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YOGA ASSISTANT: A YOGA POSTURE DETECTION & CORRECTION SYSTEM

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Abstract: In order to study and evaluate yoga postures, this final-year project covers the design, development, and implementation of a Yoga Pose Detection System that combines computer vision and machine learning approaches. By giving practitioners immediate feedback and direction, the method seeks to improve the quality of the yoga practice and help practitioners achieve better alignment, form, and general well-being. The research uses cutting-edge image processing algorithms to identify and extract important body landmarks and information from pictures or videos of people doing yoga positions. Utilizing a trained machine learning model, the system accurately identifies and classifies various positions, offering real-time feedback on alignment, balance, and good posture. Experts seeking guidance from beginners to seasoned practitioners refining their skills can all benefit from the offered solution.

Keywords – Self-learning, Machine Learning, Yoga Pose Detection.

I. INTRODUCTION

Yoga has been increasingly popular in recent years as people look for all-encompassing ways to enhance their general lifestyle, mental health, and physical health. There is a rising interest in using technology to improve yoga practice as it becomes more widely adopted in several fields. The creation of a Yoga Pose Detection system, which analyses and offers feedback on yoga postures using computer vision and machine learning techniques, is one potential direction in this respect. The goal of this senior project is to develop a reliable and precise Yoga Pose Detection system that will help people improve their yoga poses.

The development of a Yoga Pose Detection system aligns with the broader trends in health and wellness technology, offering a novel solution to address the challenges individuals may face in perfecting their yoga postures. The integration of technology into yoga practice not only facilitates self-improvement but also opens up possibilities for remote learning, personalized workout plans, and data-driven insights into one's progress over time. Throughout this project, the focus will be on creating an accessible, user-friendly, and accurate system that can be deployed on various devices, including smartphones and web platforms. Additionally, the ethical considerations of user privacy and data security will be paramount in ensuring the trust and adoption of the proposed Yoga Pose Detection system. As the demand for health and wellness solutions continues to rise, the development of a Yoga Pose Detection system stands at the intersection of traditional practices and modern technology, contributing to the evolution of how individuals engage with and benefit from the ancient art of yoga.

II. MOTIVATION OF THE PROJECT

This Yoga Pose Detection project was inspired by the convergence of two major trends: the growing acceptance of yoga as a comprehensive practice for mental and physical well-being, as well as the growing use of technology to improve wellness and health outcomes. Although yoga has gained popularity across the world for its healing properties, practitioners frequently struggle to master their poses, which can result in less-than-ideal outcomes and increased risk of injury. Using cutting-edge technology to solve these problems is in line with the current need for creative answers in the field of health and wellbeing.

III. OBJECTIVE

Develop a robust and real-time yoga pose recognition system capable of accurately identifying and classifying various yoga postures from images or video footage. The system should be able to recognize poses dynamically as practitioners transition from one posture to another. Implement advanced image processing algorithms and machine learning models to analyse key body landmarks and features, ensuring precise identification and assessment of yoga poses. The system should provide detailed feedback on alignment, angles, and posture correctness to guide practitioners in refining their poses. Design and create a user-friendly interface that allows practitioners to easily interact with the Yoga Pose Detection system. The interface should be intuitive, accessible on multiple devices, and provide real-time feedback in a clear and understandable manner.

IV. SYSTEM DESIGN

Data Flow Diagrams: -In Data Flow Diagram, we Show that flow of data in our system in DFD0 we show that base DFD in which rectangle present input as well as output and circle show our system, In DFD1 we show actual input and actual output of system input of our system is text or image and output is rumour detected likewise in DFD 2 we present operation of user as well as admin.

