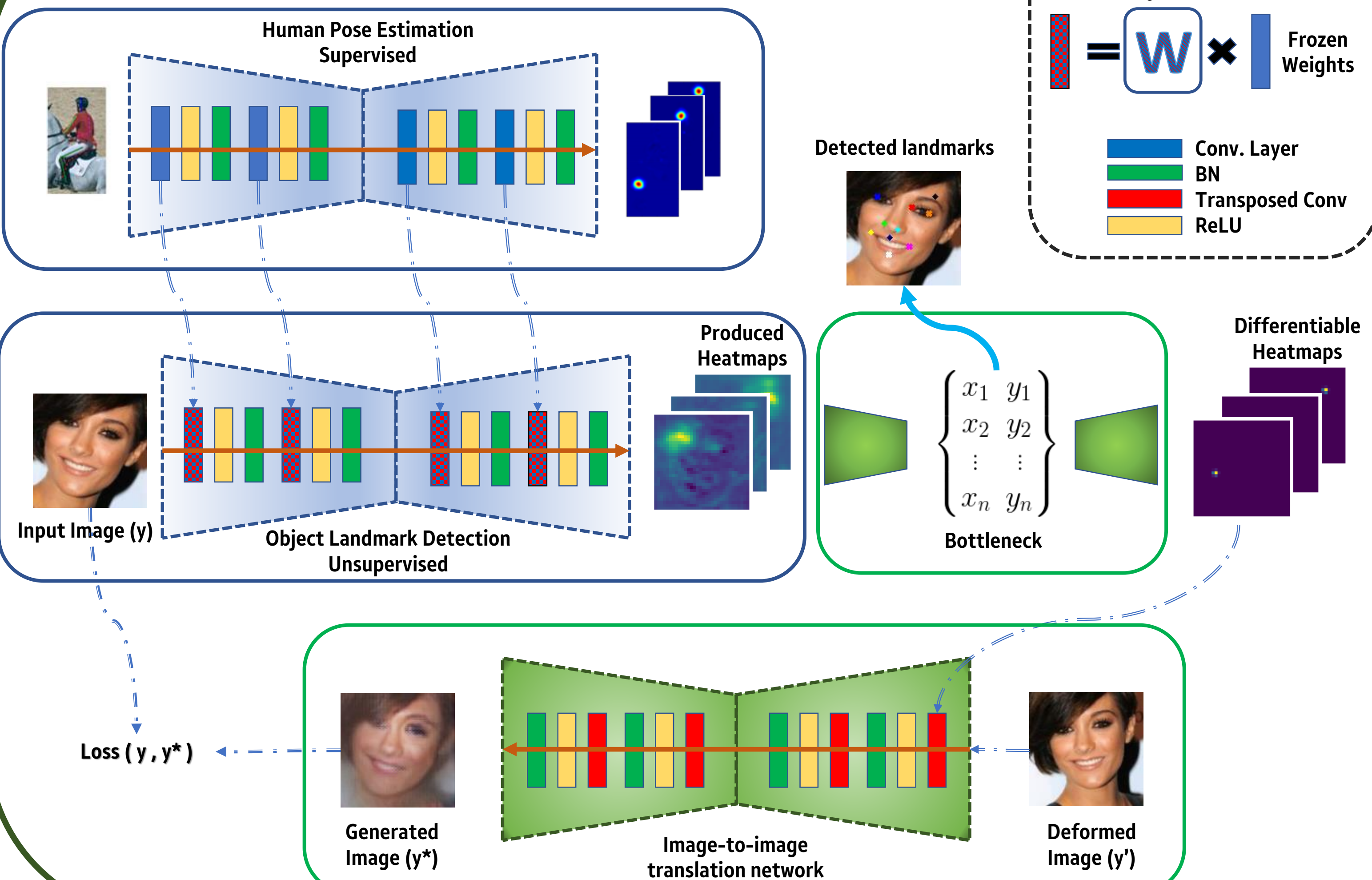


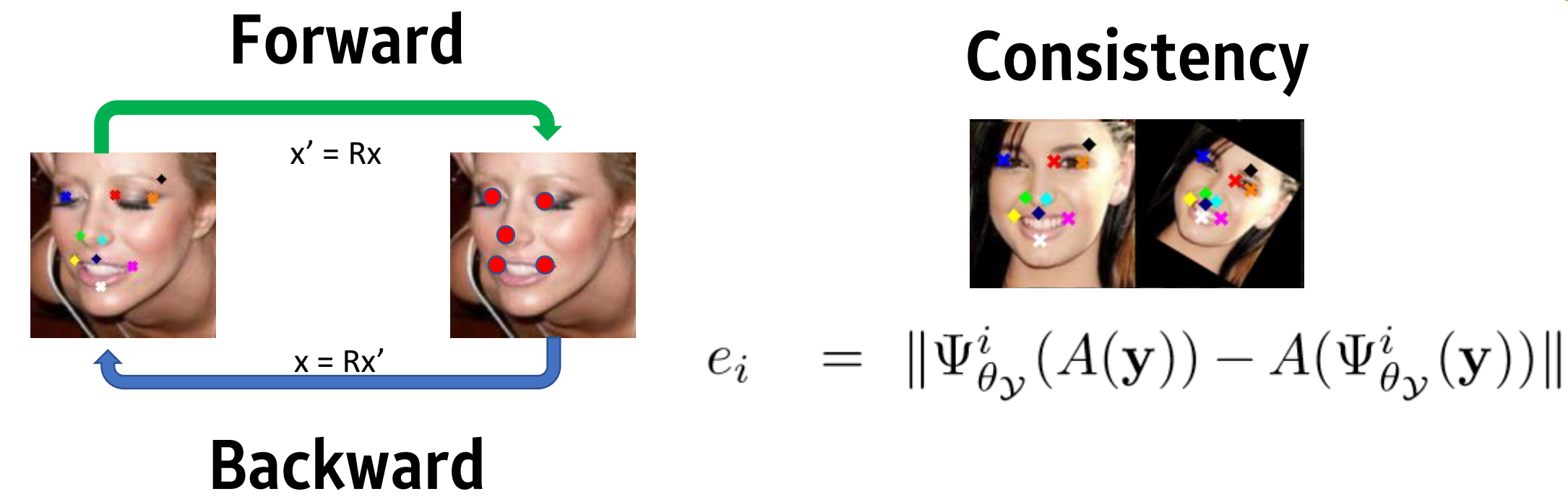
## Contributions

- 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

