Vidyavardhini's College of Engineering & Technology

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Mini Project Report
Yoga Posture Detection and Correction System using Machine Learning
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Abstract

The Yoga Posture Detection and Correction System is a computer vision-based tool that can automatically identify and monitor the positions of the human body when practicing yoga. In real-time, our system accurately recognises and classifies yoga postures, providing practitioners with immediate feedback. It is built on the ML and Deep Learning Media Pipe library. Before being inserted into the model, the photos are skeletonized. The MediaPipe library is used throughout the skeletonization process to detect body keypoints. Its primary objective is to use a system with cameras to record and assess many aspects of human posture, including joint angles, body alignment, and movement patterns. This method allows one to fundamentally change the way yoga is taught and practiced. By providing real-time feedback and instructions, the Yoga Posture Detection System can aid practitioners in correcting their posture, preventing injuries, and enhancing the overall effectiveness of their yoga practice.

Keywords - Mediapipe, Yoga Postures, Deep learning, Skeletonization, React

DETAILED DESCRIPTION

A.   Web-Application :

ReactJs is used to provide an interface for users. The users can access all the features through this user-friendly GUI. In an application built with ReactJS, users can access all the features through the GUI, which typically includes a set of menus, buttons, forms, and other interactive elements. clear labels and instructions to guide users through the various functions and features of the application.

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B.   GUI:

Use of OpenCV Python script is running in the backend. The GUI lets the users turn on the camera to get real time video of the users performing yoga. The application provides real-time feedback on the user's posture and technique, highlighting areas where they can improve their form.It is responsive and compatible with different screen sizes and devices, ensuring that users can access it from anywhere, anytime.

C.   Mediapipe:

An open-source framework developed by Google that provides a platform for building machine learning & computer vision applications. It provides a variety of pre-built models and tools for developers to build applications that require machine learning. MediaPipe provides a set of libraries and tools to apply artificial intelligence & machine learning algorithms in your applications. You can use these solutions into your system immediately, customize as per your needs, and use them across multiple development platforms.It provides us with to detect & track by using various landmarks.

D.   Selecting your yoga pose:

When selecting a yoga pose to practice, it's essential to consider user goals, level of experience, and any physical limitations or health concerns one may have. Different yoga poses can target specific areas of the body and provide various benefits, so it's essential to identify the goals before selecting a pose. If a user is a beginner, it's best to start with simple poses that are easy to perform and don't require a lot of strength or flexibility. As one becomes more experienced, gradually progress to more advanced poses. If a pose feels uncomfortable or causes pain, back off or modify the pose to suit the needs.

E.   Accuracy :

The accuracy of the yoga app detection using AI/ML will depend on several factors, such as the quality of the input video, the complexity of the yoga pose being performed, and the algorithm used for pose detection. MediaPipe's pose detection model is one of its most popular applications, which uses machine learning algorithms to detect human poses in real-time. This model can be used to identify the position of various body parts and joints, including the nose, eyes, ears, shoulders, elbows, wrists, hips, knees, and ankles, and estimate the 3D position of these joints. The pose detection model uses a neural network-based approach, where the model is trained on a large dataset of labeled images and videos to learn the relationship between the 2D and 3D positions of body parts. MediaPipe's pose detection model has been used in various applications, including fitness and wellness apps.

F.   Information about various postures:

It provides users with a comprehensive library of yoga poses along with their instructions and benefits. Here are some features that can be included in this module: Pose images or videos: Providing images or videos of each pose can help users understand how to perform

the posture correctly and improve their form. The app can also use machine learning models such as MediaPipe to provide real-time feedback on the user's form.