Fig. Data flow diagram level 0

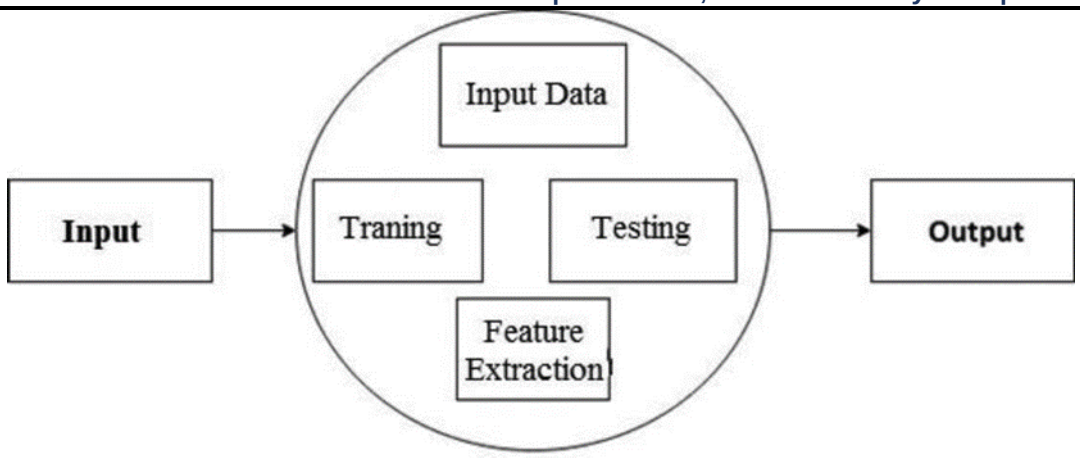

Fig. Data flow diagram level 1

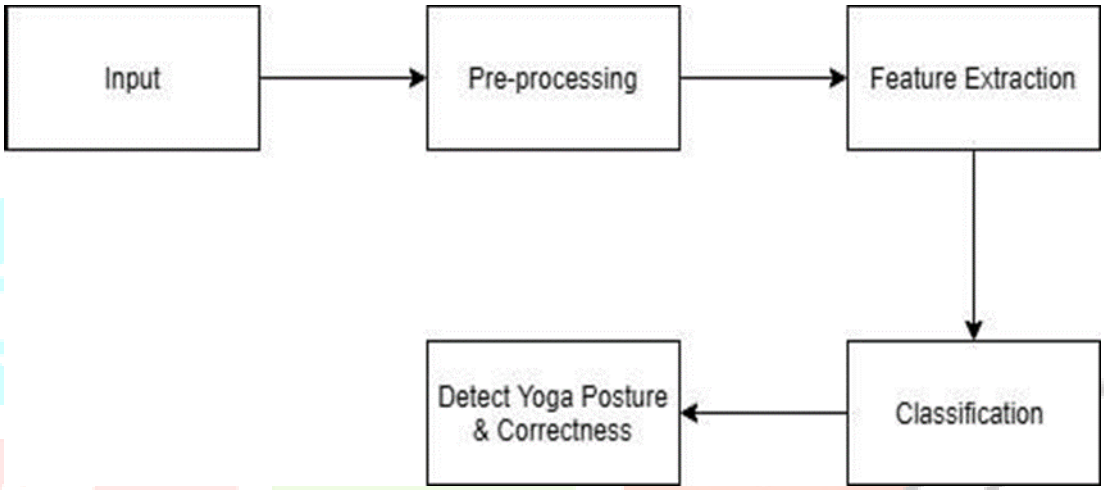

Fig. Data flow diagram level 2

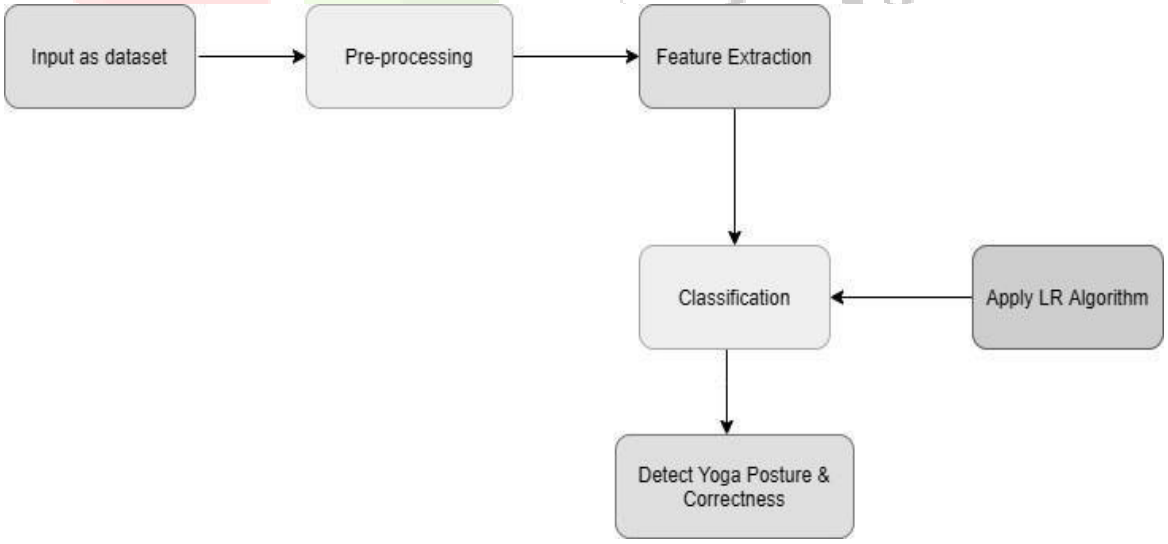

Fig: System Architecture

V. LITERATURE SURVEY

1.Paper Name: Implementation of Machine Learning Technique for Identification of Yoga Poses

