Analysis of Hand Segmentation in the Wild

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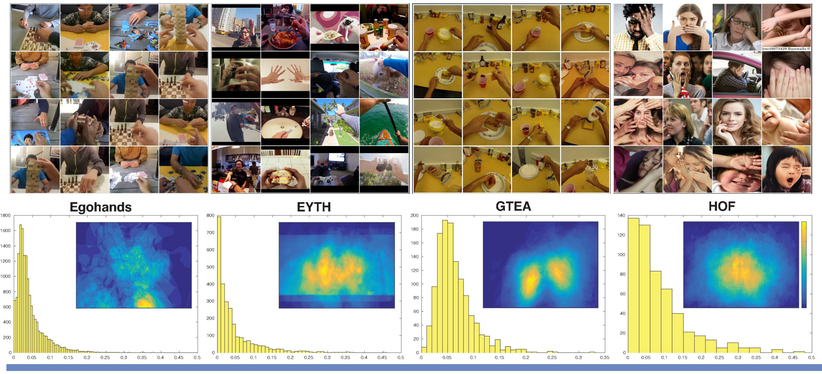
Motivation:

- Hands are ubiquitous.
- Hand segmentation is useful for hand pose recognition, in-hand object detection, gesture recognition, action/activity recognition.
- Existing RGB hand segmentation datasets are collected in laboratory settings.

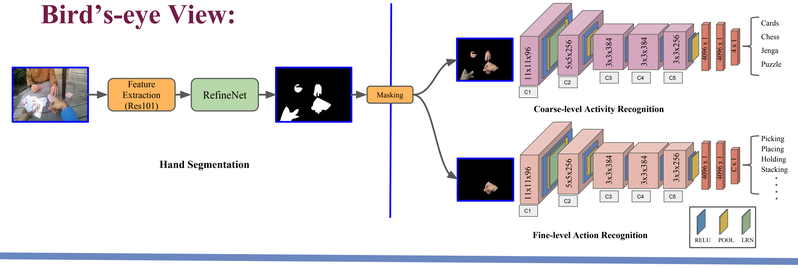
Contribution:

- We provide two hand segmentation datasets:
  - **EgoYouTubeHands:** pixel-level annotations for **1290** egocentric video frames recorded in unconstrained settings.
  - **HandOverFace**: **300** images with pixel-level annotations to study similar appearance occlusion.
- An in-depth study to investigate challenges for robust hand segmentation
- Hand based coarse/fine-level activity and action recognition

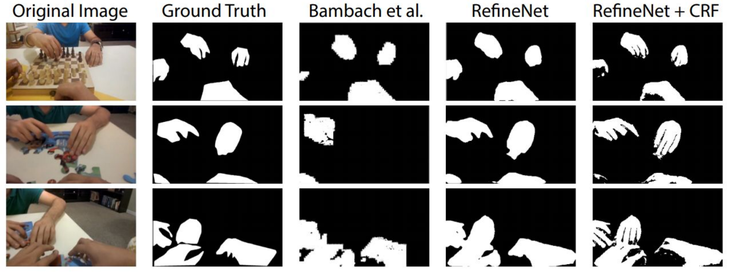
Datasets:



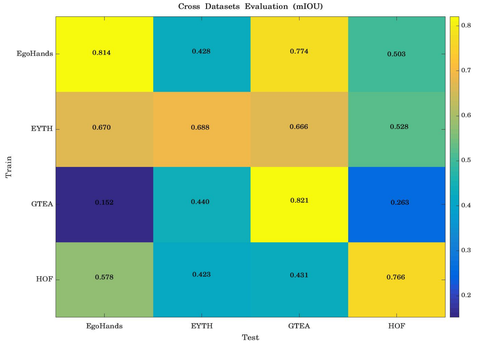
Bird's-eye View:



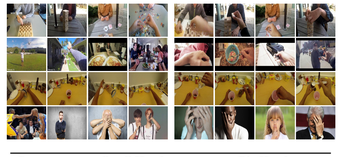
Qualitative Results:



Cross Dataset Evaluation



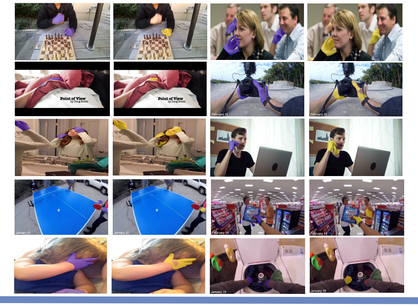
Small Hands vs. Big Hands



Datasets	Small Hands			Big Hands		
	mIOU	mRecall	mPrec	mIOU	mRecall	mPrec
EgoHands	**0.787**	**0.917**	**0.850**	0.750	0.925	0.802
EYTH	0.537	0.643	0.693	**0.867**	**0.914**	**0.944**
GTEA	0.732	0.787	0.913	**0.894**	**0.927**	**0.962**
HOF	0.713	0.866	0.808	**0.792**	**0.932**	**0.840**

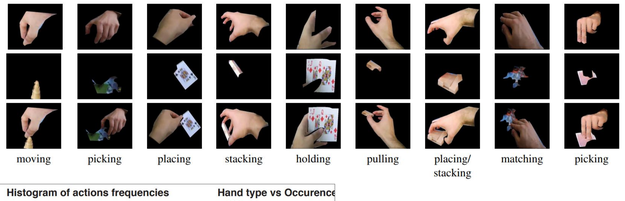
Failure Cases:

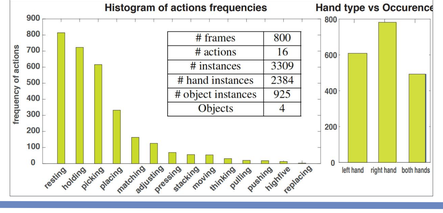
- Motion blur
- Occlusion
- Similar appearance occlusion
- Small hands
- Lightning conditions

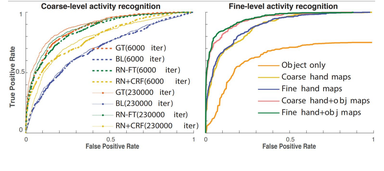


Hand-based Activity/Action Recognition:

- **Coarse-level activity recognition**
  - Trained CNN for 4 activities on EgoHands dataset: cards, chess, jenga and puzzle.
- **Fine-level action recognition**
  - EgoHands+ dataset: We provide additional annotations for fine-level actions.
  - Trained CNN for 8 most frequent actions.







Project Page URL:

https://aurooj.github.io/Hand-Segmentation-in-the-Wild/