



Michigan State University Team

Prof. Xiaoming Liu

<https://cvlab.cse.msu.edu/>

Our Expertise Relevant to LINCS

➤ Biometrics

- Face: Active research since 2001. Prime of BRIAR.
- Gait: CVPR'19, PAMI'21
- Body: ICCV'23



➤ Object Detection and 3D Vision

- 2D object/pedestrian detectors: ICCV'17, CVPR'19
- Camera calibration, depth estimation: NeurIPS'23, CVPR'23
- 3D detectors, trajectory, location cues: ICCV'19, ECCV'20, CVPR'21, ECCV'22



➤ Object Modeling via Analysis-by-synthesis, GAN, NerF

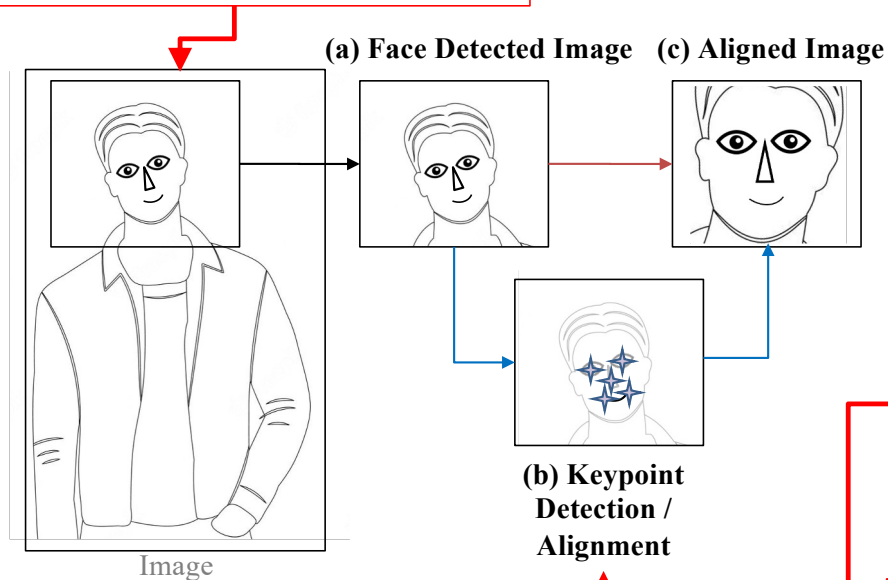
- 3D recon for ShapeNet or non-ShapeNet objects: CVPR'21, ECCV'22

➤ LVM/LLM for open-world recognition

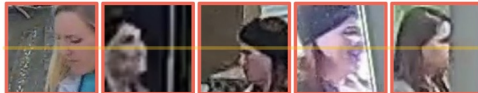


Face Recognition Research

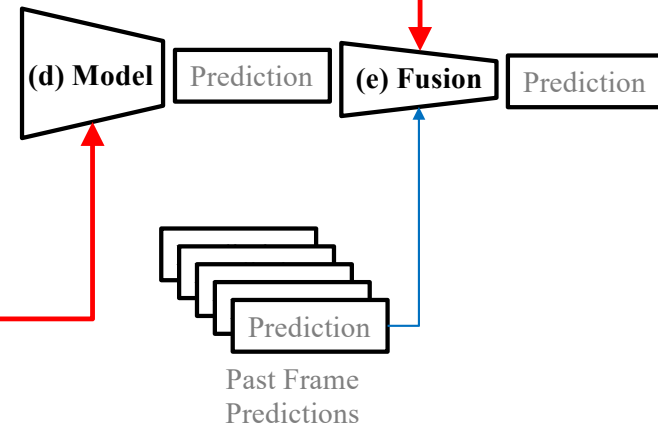
Dataset Improvement:
CFSM, DCFace. ECCV'22 CVPR'23



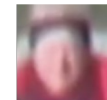
KPRPE: Alignment Robust Face Recognition. Under review



