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Yoga Pose Detection Using Deep Learning

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Abstract: *India has a long history of being connected to yoga, an age old art form .It aids in promoting physical fitness and at the same time offers mental tranquilly. Yoga is challenging to practice now that Covid-19 has been released. Class and might result in catastrophic injury if undertaken without instruction. We create a system, here that detected the many yoga poses that user have adopted .The system make use of open-source information with six different videos of yoga poses done by 15 different volunteers. First, the goes through two processes to extract the data. The second phase the use of points data from the video dataset using the media pipe pose estimation library. Employing classification-based machine learning to pre-process the acquired data, train the data and test the data algorithms. Logistic regression, support vector machine classifier random forest classifier, k closest neighbors classifier, and naïve Bayes classifier the some of the machine learning algorithms employed. The method scores a 94% accuracy rate and the system is designed to operate on still photos, static movies, and live videos with a threshold value, below which the solution is rejected.*

Key Word: *Logistic Regression, Support Vector Machine, KNN, Random forest, Naïve Bayes, Pose Estimation, Computer Version, Machine Learning, Classification, yoga, health.*

I.INTRODUCTION

Yoga is practice that has its roots in ancient India. It improves one's physical well-being and purifies one's body, mind and spirit. Numerous ailments can be cured by yoga without the need of medications. With the development of Covid-19, people came to understands that health comes first in this world and is currently facing a very challenging scenario due to constant flow of negative news that disturb everyone's mental serenity. Yoga serves as the ideal remedy for this condition. Any system that detected yoga position must estimate human poses.

Pose estimation for people is computer version issue where the camera detects any person's human stance when it gets with a picture of a person in front of it. Key point detection s used to identify human poses, these vital the nose, eyes, mouth, and other main body points are referred to as points. There are two various strategies to spot this crucial details

Top-down technique: The top-down approach starts by identifying bounding boxes that encompass each individual in the frame. The joint location of the person inside the bounding box is then determined for each bounding box. As a result, each bounding box has a set of joints that go along with it.

Bottom-up strategy: This method is the antithesis of the top-down strategy. First, all of the joints that are present in the image are located, and the joints that correspond to each bounding box are then segregated and categorized according to each individual.

Practice and Wellness is one of the reviews that attracted a lot of analysts in this field, Utilization. Yoga, a practice with profound roots that was first practiced in India but is now being celebrated for its many benefits, is one of the different types of activities. Pose estimate from video is crucial for overlaying digital material with real-world data in augmented reality, enabling the recognition of sign language and whole-body gesture control. Different positions are included in pose assessment in fitness applications for yoga, dancing, and fitness treatments.

II.LITERATURE REVIEW

1. Using pose detection as a method of yoga pose assessment for self-learning By K. Z. N. and M. C. Thar In order to aid in the self-mastery of yoga, this research suggests a Yoga position evaluation approach to the use of pose detection. In order to aid in the self-mastery of yoga, this research proposed a Performance Evaluation Method as a Yoga Pose Training System. This essay describes how to find yoga positions and how to use posture discovery to help with introspective yoga practice.
2. Real-time Yoga reputation utilizing profound mastery by A. Singh and S. K. Yadav. An in-intensity hybrid mastery version has suggested using CNN and LSTM to demonstrate yoga in real-time movies. The CNN layer is utilized to extract capabilities from the key aspects of everyone identified in open stance and watched by LSTM to provide transitory predictions. This article suggests a mobile assistant yoga app that is entirely built on human key acquisition models for video conversation.

3. A Mobile Yoga Application Based on Yoga Detection I, Sylvie. The authors demonstrate a mobile app for a yoga assistant based on a personal model where instructors direct and oversee their students' yoga practice via video chat. Yoga in real-time films was identified using an in-depth learning model that included CNN and LSTM.
4. Yoga posture ML Learning in Video Sequences from Josef. The problem is approached by looking at the production version of typical motion patterns from a variety of sources under loose control. We recommend two auto encoders for unencrypted quality so that they can function with the least amount of supervision.
5. Real-Time Detection in a Congested Environment Amman Ladjailia a totally unsupervised dynamic coding strategy based on the online constructability of query signals using learned event dictionaries to find uncommon occurrences in videos.

