

## Title: Yoga Pose Detection and Correction System

### Overview:

This project focuses on building an intelligent system capable of recognizing human yoga poses and providing real-time feedback for posture correction. The goal is to support yoga practitioners, fitness trainers, and healthcare professionals by improving posture accuracy and reducing the risk of injury.

### Objectives:

- Detect specific yoga poses using a combination of computer vision and machine learning.
- Provide real-time visual or textual feedback to help users correct their form.
- Build a lightweight model that runs efficiently on standard laptops or mobile devices.
- Create a simple interface for end-users to practice poses and monitor their progress.

### Dataset:

The system uses the Yoga-82 dataset from Kaggle, containing labelled images covering a wide range of yoga postures. Additional custom images were added to improve generalization during testing.

### Tech Stack:

- TensorFlow Keras for training and model development
- MediaPipe for pose estimation
- OpenCV for real-time video capture and processing
- Python for backend logic
- Streamlit (optional) for user interface

### Method:

1. A MediaPipe pose estimation model extracts key skeletal landmarks.
2. These landmarks are fed into a classification model trained on Yoga-82 subsets.
3. The model outputs the predicted pose in real time.
4. A secondary module compares the user's pose landmarks with the ideal posture and provides:
  - Angle-based corrections
  - Joint deviation warnings
  - Confidence scores

#### Supported Poses:

- Mountain Pose
- Tree Pose
- Warrior Pose

(Additional poses planned for the next stage)

#### Applications:

- Home yoga practice
- Virtual fitness coaching
- Physiotherapy guidance
- Gym training systems

#### Future Enhancements:

- Add more pose categories
- Deploy the model as a mobile app
- Introduce voice-based instructions
- Integrate user history for progress tracking

This project demonstrates experience with pose-estimation, model training, real-time video pipelines, and practical machine-learning deployment.