G.   Benefits:

   It provides detailed information about each pose, including its benefits, modifications, and step-by-step instructions. This can help users learn new poses and improve their practice. Providing images or videos of each pose can help users understand the correct form and alignment for each posture, which is important for preventing injury and maximizing the benefits of the pose. This can provide motivation and help users set goals for their practice. Providing information on modifications for different levels of experience and safety tips for each pose can help users practice yoga safely and reduce the risk of injury.
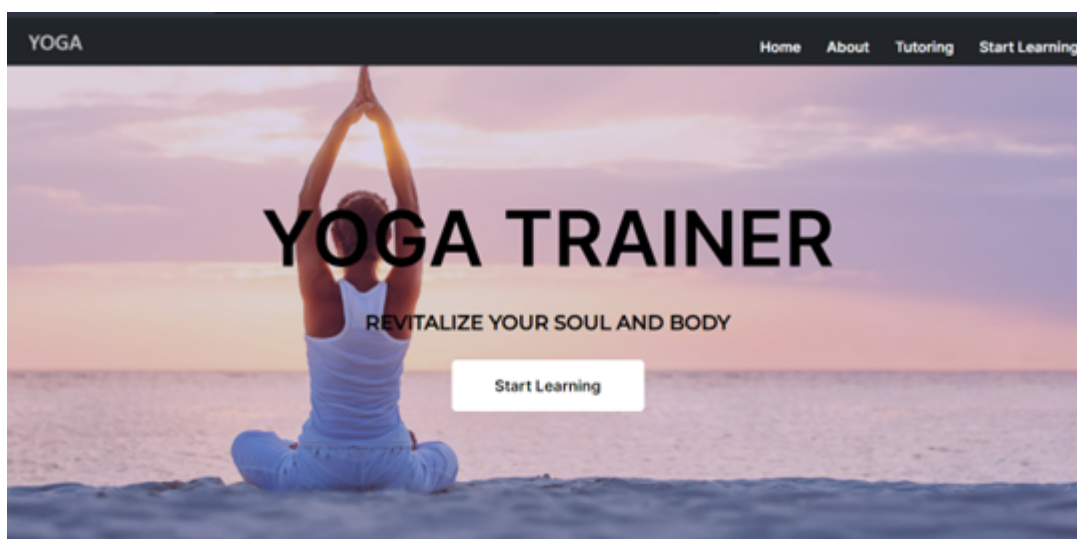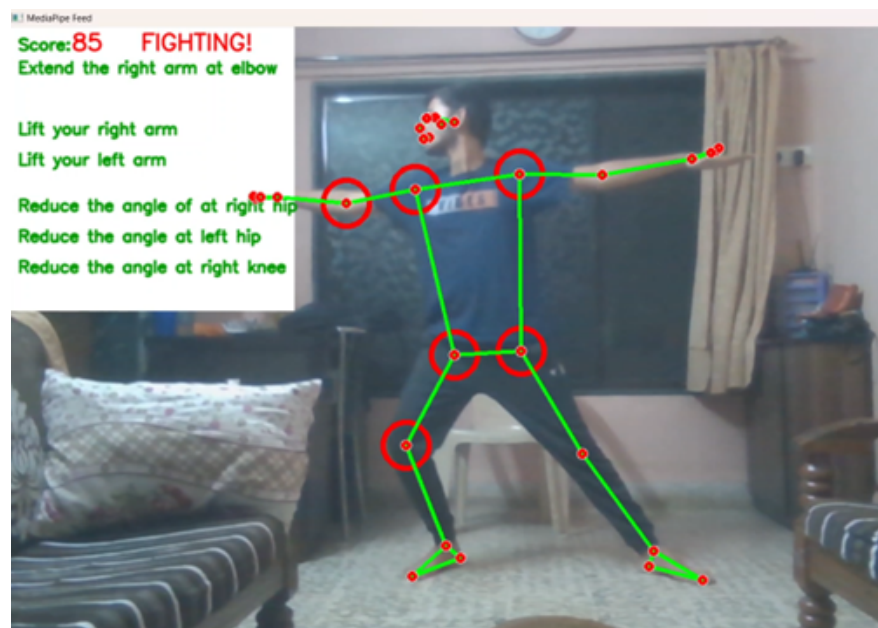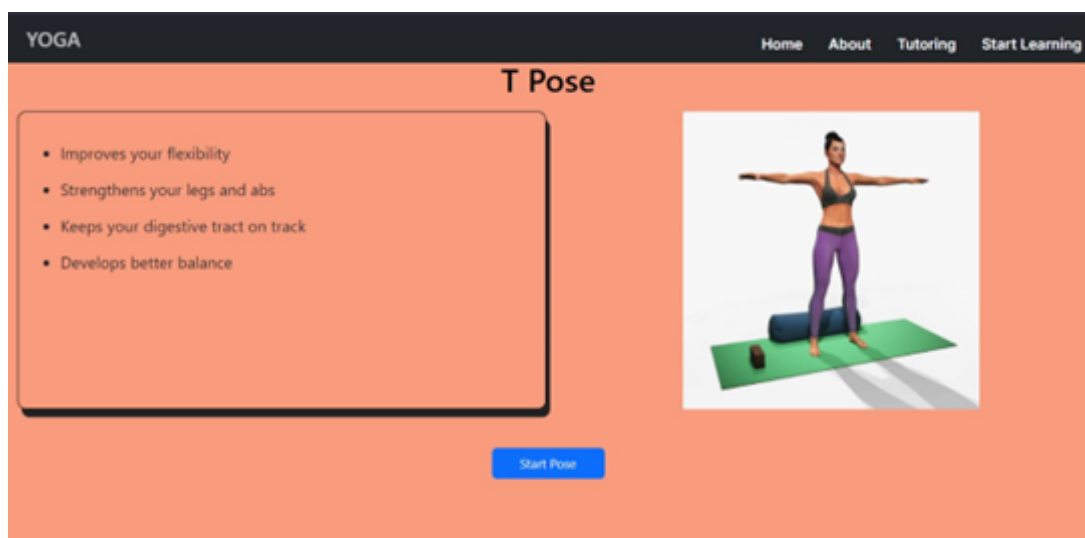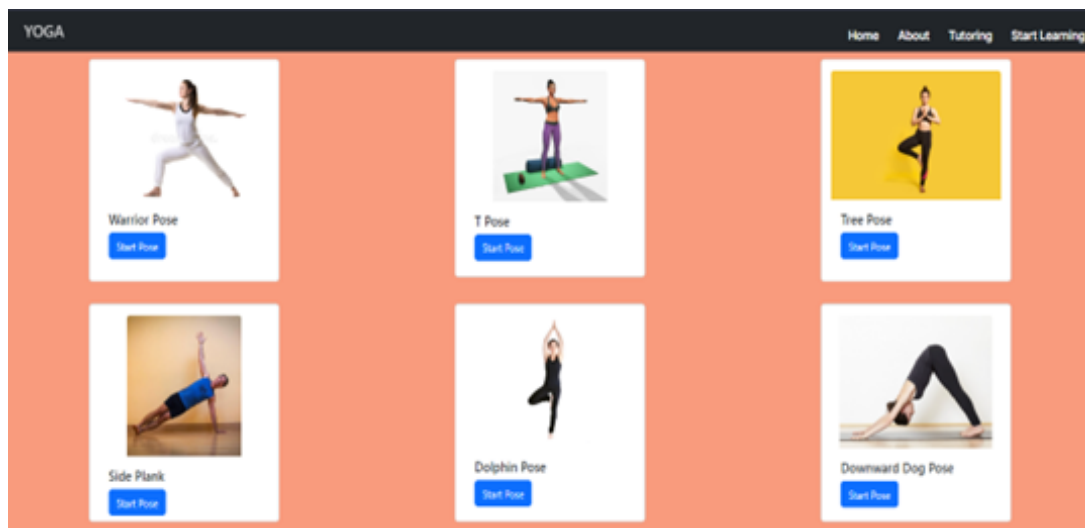
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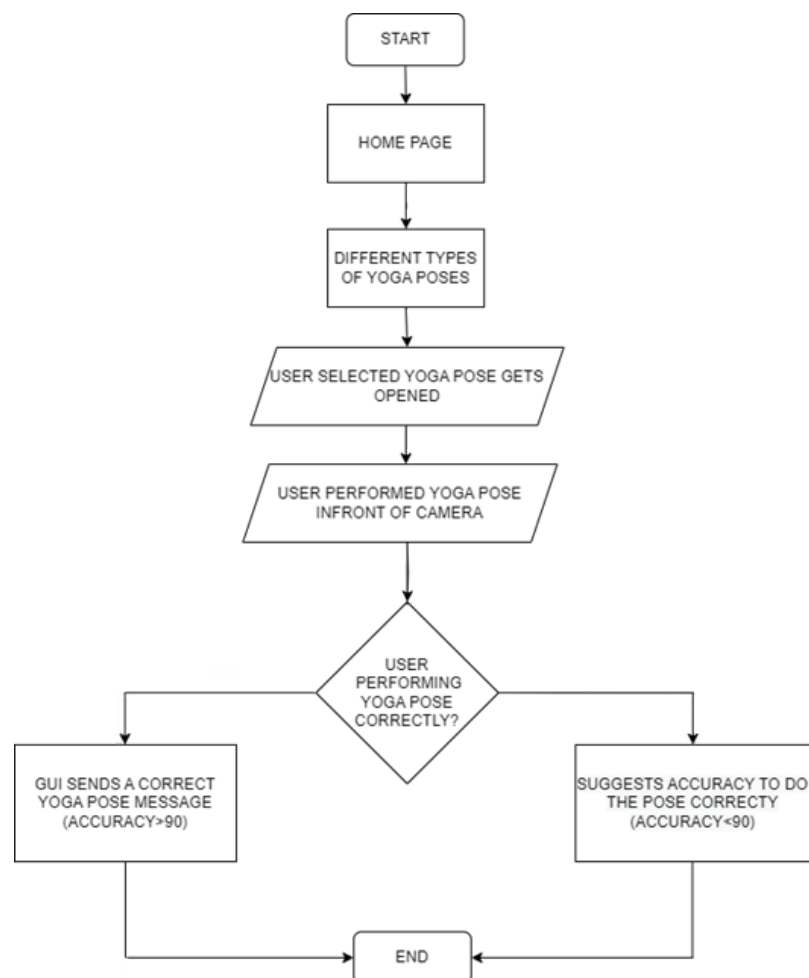
