PatchMatch-Based Neighborhood Consensus for Semantic Correspondence

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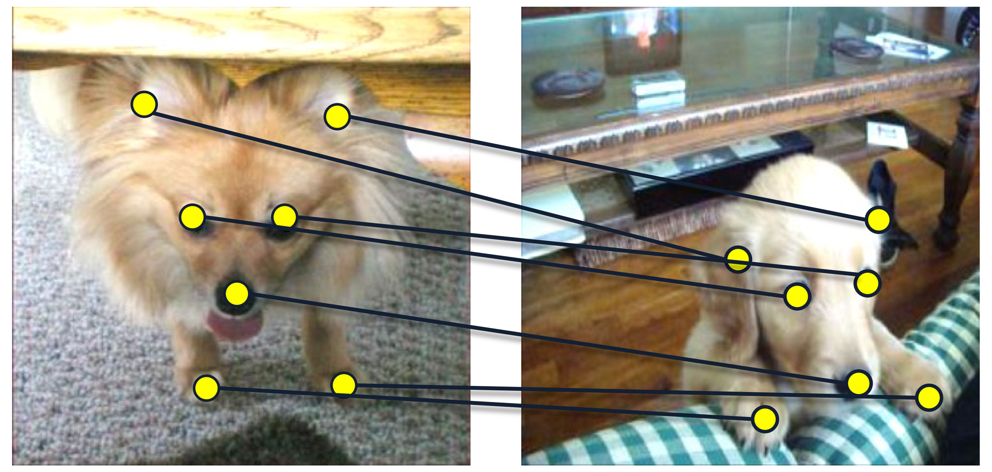
1. ILLINOIS 2. Microsoft

