EXERCISE POSE DETECTOR

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OUTLIINE :

Problem statement

Objective

AI concept /Methodology

Code overview

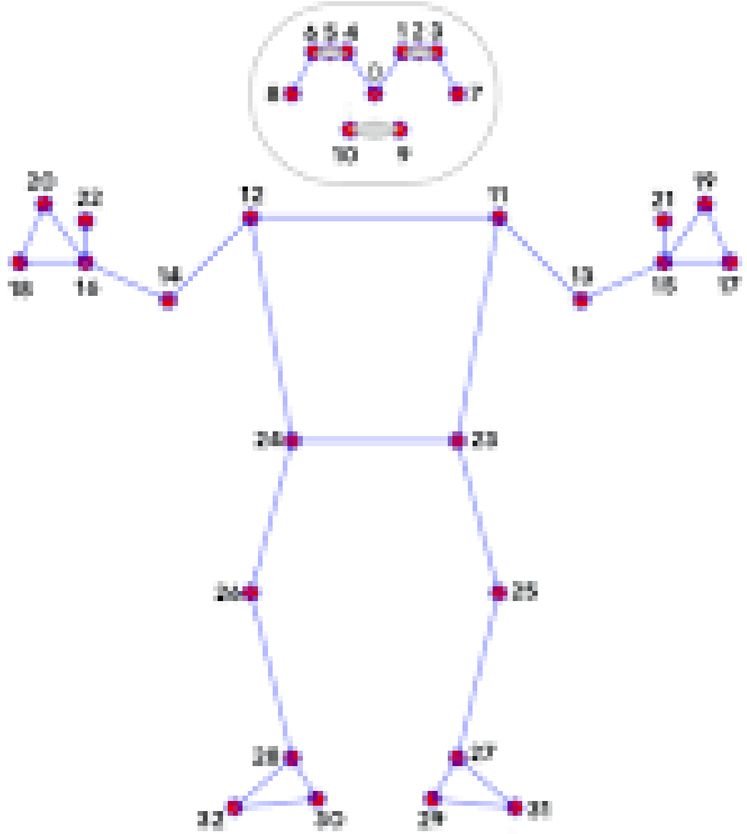
Future Enhancement

PROBLEM STATEMENT:

In traditional methods we are doing exercise with incorrect pose,motion, and couting rep of exercises is also a concern. As the pose woulb be incorrect then it could give problems like muscle pain, exercise form, and many other.

Objective

The primary objective of this project is to develop a real-time pose detection and exercise counting system using computer vision techniques. By leveraging OpenCV an Mediapipe libraries, the project aims to provide an accurate and efficient solution for monitoring and analyzing body movements during exercises.



0. nose
1. left_eye_inner
2. left_eye
3. left_eye_outer
4. right_eye_inner
5. right_eye
6. right_eye_outer
7. left_ear
8. right_ear
9. mouth_left
10. mouth_right
11. left_shoulder
12. right_shoulder
13. left_elbow
14. right_elbow
15. left_wrist
16. right_wrist
17. left_pinky
18. right_pinky
19. left_index
20. right_index
21. left_thumb
22. right_thumb
23. left_hip
24. right_hip
25. left_knee
26. right_knee
27. left_ankle
28. right_ankle
29. left_heel
30. right_heel
31. left_foot_index
32. right_foot_index

AI concept used/Methodology

- expert system : expert system there is a knowledge base where we had given the landmark and the threshold values
- landmark is the deciding the body part and threshold values are for angles of that body parts
- And after knowledge base we have given rules given to our expert system. when the expert system start working it first go through knowledge base and then follows rules accordingly.
- Model Based Reflx Agent : Considers Previous Position in angle calculation
- the Kalman filter shares some similarities, especially in terms of having a model-based approach, interacting with the environment, and influencing actions or decisions based on its estimations.

Code Overview

Biceps :

tracks key points on the user's body and calculates the angle between specific joints. The angle is then used to determine the completion percentage of a bicep curl, updating a visual representation on the screen. The application also keeps track of the total count of curls performed, providing real-time feedback to the user.

Shoulder :

tracks key points on the user's body, calculates the angles between specific joints, and provides visual feedback. The script continuously captures frames, analyzes the shoulder angles, and updates a graphical display with relevant information such as scores, bar graphs.

Squats :

counting squats using a webcam. features a graphical user interface (GUI) built with Tkinter and incorporates pose detection to analyze squat movements. The main components and functionalities include:

1]Squat Counting:

2]FPS Display:

3]allows users to browse a file, open the webcam, and run a test video.

GUI :

features buttons for actions like opening a file, starting the webcam, running a test video, clearing the screen, and exiting the application. The interface includes a graphical display for real-time feedback, presenting information such as knee joint angles, squat repetitions.

Future Enhancements on Raspberry Pi:

1. Portable Power:
    - Objective: Enable on-the-go fitness.
    - Implementation: Integrate a portable power source with Raspberry Pi for outdoor and mobile exercise sessions.
2. Improved Pose Detection:
    - Objective: Enhance accuracy and real-time performance.
    - Implementation: Utilize Raspberry Pi Camera Module for higher image quality and reduced latency in pose detection.
3. Wireless Connectivity:
    - Objective: Expand usability and convenience.
    - Implementation: Integrate wireless connectivity for communication with smartphones or smartwatches.
4. Gesture Recognition:
    - Objective: Introduce intuitive control.
    - Implementation: Explore gesture recognition capabilities using Raspberry Pi's processing power.

Conclusion

1.Our real-time pose detection and exercise counting system using OpenCV and Mediapipe brings a fresh perspective to fitness tracking.

2. By instantly evaluating form, angles, and repetitions, it empowers users to refine their workout routines.

3.Our exercise pose detector and counter project leverages cutting-edge technology to offer real-time, accurate feedback, transforming the fitness landscape.

4.This system addresses limitations of traditional monitoring methods, empowering users with personalized guidance for safer and more effective workouts.

Thank You