YOGA POSES DETECTION USING AI&ML

PROJECT SYNOPSIS

OF MAJOR PROJECT

BACHELOR OF TECHNOLOGY
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TABLE OF CONTENTS

Serial No.	Content	Page no
1.	INTRODUCTION	3
2.	BACKGROUND / PROBLEM STATEMENT	4
3.	OBJECTIVES	5
4.	LITERATURE REVIEW	6
5.	METHODOLOGY	7
6.	WORKING OF THE PROJECT / ADVANTAGES	8
7.	SYSTEM DESCRIPTION	9
8.	OUTCOMES / INTRODUCING FEATURES / TECHNOLOGY USED	10
7.	REFERENCES	11

INTRODUCTION

Yoga is an ancient Indian science and a way of living that includes the adoption of specific bodily postures, breath regulation, meditation, and relaxation techniques practiced for health promotion and mental relaxation. In recent years, yoga has been adopted internationally for its health benefits. Among several techniques, physical postures have become very popular in the Western world. Yoga is not only about the orientation of the body parts but also emphasizes breathing and being mindful. The traditional Sanskrit name for Yoga postures is asanas. During the pandemic, many people have used yoga to keep themselves physically and mentally fit. Many people practice fine forms of asanas, without a teacher to guide them: either because no trained yoga instructors are available or due to unwillingness to engage one. Nevertheless, it is important to perform asanas correctly, so the practitioner does not sustain injury. Furthermore, asanas should be practiced systematically, paying attention to the orientation of the limbs and the breathing. Improper stretching or performing inappropriate asanas and breathing inappropriately when exercising can be injurious to health. Improper postures can lead to severe pain and chronic problems. Hence, a scientific analysis of asana practice is all important. The present work was developed, with this in mind.

Pose detection techniques can be used to identify the accurate performance of yoga postures. Pose detection algorithms have been used to mark the key points and draw a skeleton on the human body for real-time images and used to determine the best algorithm for comparing the poses. Posture detection tasks are challenging as they require creating datasets from which real-time postures can be estimated.

This study estimated the five asanas performed by the participant using different machine learning architectures: OpenPose, PoseNet, and MediaPipe. These architectures are especially suitable for pose detection.

BACKGROUND / PROBLEM STATEMENT

Yoga, a centuries-old practice that is originally from India but is globally famous for its numerous spiritual, corporeal, and mental benefits is a type of exercise with complex postures. The problem with yoga is that, like any other exercise, it is critical to practice it correctly because any incorrect position during a yoga session can be ineffectual and potentially inconvenient. This necessitates the presence of a trainer to supervise the meeting and correct the individual's stance. Since not every client approach or has access to a trainer, a computerized reasoning-based application might be used to detect yoga poses and provide customized feedback to help people improve their structure.

Our Yoga Pose Detection System is designed and developed to recognize yoga stances and respond with a customized response to help users improve their postures. Our system will detect various yoga poses, namely Chair, Cobra, Dog, Shoulder Stand, Triangle, Tree, Warrior, and No Pose.

OBJECTIVES

- The fundamental goal of Yoga pose detection and correction is to provide standard and correct yoga postures using computer vision. If the yoga posture is not done properly, it can result in serious injuries and long-term issues. Analyzing human poses to detect and correct yoga poses can benefit humans living a healthier life in their homely environment. This project focuses on exploring the different approaches for yoga pose classification

- An individual can get the correct/ideal way/method to perform that specific yoga asana that he/she is trying to do. Using computer vision techniques and Open Pose (an open-source library), human pose estimation is used to estimate an individual's Yoga posture. The suggested system recognizes the difference between the actual and target positions and corrects the user with high accuracy by offering real-time visual output and necessary instructions to correct the identified pose.

LITERATURE REVIEW

[1] "Yoga Pose Assessment Method Using Pose Detection for Self-Learning" By M. C. Thar, K. Z. N. This paper recommends a Yoga pose evaluation approach to the usage of pose detection to assist the self-mastering of Yoga. This paper proposed a Performance Evaluation System as Yoga Pose Training System to assist the self-mastering of Yoga. This paper gives a way to discover yoga poses and the usage of pose discovery to assist in self-examine of yoga.

[2] "Yoga Mobile Application Based on Yoga Detection" By Sylvie. The authors show a yoga assistant's mobile app based on a personal model where instructors guide and supervise their students to practice yoga with video chat.

[3] "ML Learning Yoga pose in Video Sequences" By Jozsef. The issue approach is by studying the production model of normal motion patterns using multiple sources with limited control. With unencrypted performance, we suggest two autoencoders so that they can operate without minimal guidance.

[4] "Real-Time Detection in Crowded Area" By Ammar Ladjailia. A fully unsupervised dynamic coding approach for detecting unusual events in videos based on online constructability of query signals from learned event dictionaries.

METHODOLOGY

"Agile process model" refers to a software development approach based on iterative development. Agile methods break tasks into smaller iterations, or parts do not directly involve long term planning. The project scope and requirements are laid down at the beginning of the development process. Plans regarding the number of iterations, the duration and the scope of each iteration are clearly defined in advance.

Each iteration is considered as a short time "frame" in the Agile process model, which typically lasts from one to four weeks. The division of the entire project into smaller parts helps to minimize the project risk and to reduce the overall project delivery time requirements. Each iteration involves a team working through a full software development life cycle including planning, requirements analysis, design, coding, and testing before a working product is demonstrated to the client.

