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Unsupervised Landmark Discovery via Self-Training

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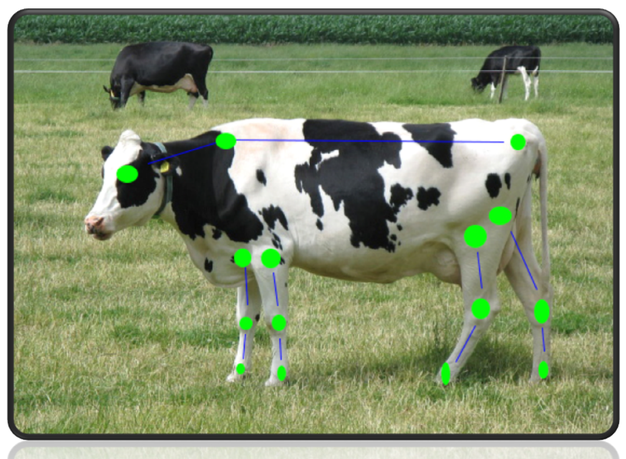
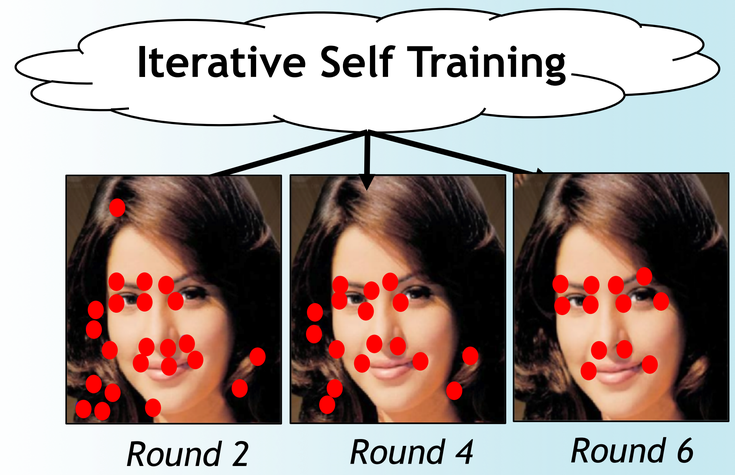
Motivation

- Landmark localization can be used for accurate animal monitoring
- Landmarks capture the shape (limb configuration) of the animal
- Essential building block for most vision applications
- Strong landmark detectors are only available on the human-sending domain due to luck of annotated data



