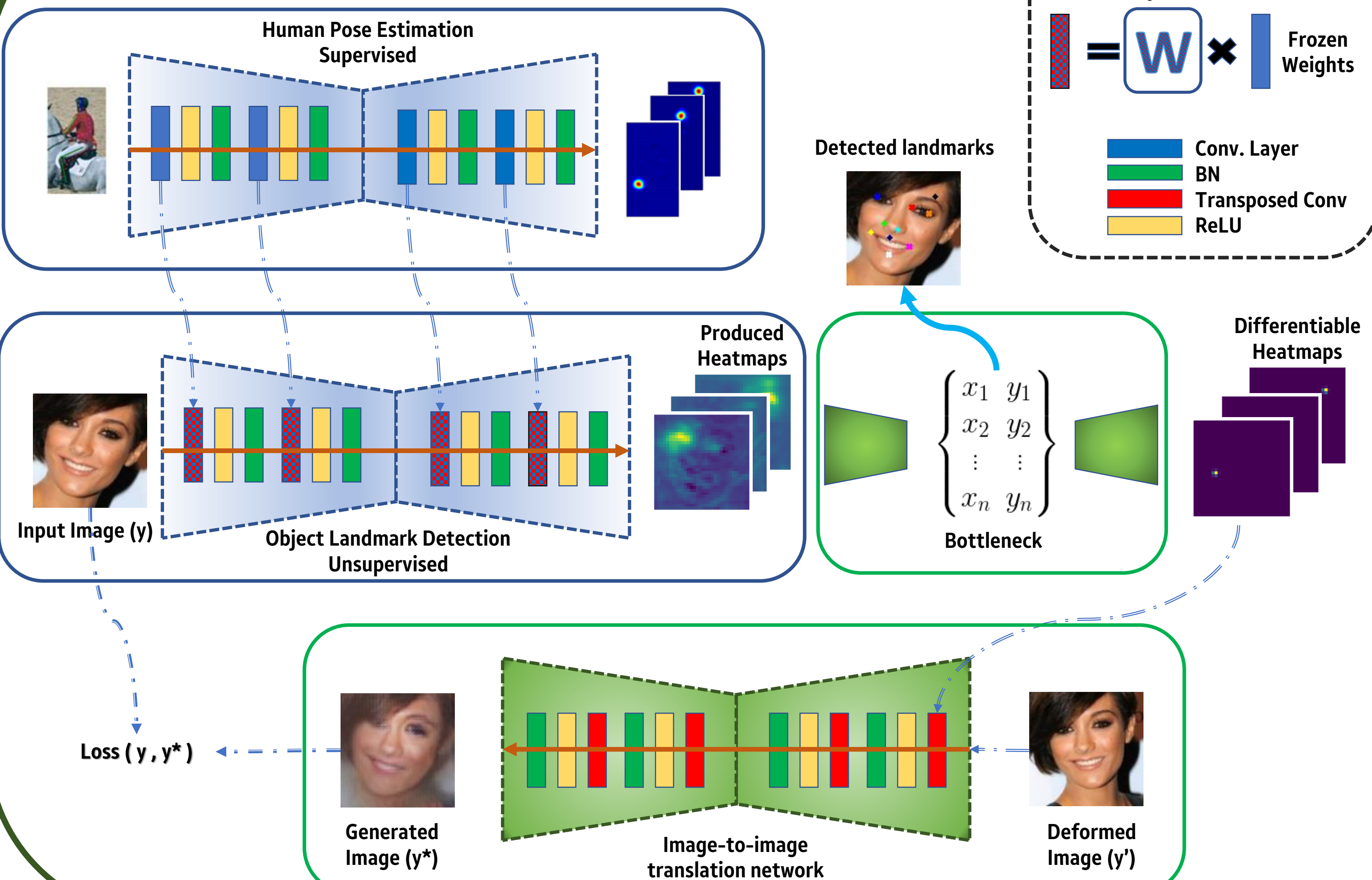


Contributions

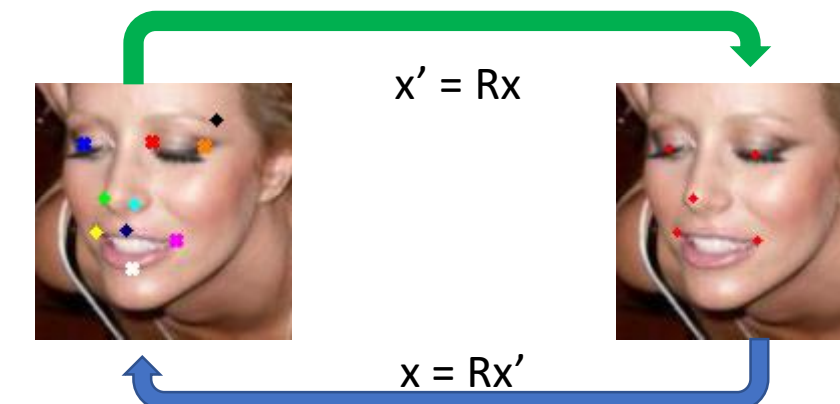
- Goal:** learn an object detector w/o supervision through conditional image generation
- We propose an **incremental learning** approach to **unsupervised learning** of object landmark detectors
- Main idea:** use the “knowledge” of a network trained in a **supervised** way for an object category X, to learn how to discover landmarks for a different object category Y, in an **unsupervised** way.
- More constrained learning with **~10% parameters**
- Novel evaluation:
 - Forward
 - Backward
 - Consistency

