Task 10

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Subject : " Perform pose Estimation using Computer vision "

Pose estimation :

Pose estimation is computer vision technique that predicts and tracks the location of person or object. This pose estimation is done by looking at a combination of pose and the orientation of given person /object.

Categories of pose estimation :

When working with people , these keypoints represent major joints like elbows, knees, wrists, etc. This is referred to as human pose estimation.

2D HUMAN POSE ESTIMATION

2D human pose estimation is used to estimate the 2D position or spatial location of human body key points from visuals such as images and videos. Traditional 2D human pose estimation methods use different hand-crafted feature extraction techniques for the individual body parts.

2. **3D HUMAN POSE ESTIMATION**

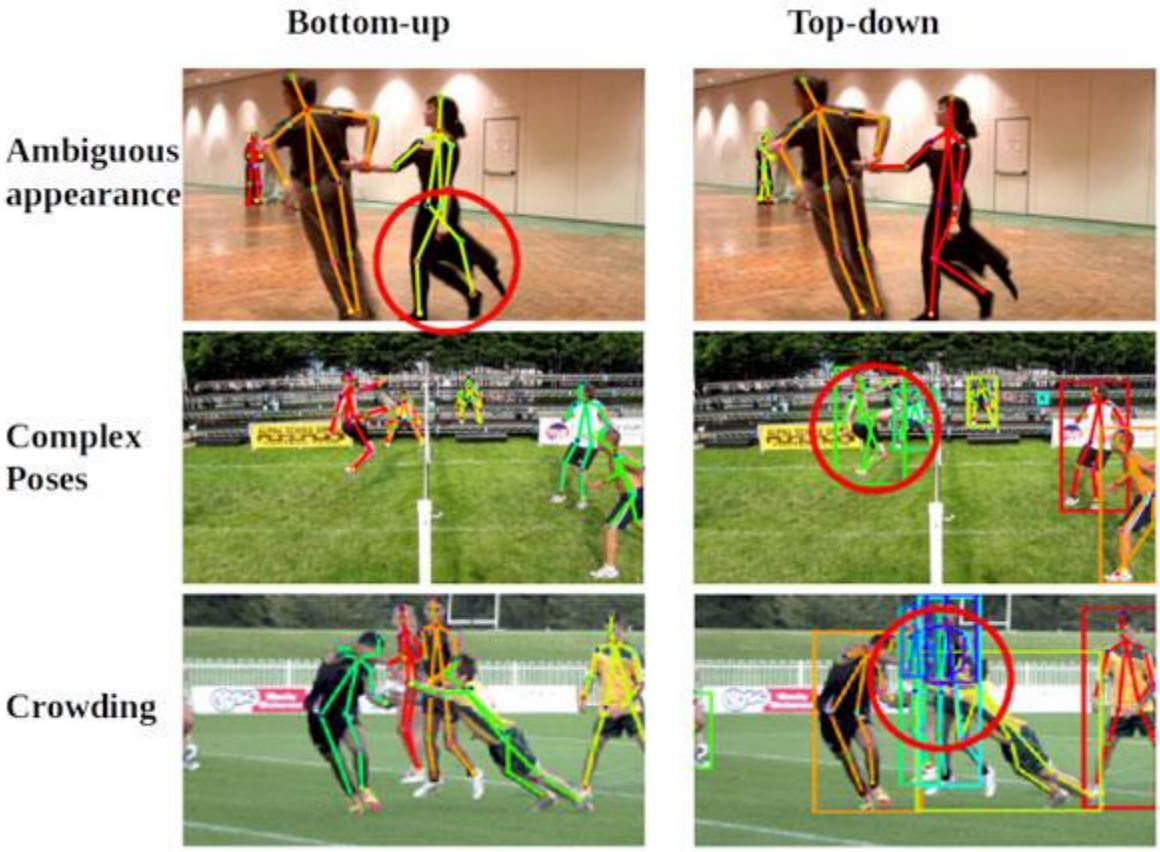
3D Human Pose Estimation is used to predict the locations of body joints in 3D space. Besides the 3D pose, some methods also recover 3D human mesh from images or videos. It can be applied to various applications, such as 3D animation industries, virtual or augmented reality, and 3D action prediction. 3D human pose estimation can be performed on monocular images or videos (normal camera feeds).

Primary techniques for pose estimation :

There are two approaches :

- Bottom-up methods estimate each body joint first and then group them to form a unique pose. Bottom-up methods were pioneered with *DeepCut*

- Top-down methods run a person detector first and estimate body joints within the detected bounding boxes.



Most popular Pose Estimation Methods :-

- High-Resolution Net (HRNet)
- Open Pose
- DeepCut
- Regional Multi-Person Pose Estimation (AlphaPose)
- Deep Pose
- PoseNet
- Dense Pose

Use cases and applications :-

1. *Human activity and movement*:

Tracking the variations in the pose of a person over a period can also be used for activity, gesture and gait recognition. Some applications could be as below -

- Application to identify if a person follows the exercise regime preperly.
- Application to identify the health of a person - in case a person collapses inform somebody close or paramedics.
- Application to identify body language and flag suspicious individuals to nearby authorities - used at airports.

2. *Augmented reality:*

CGI Application to track the human pose variations to render graphical animations - eg Thanos.

3. *Animation & Gaming:*

Identify and track movements in gaming.

4. *Robotics:*

Robotics can be taught to mimic human poses, activities by tracking and following human instructor demonstrations, instead of manually programming robots.