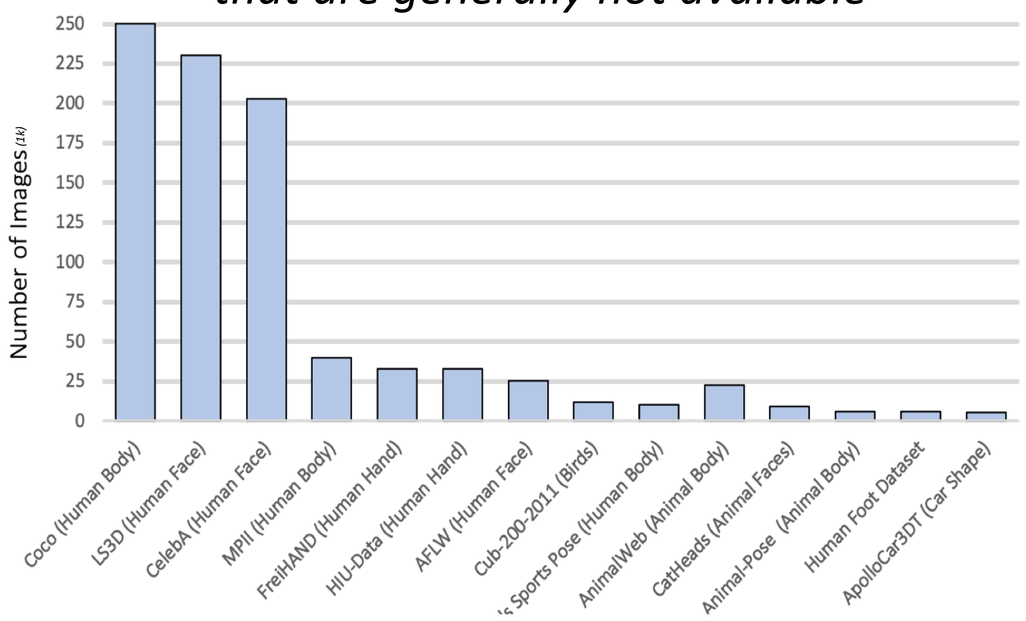
Core Idea



Research Challenge

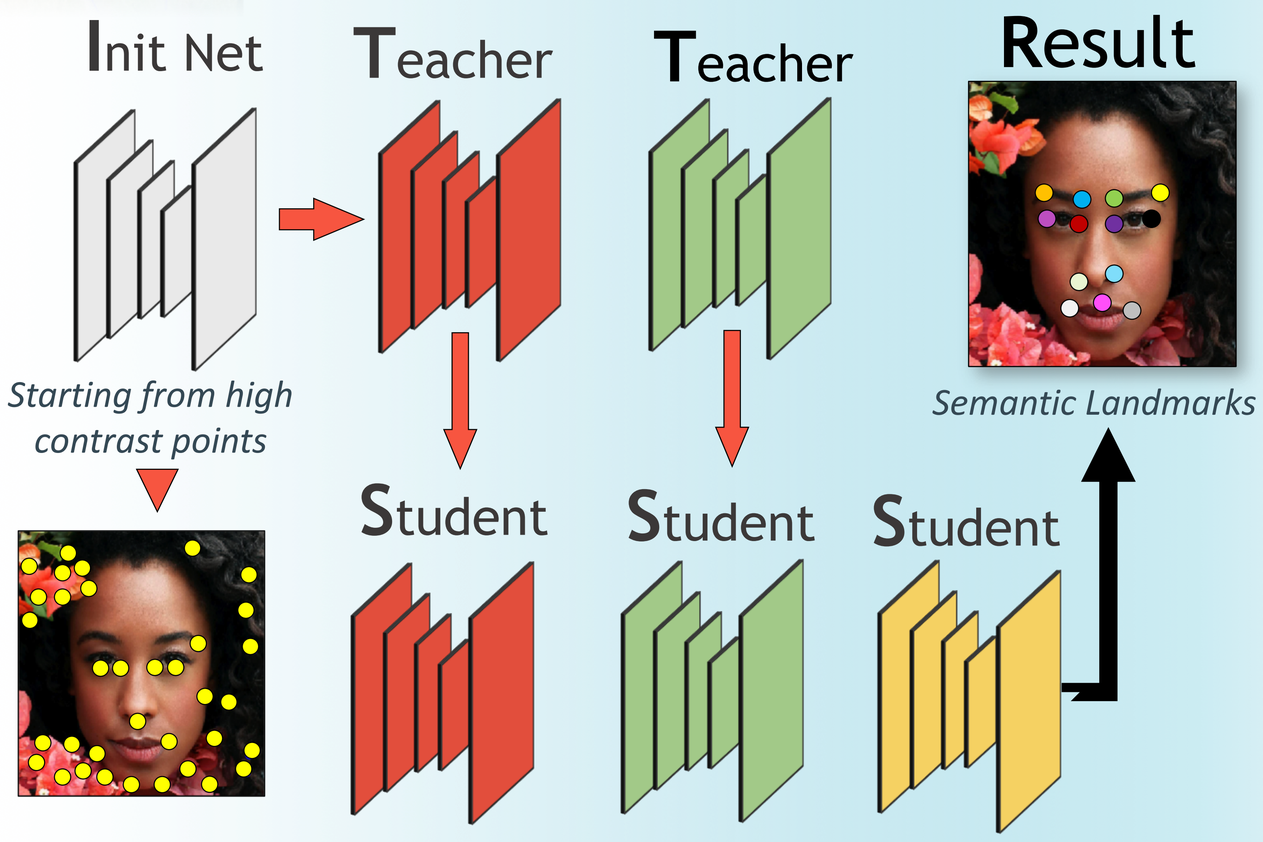
Existing methods require vast amounts of labeled data

that are generally not available



We are exploring the task of Unsupervised Landmark Detection from 2D unlabeled images.

Proposed Architecture



Quantitative Results

PennAction Raw Landmark Accuracy (%)

Method	Head	Shldrs	Elbws	Hands	Waist	Knees	Legs
Jakab	6.36	9.23	7.85	0.59	22.27	17.85	6.48
Ours	74.27	57.91	33.00	8.36	64.81	69.54	75.84

CatHeads Forward-NME (%)

Thewlis	Zhang	Lorenz	Ours
26.94	14.84	9.30	9.31

Conclusions

- Our method can detect meaningful landmarks without need for manual annotations.
- Results show that our method can perform better that other recently proposed methods.
- Can be applied without modification on arbitrary object categories

References

Jakab et al. Unsupervised learning of object landmarks through conditional image generation. NeurIPS 2018

Zhang et al. Unsupervised discovery of object landmarks as structural representations. CVPR 2018

Thewlis et al. Unsupervised Learning of object landmarks by Factorized Spatial embeddings, ICCV 2017

Lorenz et al. Unsupervised Part-Based Disentangling of Object Shape and Appearance. CVPR 2019

Qualitative Results on Animal datasets

Robustness to Changes in Viewpoint

Our approach can learn landmarks that are more flexible in terms of capturing large changes in viewpoint.