Method

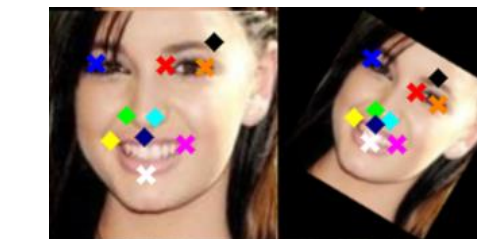


Evaluation

Forward



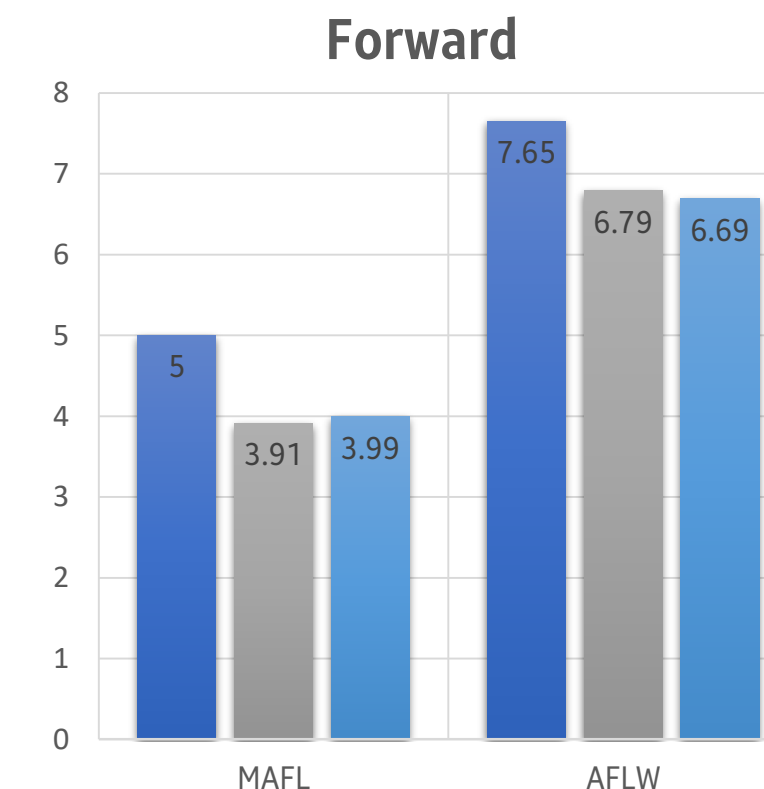
Consistency



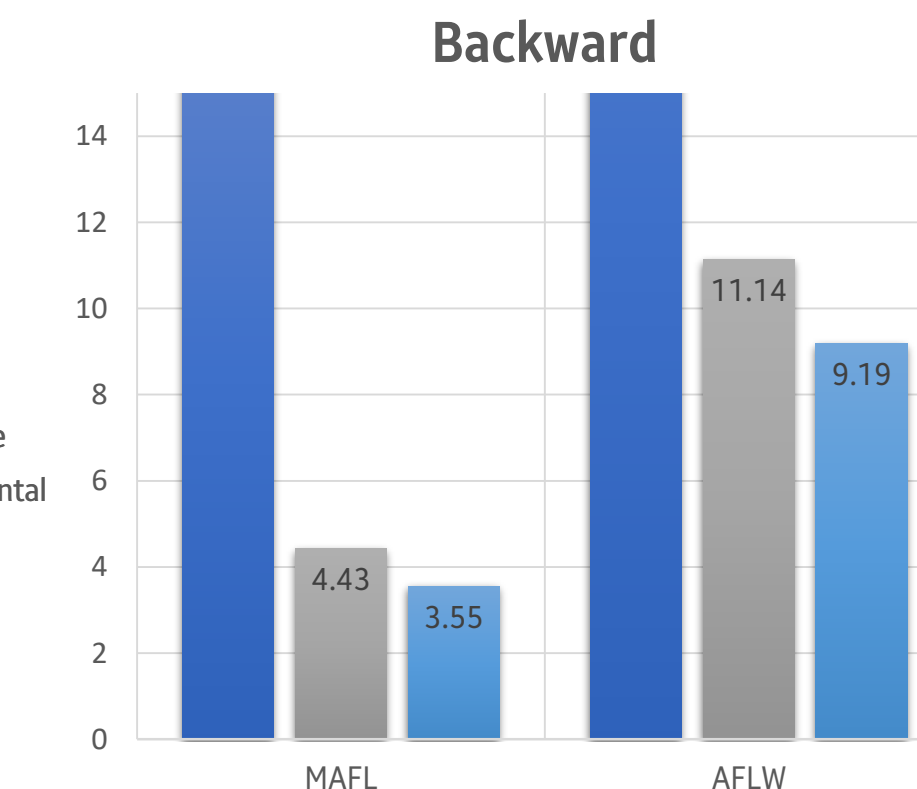
$$e_i = \|\Psi_{\theta_y}^i(A(y)) - A(\Psi_{\theta_y}^i(y))\|$$