CAFace: Feature Fusion with large Probe Set. NeurIPS'22

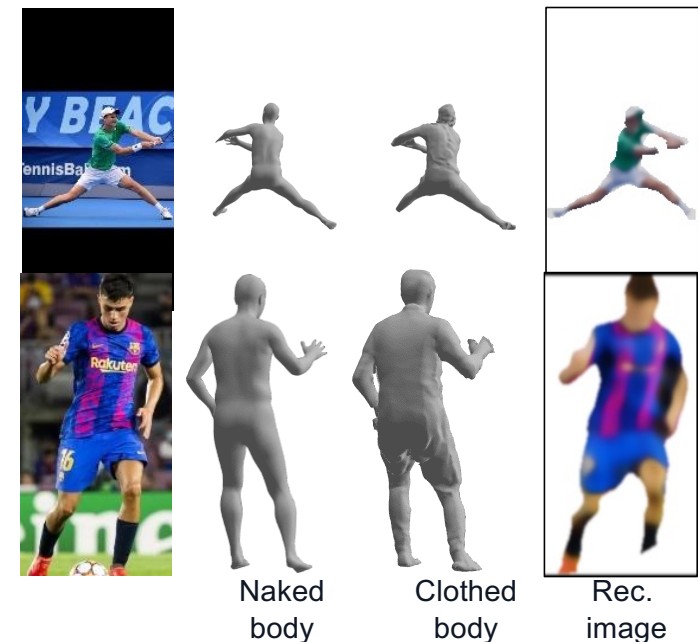
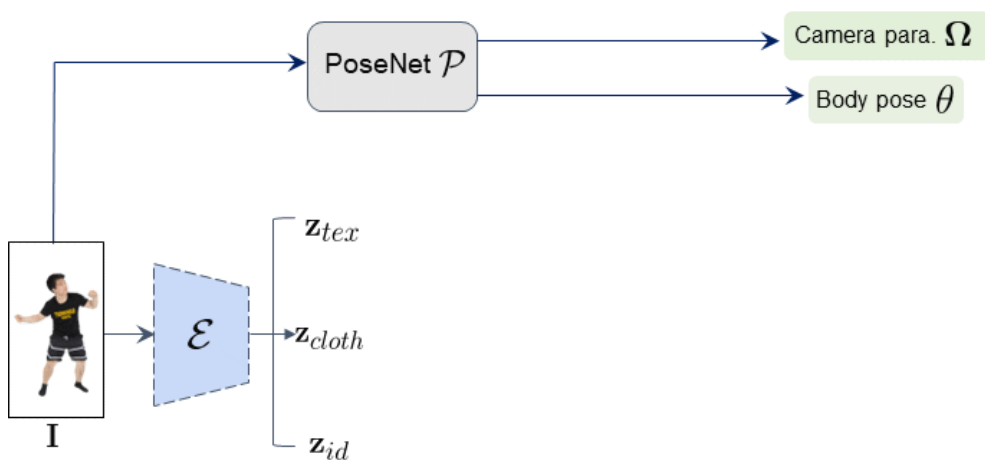