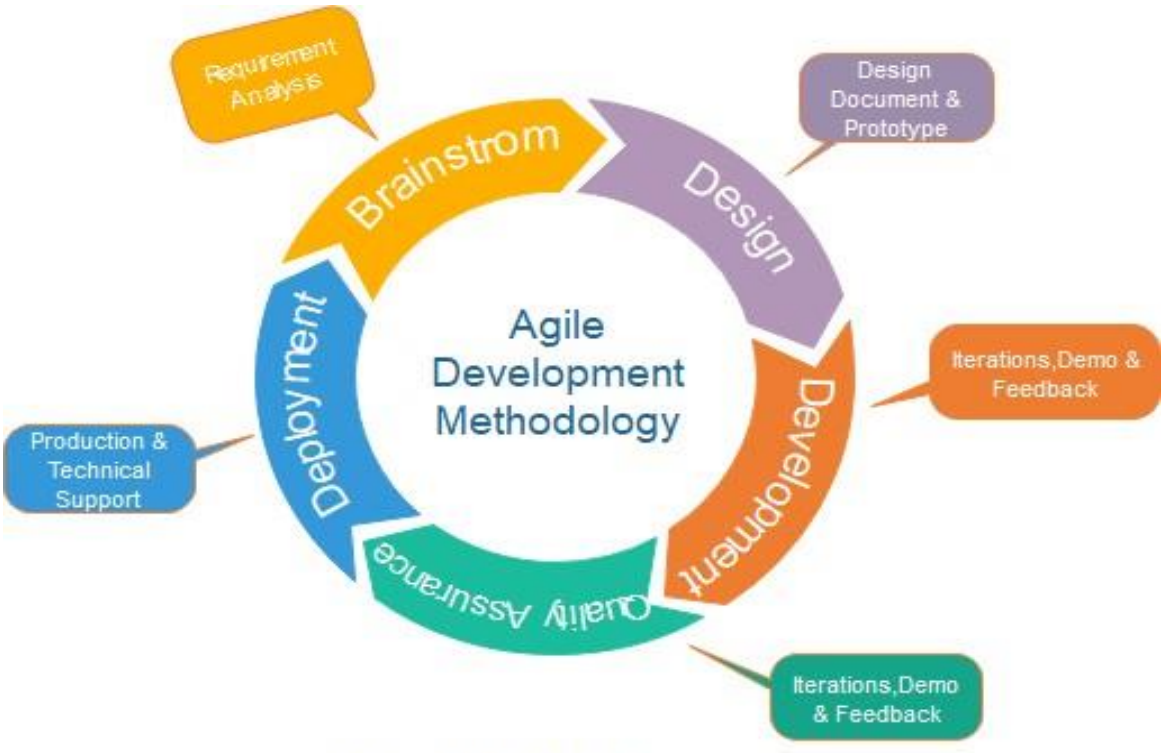

Fig. Agile Model

WORKING OF THE PROJECT

Our Yoga Pose Detection System consist of 2 module: User and Admin. User can either upload a picture of a Yoga pose or pose directly in front of a camera and the system will automatically detect and show the name of the yoga pose.

The system will detect various types of Yoga poses like Chair, Cobra, Dog, Shoulder Stand, Triangle, Tree, Warrior and No Pose. The libraries that are used in this project are OpenCV, dlib, OpenPose and MediaPipe. OpenPose is the first real-time multi-person system to jointly detect the human body, foot, hand, and facial key points on single images.

ADVANTAGES

- The system is easy to maintain.
- It is user-friendly.
- The system successfully helps to identify Yoga poses.
- It aims to help users improve their poses.

System Description

The system comprises 2 major modules with their sub-modules as follows:

❖ User:

- **Upload:**
  - The user can upload a photo of the yoga pose and the system will detect the pose accordingly.

- **Real-time:**
  - If the user does a yoga pose in front of the laptop camera, the system will detect the pose and show the name accordingly.

❖ Admin:

- **Maintenance:**
  - Update and add new yoga poses.

OUTCOMES

- User Friendly
- High-performing real-time pose detection and tracking will drive some of the biggest trends in computer vision.
- Using webcam, Model will extract the key points from the Yoga Pose performed by user.
- Depending upon the feed it will classify it to one of the trained Yoga Poses and then we can see a video of a Yoga Instructor performing the detected pose accurately so that user can learn and correct the posture accordingly.
- The results were promising with an accuracy rate of 95%.

INTRODUCING FEATURES

- 3D based videos
- Voice commands in different languages
- Provide suggestions
- User account and comparison with others

TECHNOLOGY USED

- **Language:** Python
- **Libraries:** Openpose, OpenCV, Mediapip etc.
- **Server:** Apache
- **Front-end:** React
- **Back-end:** MySQL
- **Editor:** Visual Code Studio
- **Platform:** Windows 11

REFERENCES

- E. Trejo, P. Yuan, "Recognition of yoga poses through an interactive system with kinect device", Intl. Conf. Robotics and Automation Science, 2018.
- P. Szczuko, "Deep neural networks for human pose estimation from a very low resolution depth image", Multimedia Tools and Appl, 2019.
- Nath A. Impact of COVID-19 Pandemic Lockdown on Mental Well-Being amongst Individuals in Society. International Journal of Scientific Research in Network Security and Communication. 2020
- S. Kreiss, L. Bertoni, and A. Alahi, "PifPaf: composite fields for human pose estimation", IEEE Conf. Computer Vision and Pattern Recogn, 2019
- Yash A, Yash S, Abhishek S. Implementation of Machine Learning Technique for Identification of Yoga Poses. IEEE 9th International Conference on Communication Systems and Network Technologies (CSNT) 2020
- Chiddarwar GG, Ranjane A, Chindhe M, Deodhar R, Gangamwar P. AI-based yoga pose estimation for android application. Int J Inn Scien Res Tech. 2020