SAMSUNG Al Center

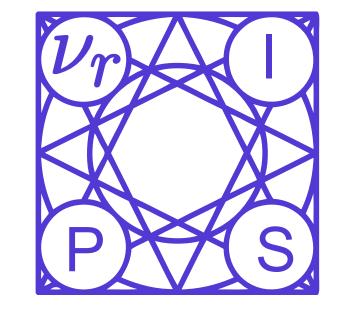
- Cambridge

Object landmark discovery through unsupervised adaptation

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https://github.com/ESanchezLozano/SAIC-Unsupervised-landmark-detection-NeurIPS2019



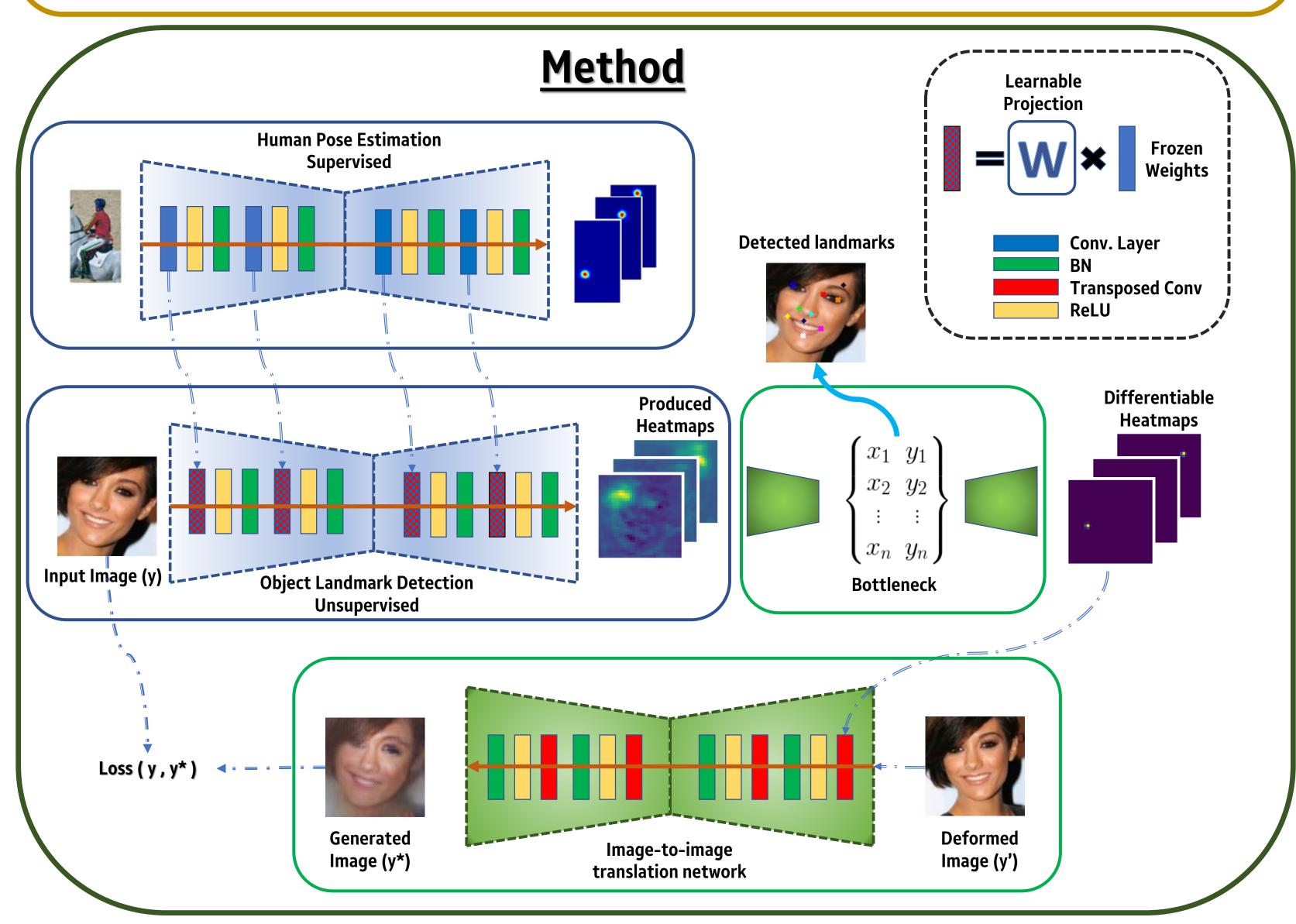
Contributions

1. Goal: learn an object detector w/o supervision through conditional image generation

The University of

Nottingham

- 2. We propose an **incremental learning** approach to **unsupervised learning** of object landmark detectors
- 3. 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.
 - 4. More constrained learning with ~10% parameters
 - 5. Novel evaluation:
 - i. Forward
 - ii. Backward
 - iii. Consistency



Evaluation Forward Consistency $= \|\Psi_{\theta_{\mathcal{V}}}^{i}(A(\mathbf{y})) - A(\Psi_{\theta_{\mathcal{V}}}^{i}(\mathbf{y}))\|$ **Backward Backward:** Forward: Scratch/Finetune/Proposed Scratch/Finetune/Proposed **Forward Backward** Forward: Consistency Comparison s.o.t.a. MAFL AFLW Method ■ Scratch ■ Finetune ■ Incremental **TCDCN [45]** MTCNN [44] 6.905.39Thewlis [35](K = 30)Jakab [13]† 3.323.19Jakab [13]†† 6.86Zhang [43](K = 10)3.465.456.01Sahasrabudhe [30] 5.007.65Baseline 3.916.79Finetune 3.99 **6.69** Proposed Landmark



<u>References</u>

Thewlins 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*