AdaFace: Improved Training with Low Quality Images. CVPR'22



Body Matching via 3D

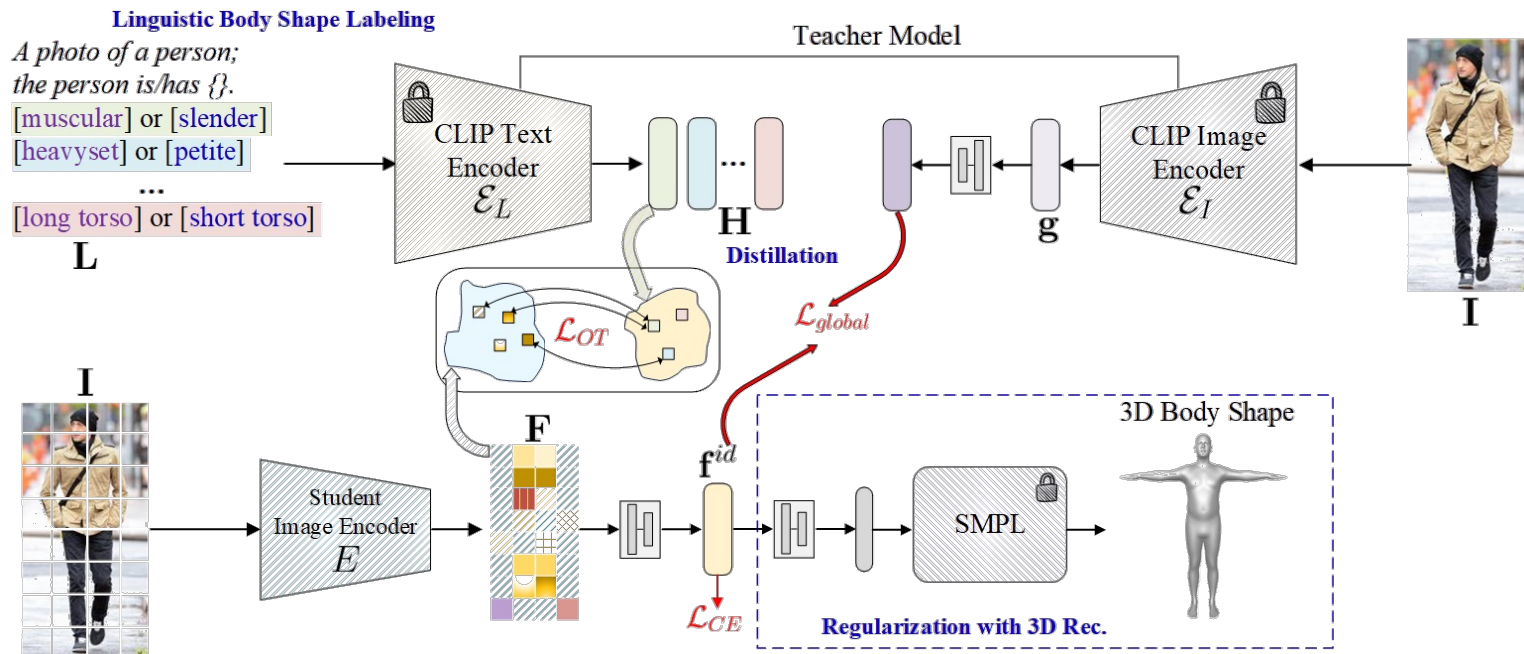
- We devise a fitting process that can disentangle identity and non-identity features in 3D shape;
- We introduce a novel joint two-layer implicit model that fully models a textured 3D clothed human.



Feng Liu, Minchul Kim, ZiAng Gu, Anil Jain, and Xiaoming Liu. Learning Clothing and Pose Invariant 3D Shape Representation for Long-Term Person Re-Identification. ICCV 2023

