

HUMAN POSE ESTIMATION

TEAM -15 KIET(+)

Team Details

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Project Basics

- AIM

Human Pose Estimation (HPE) is a computer vision task that detects and analyzes human body postures from images or videos.

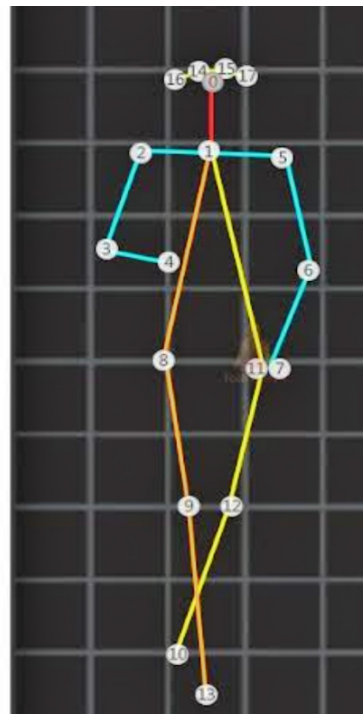
It is widely used in applications such as motion capture, activity recognition, augmented reality, and healthcare monitoring.

- OBJECTIVE

The goal of this project is to develop an efficient system for detecting key human joints (such as elbows, knees, and shoulders) in static images using deep learning and computer vision techniques.

- REAL-TIME APPLICATIONS

- Sports Analytics: Tracking athlete movements for performance improvement.
- Healthcare: Posture correction and rehabilitation.
- Virtual Reality: Enhancing immersive experiences.
- Security and Surveillance: Identifying human movements in restricted areas.



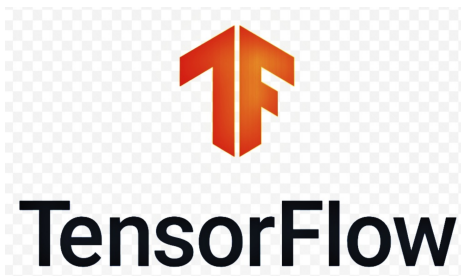
Algorithms and Technology

Algorithms Used:

1. Convolutional Neural Networks (CNNs): Used for feature extraction from images.
2. OpenPose & PoseNet: Pre-trained deep learning models for detecting keypoints.
3. DeepLabCut: For animal and human pose tracking.
4. MediaPipe Pose: Lightweight and real-time pose estimation framework by Google.

Technology Stack:

- Programming Languages: Python
- Libraries: TensorFlow, PyTorch, OpenCV, NumPy
- Frameworks: DeepPose, HRNet, MediaPipe
- Tools: Jupyter Notebook, Google Colab, CUDA for GPU acceleration.



Process and Summary

• process workflow

1. Data Collection & Preprocessing:

- Gather annotated datasets like COCO, MPII, or custom datasets.
- Normalize and augment images to improve model robustness.

2. Model Selection & Training:

- Choose an appropriate model (OpenPose, HRNet, etc.).
- Train using labeled datasets.

3. Inference & Evaluation:

- Test on unseen images.
- Evaluate accuracy using metrics like PCK (Percentage of Correct Keypoints) and mAP (Mean Average Precision).

4. Deployment:

- Optimize model size for real-time applications.
- Deploy via API or edge devices.

• Summary

Human Pose Estimation is an evolving field with numerous applications. By leveraging deep learning and computer vision, accurate detection of human joints and poses is possible, enabling advancements in multiple domains. Future work includes improving real-time efficiency and reducing computational costs.