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Yoga Guide: Yoga Pose Estimation Using Machine Learning

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Abstract: ***A deep learning model is proposed which uses convolutional neural networks/LR algorithm for yoga pose identification along with a human joints localization model followed by a process for identification of errors in the pose for developing the system. After obtaining all the information about the pose of the user the system gives feedback to improve or correct the posture of the user. we propose an improved algorithm to calculate scores that can be applied to all poses. Our application is evaluated on different Yoga poses under different scenes, and its robustness is guaranteed.***
Keywords: Yoga, OpenPose, Pose Assessment, Machine Learning, Classification

I. INTRODUCTION

Yoga is a holistic practice that encompasses physical postures (asanas), breathing techniques (pranayama), meditation, and ethical guidelines for living a balanced and harmonious life (yamas and niyamas). Many people are drawn to yoga for its physical benefits. Yoga poses can improve flexibility, strength, balance, and posture. Regular practice can help alleviate physical ailments such as back pain, arthritis and joint stiffness.Yoga poses are often used as a means to reduce stress and promote relaxation. The practice encourages deep breathing and mindfulness, which can lower cortisol levels and induce a sense of calm and relaxation.Yoga poses are linked to improved mental clarity and focus. The combination of physical movement and controlled breathing can clear the mind and enhance concentration. Many people struggle with achieving proper alignment and posture in various yoga poses, which can lead to discomfort or even injury. The problem statement could focus on how to improve alignment and posture in specific poses or overall. Some individuals have limited flexibility or range of motion, making it challenging to perform certain yoga poses. The problem statement might involve finding ways to enhance flexibility and increase range of motion to improve yoga practice.

II. RELATED WORK

1) *Yogic Posture Recognition [1]*: In the paper by Arun Kumar Rajendran and Sibi Chakkaravarthy Sethuraman, titled "A Survey on Yogic Posture Recognition," the authors highlight the significance of yoga in personal healthcare. The paper emphasizes the importance of correct body postural alignment during yogic asanas, as incorrect poses can lead to strain in joints and ligaments, causing potential health issues.
2) *Yoga Pose Estimation Using Deep Learning [2]*: Vivek Anand Thoutam and Anugrah Srivastava present "Yoga Pose Estimation and Feedback Generation Using Deep Learning." This paper discusses the use of deep learning techniques for yoga pose estimation and feedback generation. It emphasizes the global attention gained by yoga in modern times due to increased stress levels and provides various methods for learning yoga, including online resources and personal tutors.
3) *Real-time Yoga Recognition[3]*: Santosh Kumar Yadav and Amitojdeep Singh propose an approach for "Real-time Yoga Recognition using Deep Learning." Their work focuses on creating a dataset for six yoga asanas and implementing a hybrid deep learning model using convolutional neural networks (CNN) and long short-term memory (LSTM) for real-time yoga recognition on videos. The model aims to provide accurate temporal predictions for different yoga poses.
4) *Yoga Pose Detection and Correction[4]*: Varsha Bhosale and Pranjal Nandeshwar address the goal of "Yoga Pose Detection and Correction using PoseNet and KNN." Their project utilizes computer vision techniques and the PoseNet algorithm for human pose estimation to detect and correct yoga poses. The system aims to offer real-time visual feedback and instructions to help individuals achieve correct yoga postures.
5) *Human Pose Estimation Using CNN[5]*: Anubhav Singh, Shruti Agarwal, Preeti Nagrath, Anmol Saxena, and Narina Thakur present a paper on "Human Pose Estimation Using Convolutional Neural Networks." The authors propose a model that combines the best settings from different variations for human pose estimation. The model focuses on classification based on RGB images and human body joints coordinates, demonstrating that depth images or additional sensors are not required.

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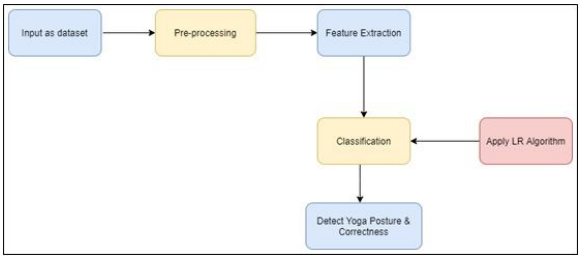
6) *Recognition of Yoga Poses through an Interactive System[6]*: Edwin W. Trejo and Peijiang Yuan discuss an "Interactive System with Kinect Device" for the recognition of yoga poses. The project uses the SURF algorithm to detect yoga asanas performed by users +through a webcam. It compares the user's pose with an expert's video, aiming to detect and correct errors in real-time. The system is designed to enhance users' understanding and performance of yoga poses.

