

# Personalized Pose Detector for Yoga and Similar Sports

Author: Bc. Adriana Buchmei  
Supervisor: prof. Ing. Adam Herout, Ph.D.

## The Problem of "Perfect" Poses



Figure 1

## Visual Active Learning Tool [2]

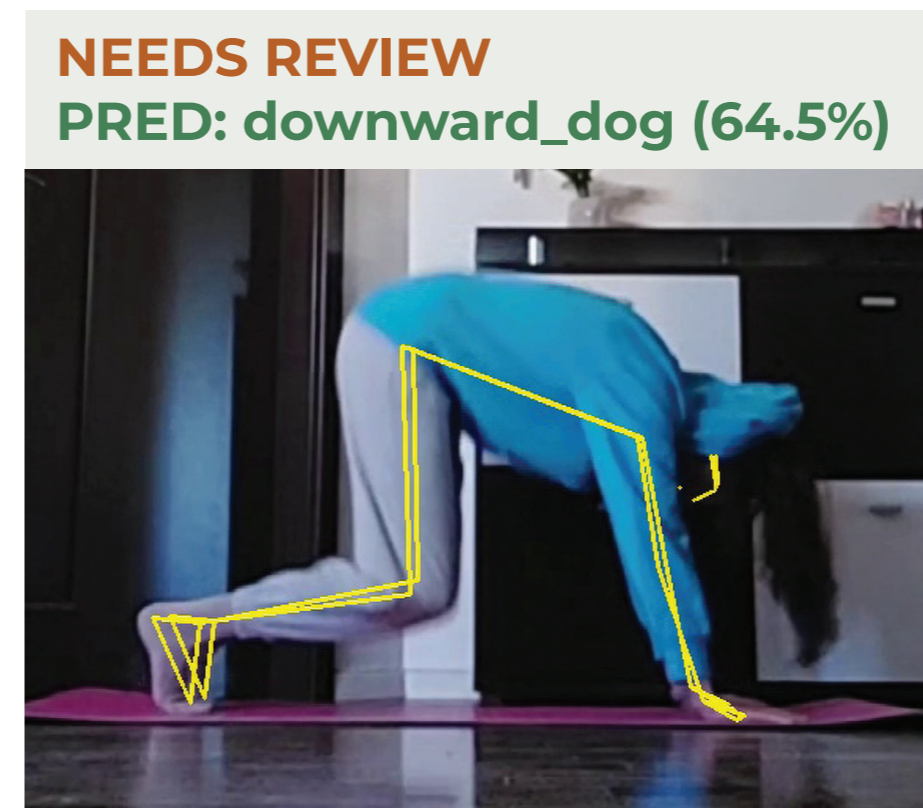
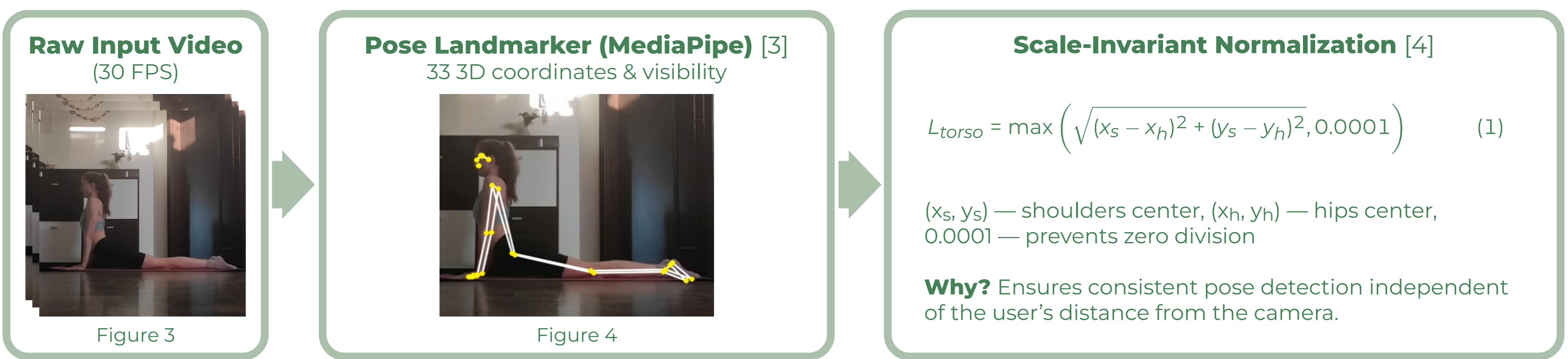
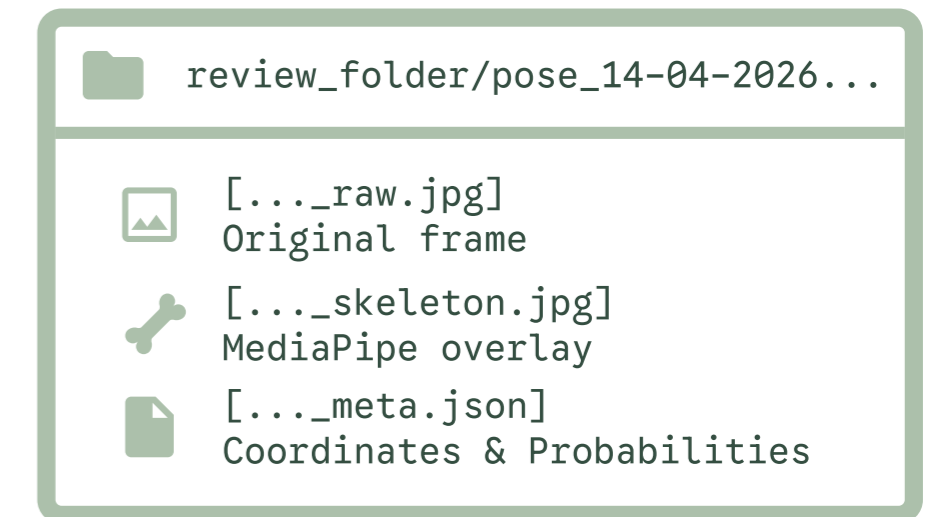