Backward

Forward: Scratch/Finetune/Proposed



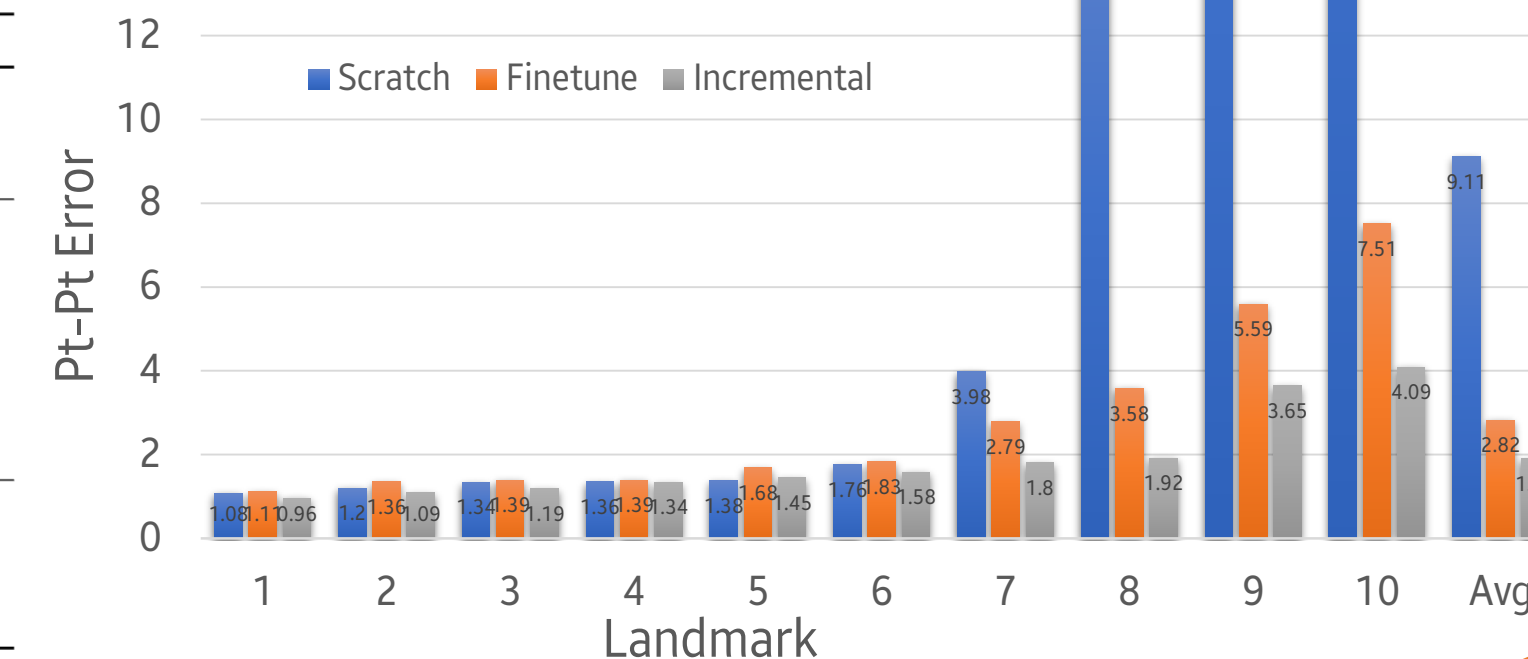
Backward: Scratch/Finetune/Proposed



Forward: Comparison s.o.t.a.

Method	MAFL	AFLW
Supervised		
TCDCN [45]	7.95	7.65
MTCNN [44]	5.39	6.90
Unsupervised		
Thewlis [35]($K = 30$)	7.15	-
Jakab [13]†	3.32	6.99
Jakab [13]††	3.19	6.86
Zhang [43]($K = 10$)	3.46	7.01
Shu [31]	5.45	-
Sahasrabudhe [30]	6.01	-
Ours		
Baseline	5.00	7.65
Finetune	3.91	6.79
Proposed	3.99	6.69

