International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 09 Issue: 03 | March - 2025 SJIF Rating: 8.586 ISSN: 2582-3930

Voice Based Yoga Pose Detection System

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Abstract*— A system for accurately recognizing and assessing Yoga poses using deep learning. The system helps people learn Yoga by evaluating their poses through a regular PC camera. It first detects the Yoga pose using a method that looks at key body parts. An improved algorithm is also introduced to calculate scores for each pose, which works for all types of poses. The system was tested with different Yoga poses in various environments to check its reliability. Additionally, a hybrid machine learning model is used, where logistic regression helps identify Yoga poses in real-time videos by analyzing key points from each frame detected by OpenPose, a pose detection tool.

Keywords*— Logistic Regression, Machine Learning, Yoga Pose detection etc.

I. INTRODUCTION

Yoga originated in ancient India and is a practice that helps build mental, physical, and spiritual strength. Over the years, more and more people have started practicing yoga, especially in the last decade, due to its health benefits. However, it's important to do yoga with the correct posture, as doing it wrong can lead to injuries. Many people try to practice yoga on their own without proper knowledge or guidance, which can result in mistakes and harm. While it's best to learn from a trained instructor, not everyone can afford personal training. To solve this, AI software using computer vision and data science has been developed to act as a virtual trainer, helping people practice yoga correctly. [1].

Humans are naturally vulnerable to a wide range of health issues, with musculoskeletal disorders being a major concern that requires attention. With the introduction of Microsoft Kinect, it became easier to track and understand human movement and poses. While a lot of work has been done on using Kinect for detecting human poses and helping with physical rehabilitation, yoga—an important part of rehabilitation—hasn't been fully explored. In our work, we aim to detect yoga poses using Kinect and compare them to correct, reference poses. We have created a model with accurate pose data to check against the poses detected by Kinect. The main challenge is identifying the correct positions of the body joints, and we do this by using the coordinates captured by Kinect to detect the poses. [2].

Infinity Yoga Tutor, which is a yoga posture detection and correction system, uses a mobile-based approach for correcting improper yoga postures of the people who are doing yoga with the knowledge they have and doing yoga by watching yoga videos or using yoga applications. Although there are some systems on yoga posture detection, there are no significant amount of systems for correcting improper yoga postures. This mobile based approach consists of both yoga pose detection and yoga pose correction abilities. Moreover, this system consists of giving visual instructions to the user in real time, which would help the user to maintain a proper asana throughout the practice [3].

Human pose estimation is a key problem in computer vision, with applications in areas like security, behavior analysis, assisted living, and driver assistance systems. With the rise of deep neural networks, pose estimation has greatly improved. This progress is partly due to the availability of large human pose datasets like MPII, FLIC, SHPD, and LSP. These datasets contain labeled keypoints and skeletons, which are crucial for the success of advanced pose estimation models. However, manually labeling the data can lead to errors and is affected by factors such as image quality, obstructions, lighting, viewing angles, and variations in poses. [4].

B. Logistic Regression

- Logistic Regression can be used to classify the pose based on the numerical representation of the body structure.
- Goal: The task is to classify different yoga poses into predefined categories.
- Data Input**:** Feature vectors representing the yoga poses.
  - i. These feature vectors could be derived from:
  - ii. Keypoint data: Positions of key joints (e.g., from OpenPose, MediaPipe).
  - iii. Angle features: Joint angles (e.g., angle between the knee, hip, and ankle).
  - iv. Distance measures: Relative distances between body parts.
- Once these features are extracted from images or videos, Logistic Regression can be used to classify

the pose based on the numerical representation of the body structure.

II. LITERATURE REVIEW

Yash Agrawal et al., “Implementation of Machine Learning Technique for Identification of Yoga Poses”, this paper focused on yoga pose detection has gained importance with the growing popularity of yoga worldwide. To address challenges in posture recognition, a dataset of 5500 images from 10 yoga poses was created and analyzed using a tf- pose estimation algorithm The joint angles from the skeleton model were used as features for machine learning. With 80% of the dataset for training and 20% for testing, the Random Forest Classifier achieved an accuracy of 99.04%. [1].

Muhammad Usama Islam et al., “Yoga posture recognition by detecting human joint points in real time using microsoft kinect.”, The paper proposes a system that uses Microsoft Kinect to monitor and recognize yoga postures in real time and assess the accuracy of yoga poses in real time. By detecting joint points and calculating angles, the system helps users practice yoga correctly, aiding in the prevention of musculoskeletal disorders. [2].