III.FUTURE SCOPE

Currently, the proposed model groups the top 6 yoga asana. There are a number of yoga asana, thus it can be challenging to develop a position estimation version that could work for all asana. More yoga postures performed by people in both indoor and outdoor settings, as well as poses performed by people in both, could enrich the dataset. The performance of the models depends on the quality of Open Pose posture estimation, which may not work well when there is overlap between people or between frame segments. For this system, a portable self-education tool and real-time forecasting could be used. The repute of the hobby for realistic applications is shown in this painting.

A technique like this might be used to assess a person's reputation in tasks like sports, surveillance, healthcare, etc. Pose estimate for many characters is a brand-new problem with lots of research potential. There are several situations in which single character pose estimation may no longer be sufficient. For example, pose estimation in crowded situations may involve more than one person in order to keep track of and determine the pose of each person. Multi-character pose estimate may be challenging for a variety of reasons, including those already discussed in this study, such as background, illumination, overlapping figures, etc.

IV.METHODOLOGY

Users can learn about the yoga positions the system offers and their advantages by using the user interface. Each yoga posture can be practiced or performed by the users one at a time.

The user receives vocal and written directions on how to adjust their position. The movements of users are recorded using live video feeds from webcams. Yoga positions are recognized and adjusted using Post Net. A machine learning model called Post Net gives a system the ability to continuously detect human position.

The user can adjust their location in front of the camera using this technology. The user can adopt the yoga position seen in the image. The user's yoga poses are photographed here. On the video canvas, the main points are highlighted and drawn. In order to determine whether any adjustments are necessary, these key points are utilized to compare the user's stance with the intended yoga pose. The user's pose is deemed ideal if the two poses share a high degree of similarity.

The system will produce advice for the user to alter their pose if their current yoga pose does not match the goal yoga pose's coordinates. The user can fix the error by according to the teacher's directions.

The JavaScript speech synthesis API receives text instructions as input and outputs verbal commands to the user for pose correction. The user has the option to either continue or quit the yoga practice session.

V.PROPOSED SYSTEM

AI-based yoga fitness trackers are often designed to be used with cameras on gadgets that can record angular coordinates and take more pictures when an exercise is being performed. For a tracker based on human posture estimate, the typical approach is as follows: When customers begin using the fitness yoga tracker, the camera begins to record their actions while they are doing out. A human position estimate model is used to convert the collected image and angular data into individual frames. The user's body is detected at critical locations by this model, which creates a virtual "skeleton" in 2D or 3D dimensions. To find faults in the exercise approach, the virtual skeleton is examined using geometry-based principles or other techniques (if any). The user receives an explanation of the mistakes made and suggestions for fixing them.

The suggested system operates on a Lenovo Intel Core i3 CPU, 4 GB RAM, and Windows 10, 64-bit operating system. It is written in Python using the Open CV package. Using a standard camera, the system chooses a dataset of 84 yoga asana sets in a common yoga stance and makes it available to the public. a cutting-edge hybrid strategy based on deep learning classifiers and machine learning classifiers. A support vector machine (SVM) is envisaged in step one. This classifier enhances the performance of ML algorithms through machine learning prediction. The user's desired poses are captured in the second stage by a convolution neural network, which compares the two poses to find similarities. I included libraries like Media pipe, OS, Time, Keyboard, and Array. According to our theory, the coordinates of the various human body parts in the photos can be used to assess whether a position is being executed correctly or not.

VI.CONCLUSION

In this study, a yoga posture classifier that is excellent for photos, static video, and live video of any user was successfully constructed. The construction of the study's setting is the first step, and then open data sources are used to collect data. For human posture estimation, the Media pipe pose estimation library is employed, returning body key points that serve as the building blocks of a new dataset. Then, during data pre-processing, target variables are modified. Following this, data is

normalized to improve the performance of machine learning algorithms, and then feature engineering of features begins with the calculation of various joint angles of the body using the method in figure 6. Finally, after thorough pre-processing, the data is sent to machine learning models.

These models are assessed using test data, and their comparisons are based on accuracy scores. The highest score among all classifiers for the logistic regression classifier is 94%. A threshold value is utilized for categorization, and it is set at 97%, below which the user receives no posture detected as output.

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