Author: Yash Agrawal, Yash Shah, Abhishek Sharma

Description: In recent years, yoga has become part of life for many people across the world. Due to this there is the need of scientific analysis of y postures. It has been observed that pose detection techniques can be used to identify the postures and also to assist the people to perform yoga more accurately. Recognition of posture is a challenging task due to the lack availability of dataset and also to detect posture on real-time bases. To overcome this problem a large dataset has been created which contain at least 5500 images of ten different yoga pose and used a ft.-pose estimation Algorithm which draws a skeleton of a human body on the real-time bases. Angles of the joints in the human body are extracted using the ft.-pose skeleton and used them as a feature to implement various machine learning models. 80% of the dataset has been used for training purpose and 20% of the dataset has been used for testing. This dataset is tested on different Machine learning classification models and achieves an accuracy of 99.04% by using a Random Forest Classifier.

2. Paper Name: Yoga-82: A new dataset for fine-grained classification of human poses.

Author: Manisha Verma, Sudhakar Kumawat, Yuta Nakashima.

Description: -Human pose estimation is a well-known problem in computer vision to locate joint positions. Existing datasets for learning of poses are observed to be not challenging enough in terms of pose diversity, object occlusion and viewpoints. This makes the pose annotation process relatively simple and restricts the application of the models that have been trained on them. To handle more variety in human poses, we propose the concept of fine-grained hierarchical pose classification, in which we formulate the pose estimation as a classification task, and propose a dataset, Yoga-82§, for large-scale yoga pose recognition with 82 classes. Yoga82 consists of complex poses where fine annotations may not be possible. To resolve this, we provide hierarchical labels for yoga poses based on the body configuration of the pose. The dataset contains a three-level hierarchy including body positions, variations in body positions, and the actual pose names. We present the classification accuracy of the state-of-the-art convolutional neural network architectures on Yoga- 82. We also present several hierarchical variants of Dense Net in order to utilize the hierarchical labels.

3. Paper Name: Recognition of yoga poses using emg signals from lower limb muscles.

Author: - Pradchaya Anantamek

Description: -Exercise with yoga postures is very popular nowadays because yoga exercises can help to increase flexibility and muscle strength and improve the respiratory system. However, the correctness of the yoga postures is difficult to check, and thus practitioners may not be able to benefit from the exercises fully. This paper presents a yoga posture recognition system to verify the correctness of the lower muscle movements while practicing yoga. The study included ten subjects, five males and five females. Data were collected during five yoga postures. This paper focuses on the use of Electromyography signals for analyzing the motion of four lower-limb muscles of both legs. Recognition was performed with three

machine learning algorithms. The results showed that the Random Forest Decision Tree algorithm has the highest accuracy in recognizing yoga postures in comparison with other algorithms and that the yoga posture recognition model is accurate at 87.43 percent.

4. Paper Name: Synthesizing Images of Humans in Unseen Poses.

Author: - Guha Balakrishnan, Amy Zhao.

Description:-We address the computational problem of novel human pose syn- thesis. Given an image of a person and a desired pose, we produce a depiction of that person in that pose, retaining the appearance of both the person and background. We present a modular generative neural network that synthesizes unseen poses using training pairs of images and poses taken from human action videos.

VI. CONCLUSION

The Yoga Pose Detection project is a huge step in smoothly integrating traditional practices with cutting-edge technology to improve the entire yoga experience. Extensive study, development, and testing have resulted in a reliable system capable of real-time recognition, accurate analysis, and individualized feedback for a wide range of yoga positions.

In summary, the Yoga Pose Detection project is evidence of the continued development of health and wellness activities as well as a triumphant union of technology and tradition. Through its smooth integration into the everyday routines of practitioners, this technique has the capacity to completely transform how people approach and reap the benefits of the age-old practice of yoga. The project's success highlights what can be achieved when innovation is used to enhance the benefits that traditional methods have always offered.

VII. ACKNOWLEDGMENT

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