Figure 2

**Flags** uncertain poses (< 75% conf.)  
**Generates** skeleton overlays for quick manual review  
**1-click update** to the local database



## The Hybrid Pipeline

- Primary:** Checks the Personal Pose DB for the user's specific variation of the pose.
- Fallback:** If unknown, relies on the generic PyTorch Model.

### Personal Pose DB (JSON)

Fast Distance Matching [5]

$$d = \sqrt{\sum_{i=1}^n (p_i - q_i)^2} \quad (2)$$

$d$  — pose distance,  
 $p, q$  — normalized landmark vectors

### PyTorch Neural Network [6]

3-Layer Fully Connected Classifier

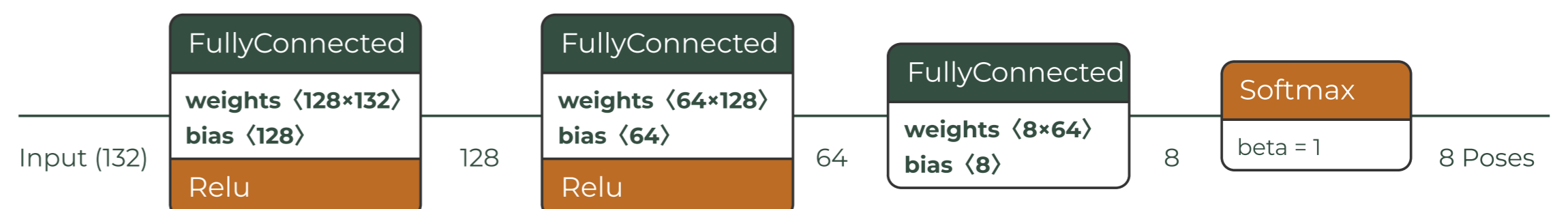


Figure 5

### Prediction Output

**Pose Label** (e.g., warrior\_two); **Confidence** (0 – 100%); **Body Status** (Stable / Moving)

## AI Inference Visualizer

Displays pose detection alongside a timeline graph of class probabilities



Figure 6

## Future Mobile App Integration

OpenCV → CameraX API  
JSON File → Room Database [7]  
PyTorch Model → LiteRT [8]



[1] Verma, M., Kumawat, S., Nakashima, Y., and Raman, S. *Yoga-82: A New Dataset for Fine-grained Classification of Human Poses*. CVPR Workshops, 2020.  
[2] Settles, B. *Active Learning Literature Survey*. Computer Sciences Technical Report 1648, University of Wisconsin-Madison, 2009.  
[3] Google. *MediaPipe Pose Landmarker*. 2024. Available at: [https://ai.google.dev/edge/mediapipe/solutions/vision/pose\\_landmarker](https://ai.google.dev/edge/mediapipe/solutions/vision/pose_landmarker)  
[4] Bazarevsky, V., et al. *BlazePose: On-device Real-time Body Pose tracking*. CVPR Workshop on Computer Vision for Augmented and Virtual Reality, 2020.  
[5] Cover, T., and Hart, P. *Nearest neighbor pattern classification*. IEEE Transactions on Information Theory, 13(1), 21-27, 1967.  
[6] Paszke, A., et al. *PyTorch: An Imperative Style, High-Performance Deep Learning Library*. NeurIPS, 2019.  
[7] Google. *Room Persistence Library*. 2018. Available at: <https://developer.android.com/training/data-storage/room>  
[8] Google. *LiteRT: High Performance On-Device ML & GenAI Deployment on Edge Platforms*. 2026. Available at: <https://ai.google.dev/edge/litert>