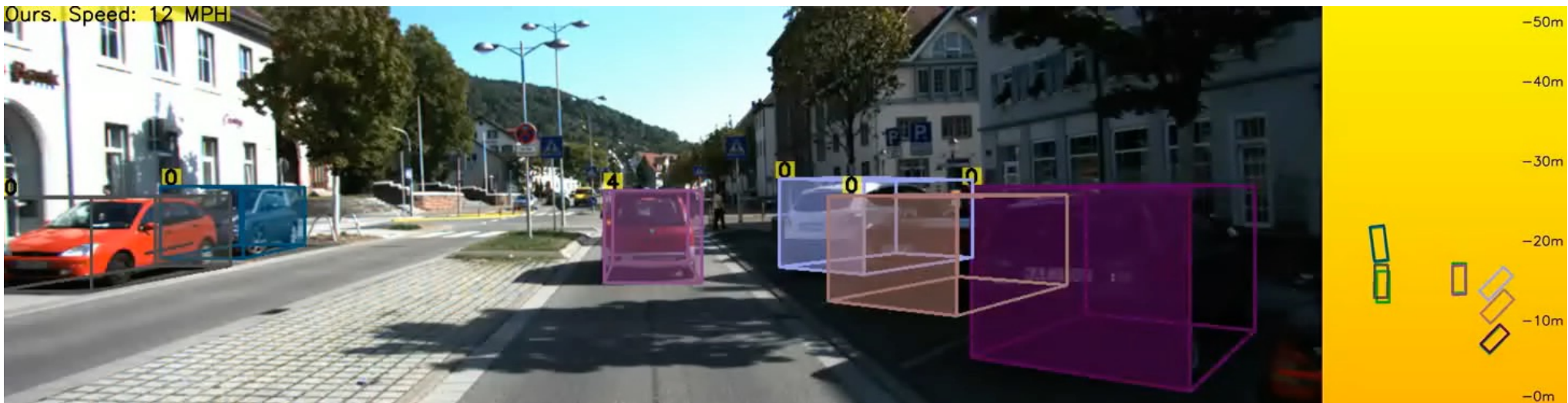
Body Matching via CLIP

- Integrating linguistic insight and visual perception for robust feature distillation.



3D Object Detector

- Estimate the object dimension/location in the metric space, essential for TA2
- Trajectory analysis in understanding object behavior: object-gait



Garrick Brazil, Gerard Pons-Moll, Xiaoming Liu, Bernt Schiele. Kinematic 3D Object Detection in Monocular Video. ECCV 2020.

Camera Calibration for in-the-wild Images

- Universal metric-space depth estimation requires calibration.
- We can estimate intrinsic for any in-the-wild image without checkerboard.

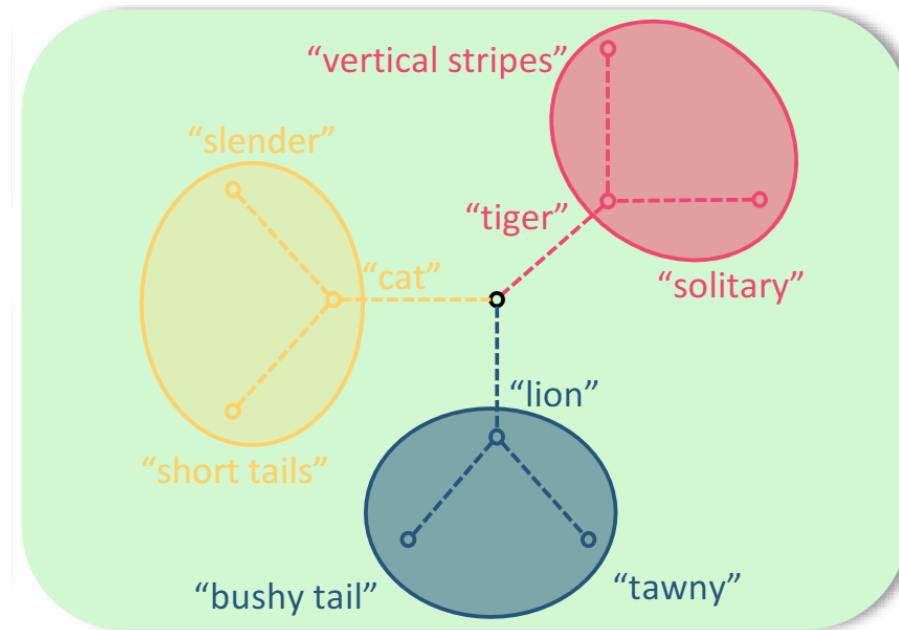


Dolly Zoom with
monotonic focal length

Shengjie Zhu, Abhinav Kumar, Masa Hu, Xiaoming Liu, Tame a Wild Camera: In-the-Wild Monocular Camera Calibration. NeurIPS 2023.

Open-world/Zero Shot Recognition

- Leveraging LLMs like ChatGPT for robust, bias-mitigated object identification without prior class exposure



Zhiyuan Ren, Yiyang Su, and Xiaoming Liu. ChatGPT-Powered Hierarchical Comparisons for Image Classification. NeurIPS 2023.

Summary

- Highly experienced biometric team
- Wide range of computer vision expertise
 - Object detection
 - 3D vision tasks: pose estimation, camera calibration, depth estimation
 - Object modeling across views
 - LVM/LLM for vision

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