- Streamlit: To create an interactive, user-friendly web interface for live workouts and performance reporting.
- Optional: Matplotlib or Plotly for generating graphs and performance charts.

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STEPS INVOLVED-

- Define scope: Exercise type, metrics (reps, speed, consistency).
- Set up environment: Install Python, OpenCV, Mediapipe, NumPy, Streamlit.
- Capture video: Access webcam using OpenCV.
- Pose detection: Detect body landmarks with Mediapipe.
- Angle calculation: Compute joint angles (elbow, shoulder) with NumPy.
- Rep counting: Track full push-up cycles based on angles.
- Real-time feedback: Display reps and posture on video feed.
- Post-workout report: Show total reps, average speed, and consistency.
- Interactive interface: Build using Streamlit with Start/Stop buttons.
- Testing & optimization: Ensure accuracy, smooth performance, adjust thresholds.
- Optional enhancements: Add other exercises, voice feedback, or progress tracking.

CONCLUSION-

The AI Fitness Virtual Push-Up Coach demonstrates the potential of integrating AI with fitness routines to provide accurate, real-time feedback without the need for expensive equipment. It encourages correct exercise form, motivates users through instant tracking, and offers insights through detailed post-workout reports. This system can be extended to other exercises, enabling a comprehensive AI-driven home fitness solution.