INTRODUCTION

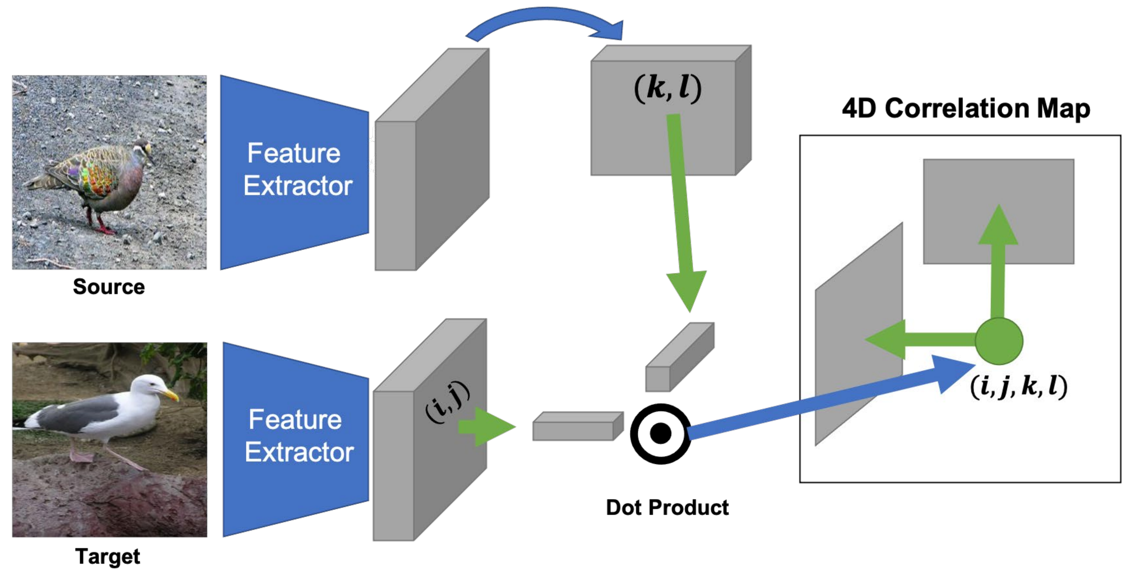
Semantic Correspondence Problem



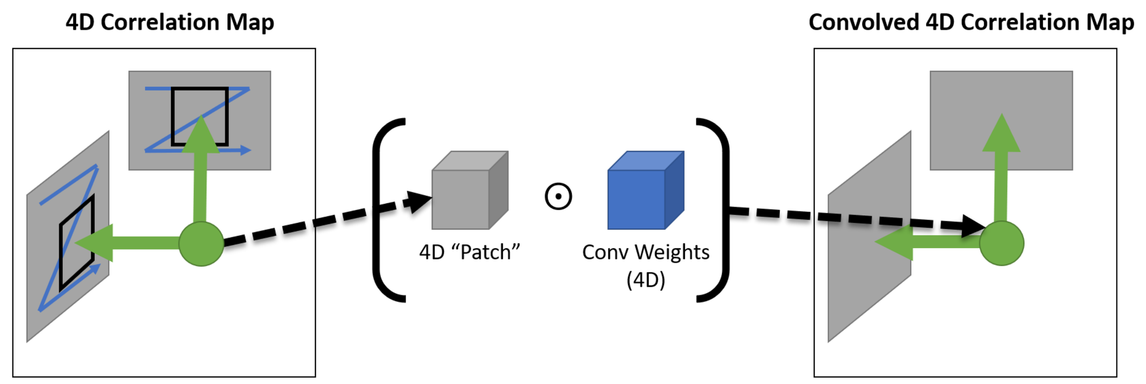
Related works: **NC-Net** (Rocco et al. 2018; NeurIPS), ANC-Net(Li et al. 2020; CVPR)

REVIEW: NEIGHBORHOOD CONSENSUS

1. Computing 4D Correlation Maps

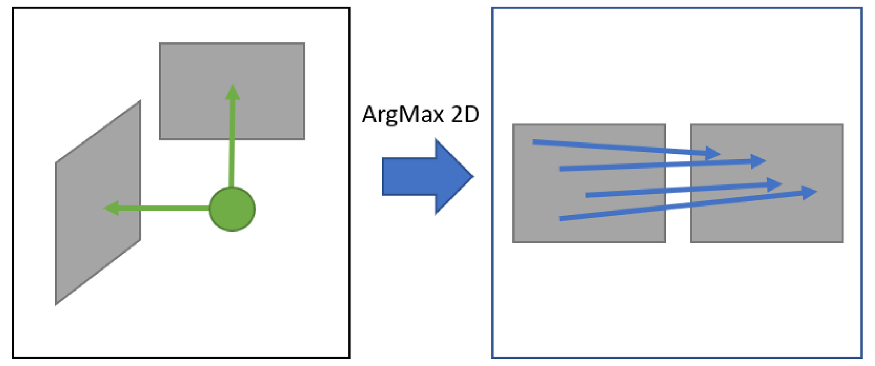


2. 4D Convolution over 4D Correlation Maps



3. Find best Correlation Value at each pixel

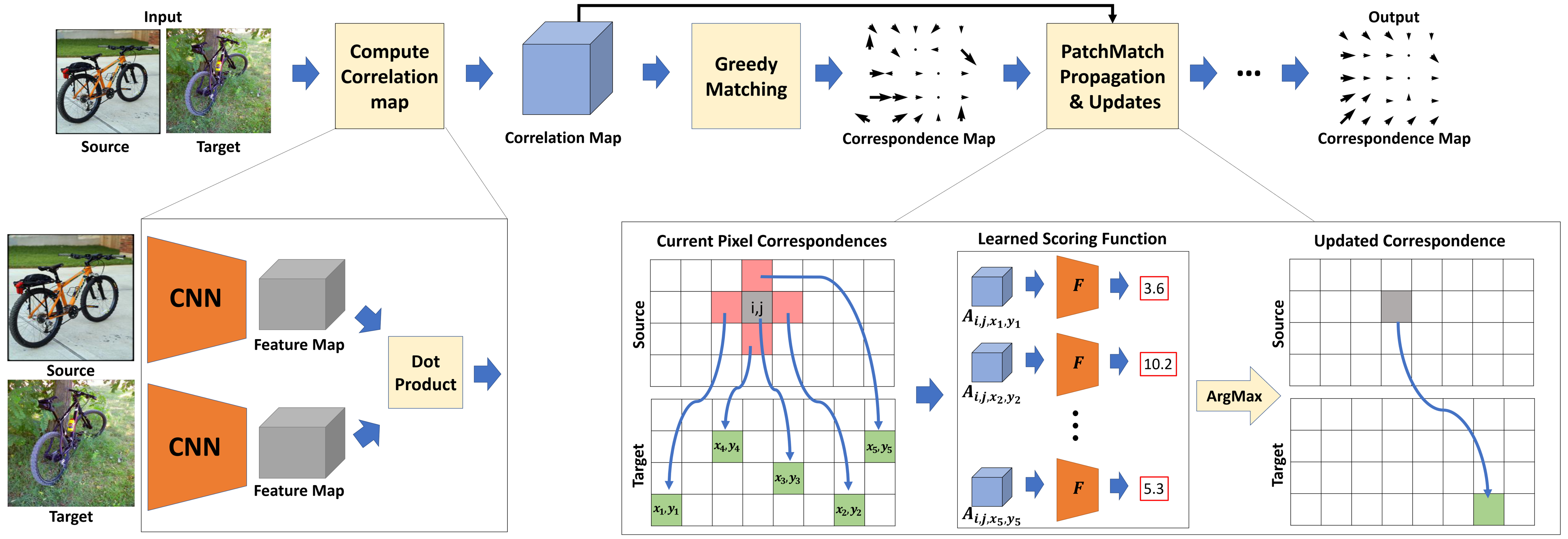
Convolved 4D Correlation Dense 2D Matches