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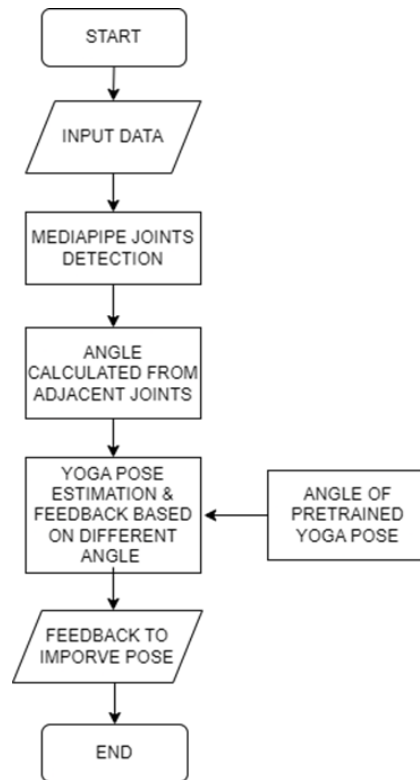
Results

Conclusion

Moreover, a yoga pose detection web app can be a great resource for individuals who may not have access to in-person yoga classes or may prefer to practice in the comfort of their own home. With the app's ability to detect and correct form in real-time, users can feel confident in their practice and progress at their own pace. By utilizing machine learning models such as MediaPipe, the app can provide real-time feedback on users' form and help them improve their practice. The incorporation of machine learning models such as MediaPipe in the app can also be a significant advancement in the field of yoga technology, potentially leading to further developments and innovations in the future. Overall, a yoga pose detection web app can offer a multitude of benefits to users, including improved form, personalized practice options, progress tracking, and a better understanding of yoga. With its ability to enhance the user experience and make yoga more accessible, a yoga pose detection web app can be a valuable tool for individuals looking to improve their physical and mental well-being through the practice of yoga. In conclusion, a yoga pose detection web app can be a useful tool for yoga practitioners of all levels, from beginners to advanced yogis. The app can also include a library of various yoga poses, personalized practice options, progress tracking, social sharing, and customization features to enhance the user experience. Ultimately, a yoga pose detection web app can help users deepen their understanding of yoga and improve their physical and mental health.