III.METHODOLOGY

In this project, we are going to create a Dataset in .csv format, which is further used for pre-processing and feature selection and extraction. Then we will build and train the model using this dataset. Then, Implementation phase will start. In the implementation phase, user first logs in or registers into the Yoga Guide Application and once the user logs in, home screen appears, where the user can start performing Yoga poses by opening live camera. The system then takes body co-ordinates of the person as input as a .csv dataset and then performs pre-processing on that dataset. After that, Feature Extraction is performed and the dataset becomes ready for classification. Now, the trained model is implemented on this dataset and classification is performed. The accuracy of the pose is calculated and shown to the user.



IV.CONCLUSION

We applied a Machine Learning Algorithm to detect patterns between key points in a single. Using the Model for the memory of previous frames and polling for denoising, the results make the system even more robust by minimizing the error due to false key point detection. Since the frames of a Yoga Images are sequential. In this paper, we proposed a Yoga identification system using a traditional RGB camera. We applied a Machine Learning Algorithm to detect patterns between keypoints in a single frame.

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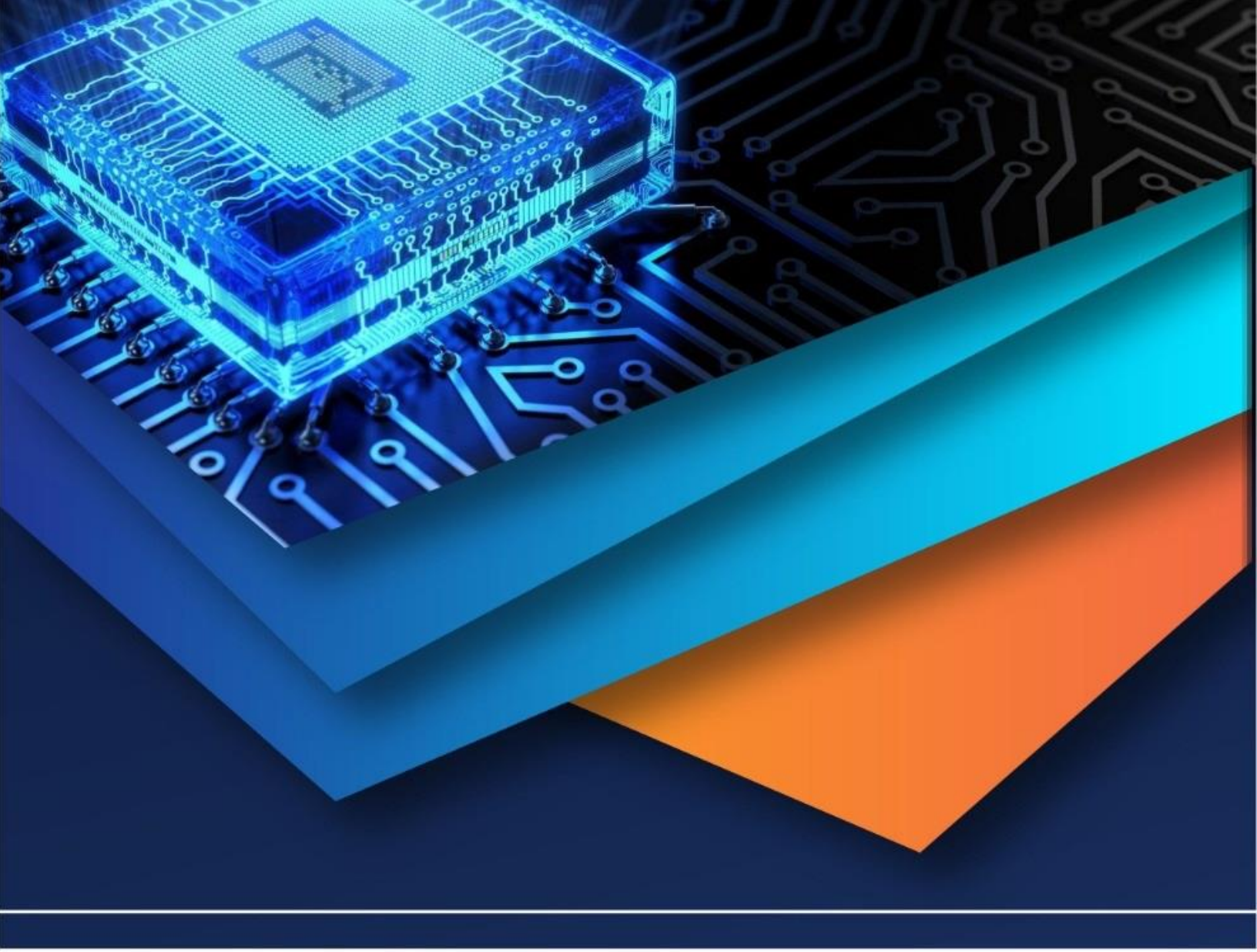

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