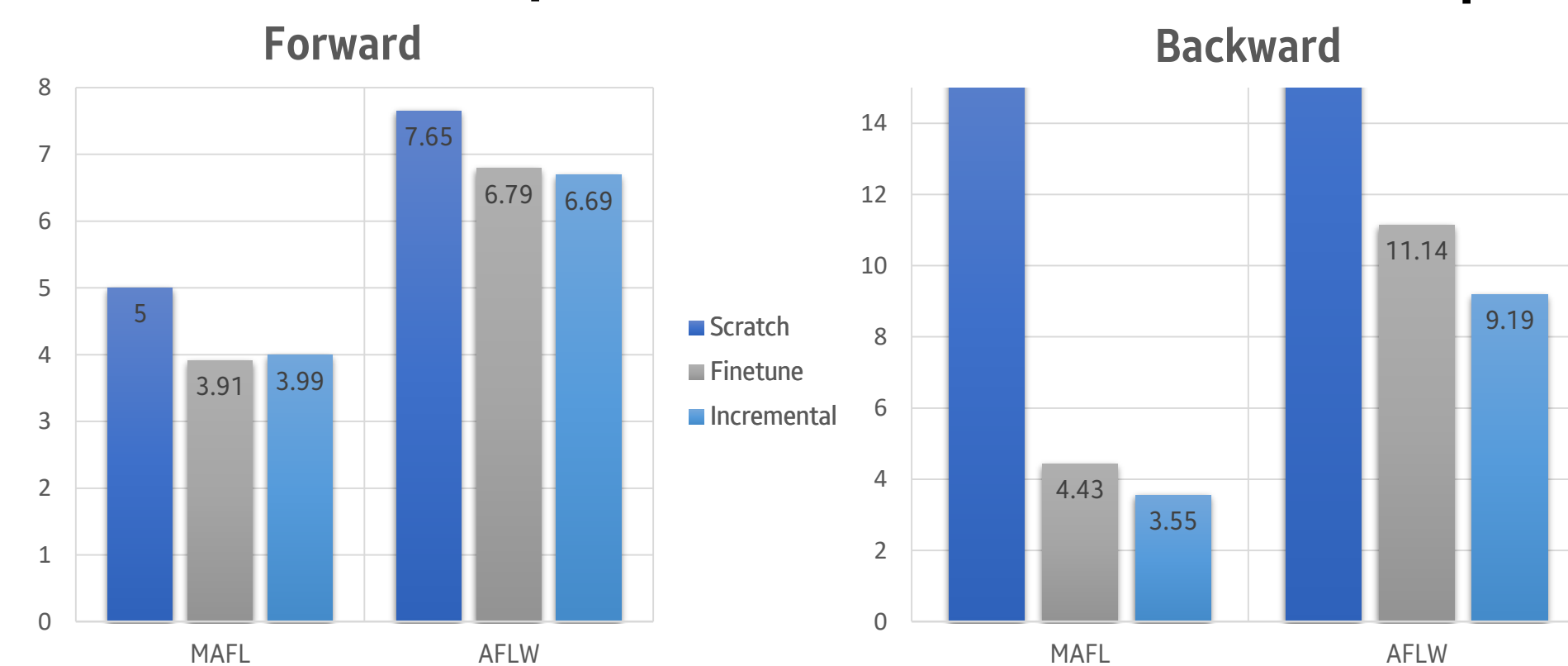


## Evaluation



**Forward: Scratch/Finetune/Proposed**

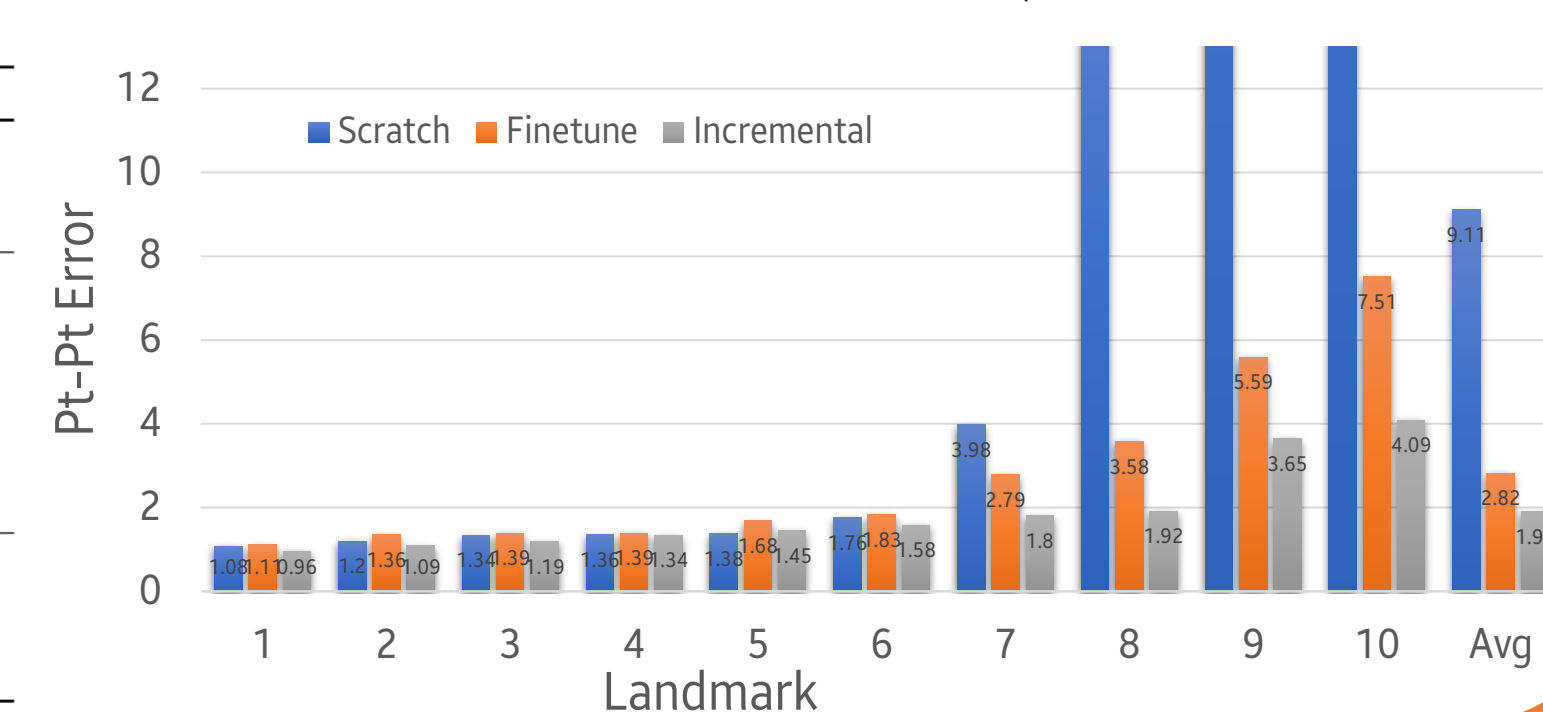
