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Yoga Posture Coaching System Using Machine Learning

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ABSTRACT—

Yoga is a traditional Indian exercise. It specifies various body postures called asanas, practicing them is beneficial for physical, mental, and spiritual well-being. To support the yoga practitioners, there is a need of an expert yoga asanas recognition system that can automatically analyse practitioner's postures and could provide suitable posture correction instruction. The project introduced a yoga posture coaching system that may help users to prevent bad postures movement in real time the chosen yoga postures. The first stream utilizes a key point detection approach to detect the practitioners pose, followed by the function of bounding boxes across the subject. The model then applies time distributed convolutional neural networks (CNN's) to extract frame-wise postural features. The project will also display the time the exercise has been performed accurately. Finally, the scores of two streams are fused using multiple fusion techniques.

INTRODUCTION

The field of computer vision has a major difficulty in estimating human position. I-t deals with positioning human joints to create a skeletal representation in a picture or video.

It is challenging to automatically identify a person's pose in a photograph since it depends on a variety of factors, including the image's size and resolution, lighting, background clutter, clothing, surroundings, and how people interact with their environment.

Exercise and fitness are two areas where pose estimation has found a lot of interest among academics in this area.

Yoga is a traditional exercise with complex postures that originated in India but is now well-known worldwide for its numerous spiritual, physical, and mental advantages. The issue with yoga is that, like any other workout, it is crucial to perform it correctly because any poor posture can make a session of yoga ineffective and even harmful.

As a result, an instructor is required to oversee the practice and adjust the participant's posture. An artificial intelligence-based application might be used to recognize yoga poses and offer tailored feedback to help users improve their form since not all users have access to the resources for a teacher.

Taking this issue into count we are developing a project which will help people to train in yoga postures at their homes at their own convenient time. This project will take input from the webcam and help the people to perform the positions.

LITERATURE REVIEW

Researches have implemented many deep learning as well machine learning techniques for yoga pose detection and correction. Some systems are high-value and are not user friendly. Doubtfully, all self-learners can be used in the system. .Using Y- system Hua-Tsung Chen proposed Yoga training application [3], which identify different poses of user, with contour-based, skeleton- based features and dominant axes points. This system is successful in improving methods of feature point detection and axis generation. Depth, colour and body tracking can be obtained using Microsoft Kinect device is concluded by many authors [9],[10].In [4], the authors have came up with Microsoft Kinect device and it records real time key points of the human body. Moreover, it is overpriced compared to a regular cell phone camera. The device Microsoft Kinect has security concerns. Hence, it is inappropriate for a yoga pose detection system. As the main motto of authors in this system is to recognize the pose, but it fails in mentoring the user to correct the wrong yoga posture. Convolution Neural Network is another technique for human pose detection. In [5][6] authors used deep learning model of two different algorithms to recognize a yoga pose in which CNN was used to predict the yoga pose, where as to understand a pattern between the change of frames LSTM algorithm is used. In [8] author has implemented multi-person pose estimation. Firstly in top down approach, person detector is applied and for every detected person in the frame pose estimation algorithm is used. The number of detected people inside the image is main factor to calculate the speed of this approach. Furthermore, bottom up, vigorous to the number of people. At initial state, from captured image all key points are detected, then clustered together by human instances. Usually, this kind of approaches are faster than the previous, as it not only finds key points at once but also human pose estimation for each person is not returned.

EXISTING SYSTEM

Yoga is a useful kind of exercise that focuses on physical, mental, and spiritual connections. However, inappropriate yoga poses can lead to health issues such as muscular sprains and soreness. Visiting the gym, attending yoga courses, and getting coached by a personal trainer are neither inexpensive nor accessible to everyone. Another option is self-training, which will provide the steps for performing the prerecorded yoga programme but will not provide feedback. Injuries can occur without sufficient feedback regarding our postures, causing more harm than good.