Manisha Verma et al., “Yoga-82: A New Dataset for Fine-grained Classification of Human Poses”, This paper introduces Yoga-82, a large-scale dataset for yoga pose recognition with 82 classes, addressing challenges in pose diversity, occlusion, and viewpoints. It proposes a fine-grained hierarchical pose classification approach, using a three-level label hierarchy (body positions, variations, and pose names) to improve accuracy. The dataset is evaluated with state-of-the-art CNN architectures and hierarchical DenseNet models[4].

Edwin W. Trejo et al., “Recognition of Yoga Poses through an Interactive System with Kinect device”, This research presents an interactive Yoga system using Kinect for gesture recognition, capable of tracking up to 6 users simultaneously. It recognizes 6 yoga poses, integrates voice commands, and provides visual instructions. The system uses the Adaboost algorithm for pose recognition, achieving over 94.78% accuracy in training data provided by an expert yoga trainer[5].

III. SYSTEM ARCHITECTURE

IV.

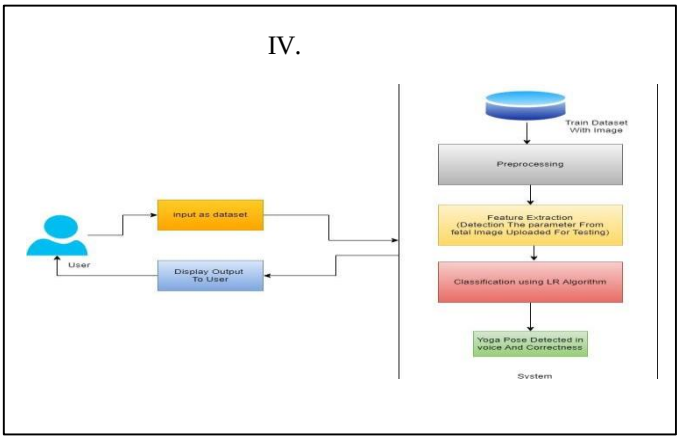


FIG1., VOICE BASED YOGA POSE DETECTION SYSTEM ARCHITECTURE

The system's architecture comprises several key components such as pre-processing, feature extraction, classification and LR algorithm, segmentation, etc.

1. **Machine Learning:-**
   a. Finding, extracting and summarizing relevant data
   b. Making predictions based on the analysis data
   c. Calculating probabilities for specific results
   d. Adapting to certain developments autonomously
   e. Optimizing processes based on recognized patterns
2. **Preprocessing:-** In the preprocessing we remove the noise or blurry part from the input. It will remove the some norms of sound or unwanted part.
3. **Segmentation:-** In the segmentation the input is divided into the small small pixel and pass these pixels as a input.
4. **Feature Extraction:-** In the feature extraction the machine will map the feature of extisting with the features of the input data model.
5. **Classification:-** Balancing the practice between left and right sides helps prevent muscle imbalances and promotes overall body symmetry. It’s important to maintain awareness and ensure that both sides receive equal attention to enhance the benefits of the practice.

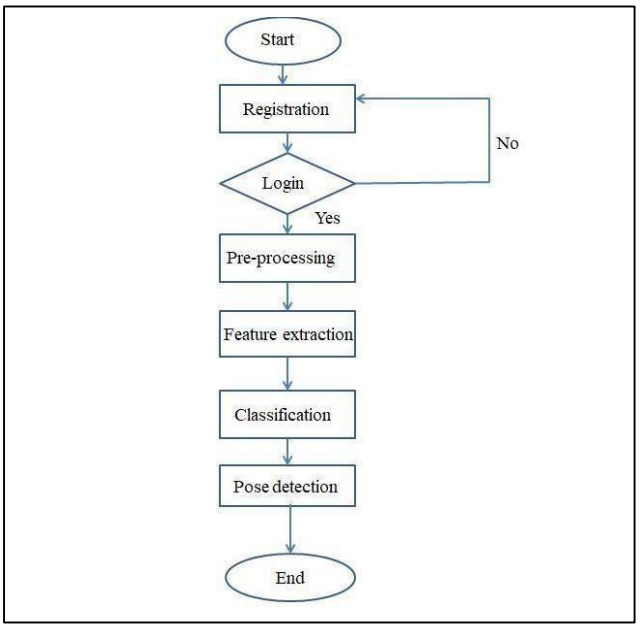
The algorithm examines smaller sections of the images. The end result is a probabilistic vector predicting the likelihood of each feature in the image belonging to a class or category.

For this , proposed work we have taken the input as a video and here we pass the video to the machine for the prediction. Firstly we train the model with the videos of the anomaly so it will train the model on that basis.