**Backward: Scratch/Finetune/Proposed**



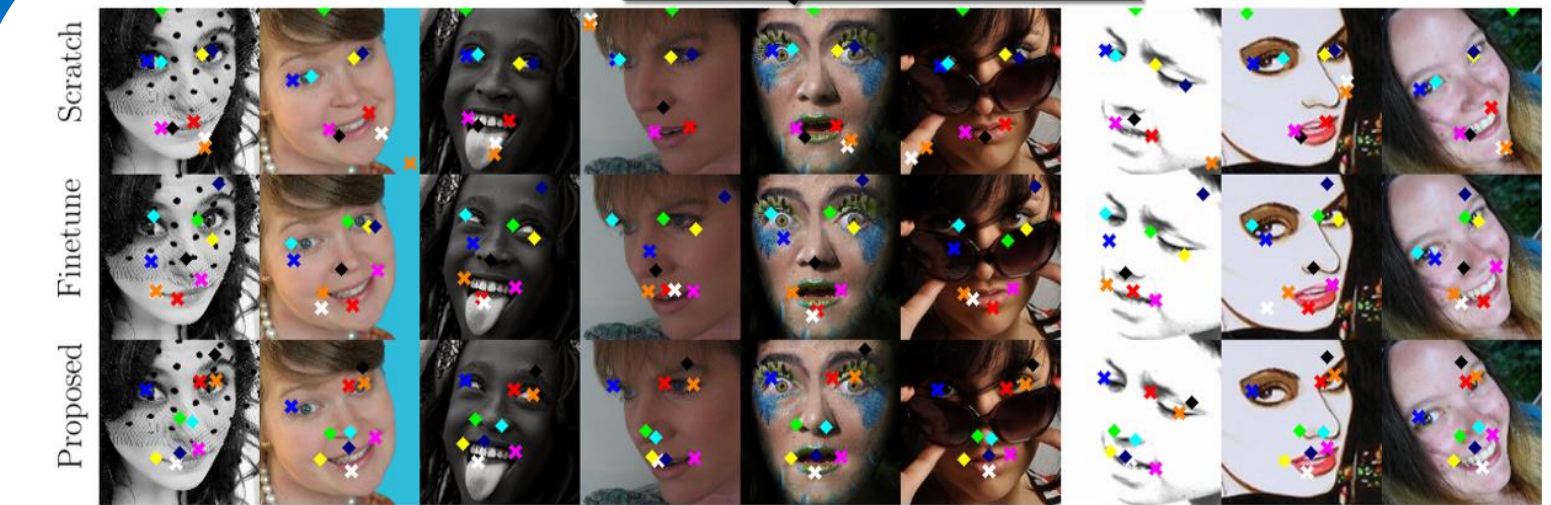
**Forward: Comparison s.o.t.a.**

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