PROPOSED SYSTEM

In this proposed system, the system is able to identify poses performed by the user and also guide the user visually. This process is required to be completed in real-time in order to be more interactive with the user. This system accepts input in the form of textual dataset. While doing data processing using trained dataset we're employing modules like per-processing, feature extraction, and classification, using different Machine Learning algorithms as Gradient Boosting Classifier, Logistic Regression, Ridge Classifier and Random Forest Classifiers. System accepts the input in the form of textual dataset and then per-processed the dataset in which the system extracts the features in the extraction section. Then in the classification, we utilize our SVM algorithm for classification and prediction based on the geometric features of yoga dataset and then it detects the yoga pose and corrections.

OBJECTIVES

- To design a system that takes a webcam feed as a data input.

- To develop a machine learning model that predicts the posture in the yoga display is performed correctly or not.

- To provide a website that has integrated the trained model and helps users to perform yoga properly.

METHODOLOGY

An overview of proposed system is shown in block diagram below. The picture is captured using a camera, which can be a discrete camera module on a smart phone, which is now widely accessible, or a webcam, which is also a useful technique to capture photos because almost everyone has one of these types of camera input solutions. The system's input component is the camera. A webcam, a mobile camera, or a separate camera module can be used as the camera source. The camera is used to capture images and provide data to the model. An RGB (Red, Green, Blue) camera is suitable with our project. On the screen, a reference square box is displayed, and the user is instructed to stand at a specific distance such that his or her entire body is included inside this square border. During the routine, the built-in camera or a separate camera module is employed to continually collect the picture of the user. After that, the data is delivered to the system (phone or computer) to be processed. After acquiring the picture or visual item, we developed a model using CNN. The suggested system is capable of recognizing a wide range of positions. As a result, we are utilizing data sets to the greatest extent feasible. Pose detection is done using Media Pipe once the user's input is taken. We can create an accurate skeleton orientation of the user using this information. The landmarks on the human body identify the key joints and positions. They are indexed from 0 to 32, indicating that the Media Pipe library outputs a total of 33 landmarks. A list of related key-points in X, Y, and Z Cartesian coordinates is produced by the Media Pipe library. These essential points may be utilized in real time to generate a general assessment of the human body form and orientation in any picture or video stream. The frame rate specified in the Media Pipe library specification is 30 frames per second. This model will be implemented as a web or Android application. To determine the angle between the user's joints, we employed the NumPy library in our system. After that, it's compared to picture data sets.

PROBLEM STATEMENT

To design and develop a Yoga Posture Coaching System Using Machine Learning. The following project proposes the development of a yoga posture coaching system using an android or web based interactive transfer learning technique. It aims to develop an artificial intelligence-based platform that aids individuals in performing Yoga in the proper order and way. There will be no need for internet connectivity, and there will be a range of yoga poses

EXPECTED OUTPUT

The vast range of exploration in machine learning for yoga poster coaching system are the suitable approaches, and types of sources were used to examine the yoga poses and key point detection method was applied.

The training was carried out using a data set that contains frames taken from an open source data set, the dataset given to the system is based on survey conducted on the mostly practiced yoga poses. The testing was performed using the real time video capture by the user. The pose estimation function extracts essential points from a frame. The robust result of the module is in the terms of accuracy and classification.

CONCLUSION

This project presented a yoga posture coaching system based on Machine learning techniques. The first step of this study was to collect the yoga posture dataset using a normal RGB webcam and then to apply data augmentation techniques, and to do a survey and go through previous researches. The Machine learning technique, per-trained on the model. In summary, we are developing a yoga posture coaching system that can predict yoga posture and confirm instruction feedback in real time.

FUTURE ENHANCEMENT

The main Machine Learning module that was created is so adaptable that it can be used with any platforms, such as Web Application, Android Application, IoT devices and so on. When we integrate the module on public platforms there will be an issue of privacy and security of the user data. This data is undoubtfully useful in many areas including medical research, law enforcement and national security, hence the storage of the data and the access of the data should be done efficiently, but security and privacy are very important concerns.

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