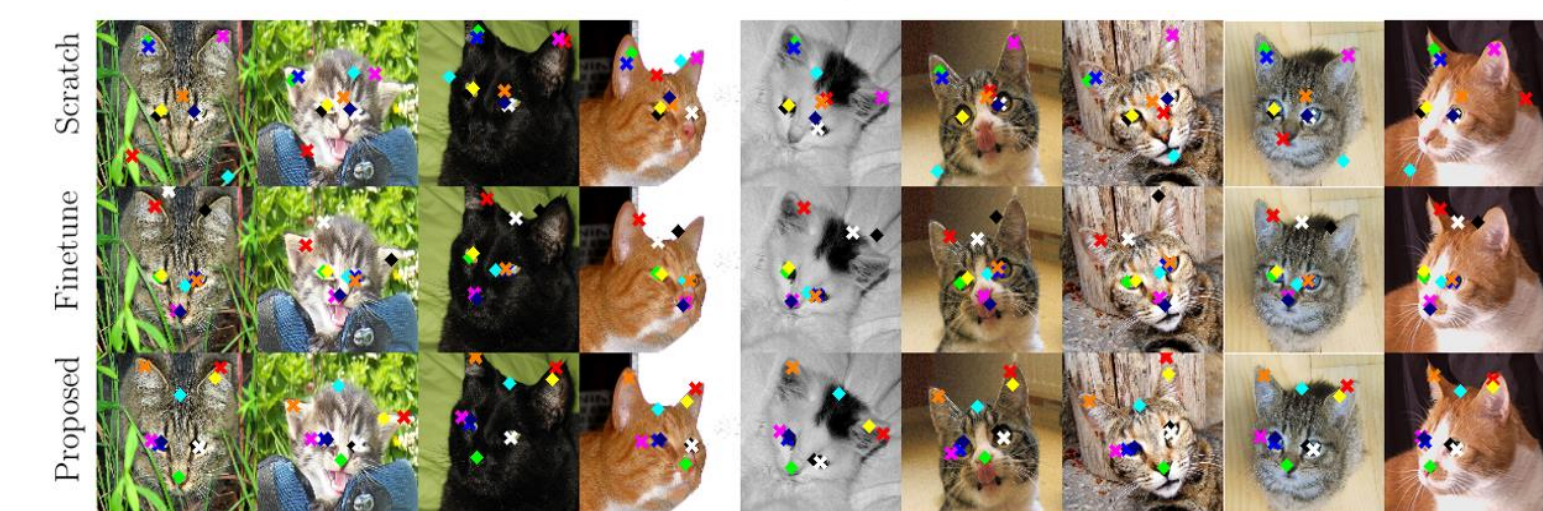
Consistency



Body -> Face



Body -> Cats



Body -> Shoes



Face -> Body



References

Thewlis et al. Unsupervised learning of object landmarks by factorized spatial embeddings. *ICCV '17*
 Jakab et al. Unsupervised learning of object landmarks through conditional image generation. *NeurIPS '18*
 Zhang et al. Unsupervised discovery of object landmarks as structural representations. *CVPR '18*