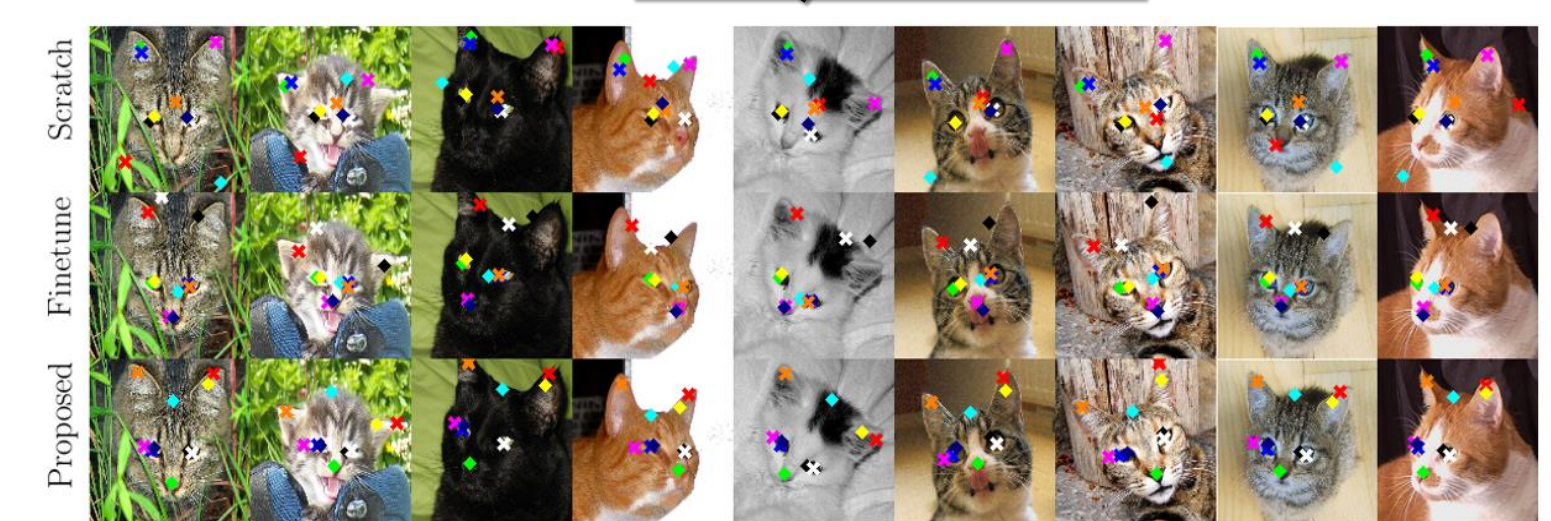
**Consistency**



**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*



