YOGA POSE PERFECT

An AI based Posture Alignment Assistant

THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY (Deemed to be University)

Electrical & Instrumentation Engineering Department

Electrical and Computer Engineering (EEC) program , TIET, Patiala

INTRODUCTION

- Yoga is recognised for its physical, mental, and spiritual benefits, but correct pose alignment is essential to maximise these benefits and prevent injuries.
- Many practitioners, especially beginners, face challenges in achieving proper form due to limited access to expert guidance.
- Traditional solutions like in-person classes or online tutorials often lack real-time, personalised feedback.
- The project leverages artificial intelligence to provide an accessible, scalable, and accurate solution for yoga practice.
- By integrating pose recognition and corrective feedback, the system ensures safer and more effective practice for users of all experience levels.

AIM, OBJECTIVE, DELIVERABLES AND NOVELTY

Aim: To enhance yoga practice by using deep learning for real-time pose detection, correction, and personalised feedback.

Objectives:

The project was carried out with the following objectives:

- Develop a deep learning model for pose detection using skeleton estimation.
- Create a diverse dataset of yoga poses covering various body types, genders, and ages.
- Train a pose correction model to provide real-time feedback for improving alignment.

Deliverables:

- A proprietary, annotated dataset of diverse yoga poses.
- A trained deep learning model capable of detecting and correcting poses.

Novelty:

EXISTING	PROPOSED
• Relies on in-person instructors or video tutorials with no real-time feedback. • Only identifies poses; does not offer guidance or corrections. • Limited adaptability to individual body types, skill levels, or alignment needs. • Generic instructions that may not address specific user needs.	• Provides real-time pose detection, alignment analysis, and corrective feedback. • Detects poses, analyzes alignment, and offers actionable corrections. • Accommodates diverse body types and demographics using a custom dataset. • Dynamic, real-time interaction fosters a more engaging and mindful yoga experience..

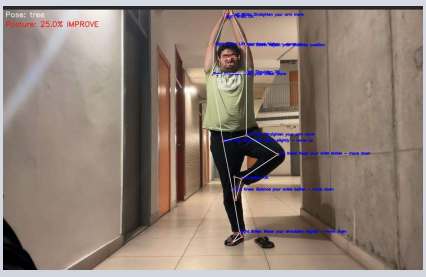

Figure 1. Demonstration of Model Proposed

METHODOLOGY

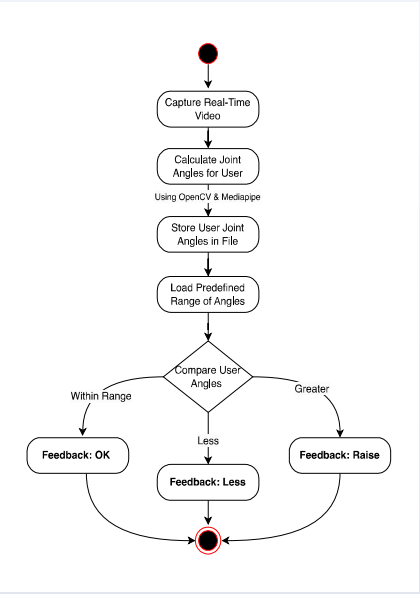

Figure 2. Activity Diagram of Proposed Project Idea

PROJECT DETAILS

- Develops a real-time system to capture video, detect human pose, and calculate joint angles.
- Provides corrective feedback to improve posture and movement accuracy.
- Uses OpenCV for video capture and MediaPipe for pose estimation.
- Computes joint angles using trigonometric calculations.
- Compares angles to predefined ranges and generates feedback (e.g., "Extend more" or "Good posture").
- Applications include fitness training, rehabilitation, and sports coaching.
- Designed for accuracy, real-time performance, and user-friendliness.
- Future enhancements include wearable integration and multi-user tracking capabilities.

RESULTS

Figure 3. Model Detecting pose and Providing Feedback

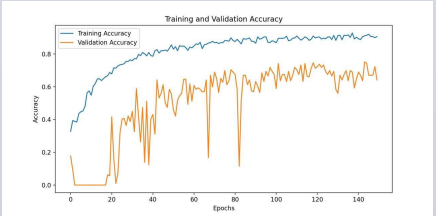

Figure 4. Training and Validation accuracy of Proposed Model

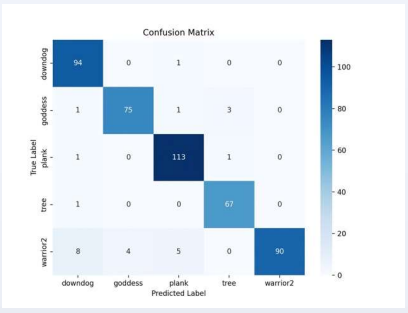

Figure 5. Confusion Matrix

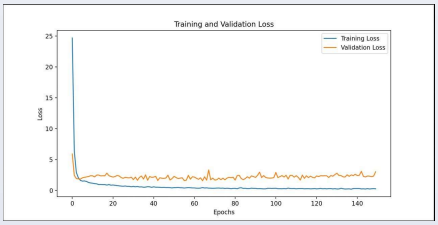

Figure 6. Training and Validation loss of our Proposed Model

CONCLUSION

- The project successfully integrates computer vision and deep learning for real-time pose detection and feedback.
- It provides accurate joint angle computation and actionable corrections to improve posture and movement.
- The system has versatile applications, including fitness, rehabilitation, and sports coaching.
- It bridges the gap between expert guidance and accessible, technology-driven solutions.
- Its adaptability, user-friendly design, and scope for future enhancements make it a valuable tool for movement analysis and correction.

REFERENCES

[1]Duffy, E., 1957. The psychological significance of the concept of" arousal" or" activation.". *Psychological review*, *64*(5), p.265.

[2] P. Kulkarni, S. Gawai, S. Bhabad, A. Patil and S. Choudhari, "Yoga Pose Recognition Using Deep Learning," *2024 International Conference on Emerging Smart Computing and Informatics (ESCI)*, Pune, India, 2024

[3] F. Rishan, B. De Silva, S. Alawathugoda, S. Nijabdeen, L. Rupasinghe and C. Liyanapathirana, "Infinity Yoga Tutor: Yoga Posture Detection and Correction System," 2020 5th International Conference on Information Technology Research (ICITR), Moratuwa, Sri Lanka, 2020.

[4] Chamola, V., Gummana, E.P., Madan, A., Rout, B.K. and Coelho Rodrigues, J.J.P., 2024. Advancements in Yoga Pose Estimation Using Artificial Intelligence: A Survey. *Current Bioinformatics*, *19*(3), pp.264-280.

[5] Garg, S., Saxena, A. & Gupta, R. Yoga pose classification: a CNN and MediaPipe inspired deep learning approach for real-world application. *J Ambient Intell Human Comput* **14**, 16551–16562 (2023).

OUR TEAM

ASHUTOSH KUMAR	102169003
MADHUR VERMA	102169012
PRATHAM BATHLA	102169011
MIHIR PRADHAN	102199004
VINAY PRAJAPATI	102119047

Mentor: : Dr. Mukesh Dalal
: Assistant Professor DEIE, TIET

Co- Mentor: : Dr. Ashish Gupta
: Assistant Professor DEIE, TIET

Group No. : 4

Academic Session: : 2024-25