IV. METHDOLOGY

LR algorithm : The Logistic Regression (LR) algorithm is a type of machine learning used to predict the likelihood of an outcome. It’s called "supervised learning" because it learns from labeled data to make predictions. The target variable in logistic regression has two possible outcomes (like "yes" or "no," "true" or "false"). The algorithm looks at the relationships between different factors (or variables) and calculates the probability of one of the two outcomes happening. It uses a mathematical function called the **Sigmoid** function, which turns numbers into a probability value between 0 and 1, where 0 means one outcome and 1 means the other.

A. *Flowchart*



This flow ensures that the user successfully registered and login then preprocessing the different types of datasets, extraction of features, classification, detecting different types of yoga poses.

V. ADVANTAGES

a. Easy to handle.

b. Improve Best accuracy.

c. Increase the knowledge about yoga poses.

d. Yoga helps bring balance to the body and mind through poses, meditation, and breathing exercises, which also calm the mind. Because of the stress in modern life, yoga has become popular worldwide.

VI. CONCLUSION

This paper presents a system for recognizing and correcting Yoga poses. The system works by detecting a learner's pose, comparing it to an instructor's pose, measuring the difference in body angles, and identifying which part of the pose needs improvement. It then classifies the pose into one of four levels based on how much the angles differ. As Yoga becomes more popular, career opportunities in the field are growing both in India and abroad. After completing Yoga courses, you can work in places like health clubs, Yoga studios, gyms, or even provide private sessions at clients' homes. Based on Yoga poses, we can also develop various applications, such as fitness trackers or Yoga trackers. For example, we can create apps that count how many squats or push- ups a person does, or check the quality of their exercises.

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REFERENCES

[1] Yash Agrawal, Yash Shah, Abhishek Sharma, "Implementation of Machine Learning Technique for Identification of Yoga Poses," *9th IEEE International Conference on Communication Systems and Network Technologies *, 2020.

[2] Muhammad Usama Islam ; Hasan Mahmud ; Faisal Bin Ashraf ; Iqbal Hossain ; Md. Kamrul Hasan "Yoga posture recognition by detecting human joint points in real time using microsoft kinect." IEEE Region 10 Humanitarian Technology Conference (R10-HTC). pp.1-5, 2017.D. Jurafsky and J. H. Martin, *Speech and Language Processing*, 3rd ed. Upper Saddle River, NJ, USA: Prentice Hall, 2020.

[3] Fazil Rishan, Binali De Silva, Sasmini Alawathugoda, Shakeel Nijabdeen, Lakmal Rupasinghe, Chethana Liyanapathirana, "Infinity Yoga Tutor : Yoga Posture Detection and Correction System,"

[4] Manisha Verma, Sudhakar Kumawat, Yuta Nakashima, Shanmuganathan Raman, "Yoga-82: A New Dataset for Fine- grained Classification of Human Poses," Osaka University, Japan Indian Institute of Technology Gandhinagar, India,2020.

[5] Edwin W. Trejo, Peijiang Yuan, "Recognition of Yoga Poses through an Interactive System with Kinect device," International Conference on Robotics and Automation Sciences,2018.

[6] Guha Balakrishnan, Amy Zhao, Adrian V. Dalca, Fredo Durand, "Synthesizing Images of Humans in Unseen Poses", MIT University.

[7] Munkhjargal Gochoo , Tan-Hsu Tan, Shih-Chia Huang , Tsedevdorj Batjargal, Jun-Wei Hsieh, Fady S. Alnajjar, and Yung-Fu Chen, "Novel IoT- Based Privacy-Preserving Yoga Posture Recognition System Using Low-Resolution Infrared Sensors and Deep Learning", Internet of Things Journal, vol. 6, no. 4, August 2019.

[8] Khushi Sidana Computer Science Narsee Monjee Institute of Management Studies Mumbai, India, "Real Time Yoga Pose Detection Using Deep Learning", International Journal of Engineering Applied Sciences and Technology, 2022 Vol. 7, Issue 7, ISSN No. 2455-2143, Pages 61-65
Published Online November 2022 in IJEAST.

[9] Kehan Chen, "Sitting Posture Recognition Based on OpenPose", IOP Conference Series: Materials Science and Engineering.

[10] Maybel Chan Thar, Khine Zar Ne Winn , Nobuo Funabiki, "A Proposal of Yoga Pose Assessment Method Using Pose Detection for SelfLearning", University of Information Technology, Yangon, Myanmar 2Okayama University, Okayama, Japan.