PATCHMATCH-BASED INFERENCE

Accelerate Inference using PatchMatch

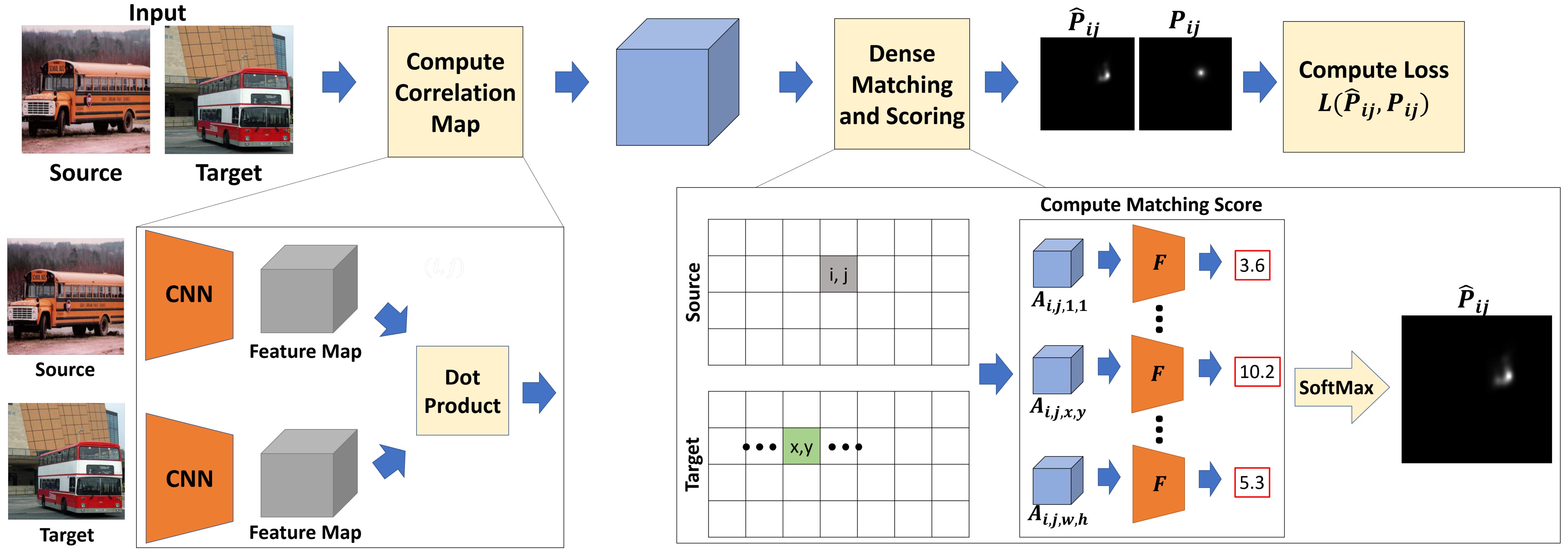
- Replace full 4D Convolution with PatchMatch
- Time Complexity: $O(N^4)$ vs $O(NMr^4)$ where N =Max(W, H), M=PatchMatch iterations, r=Patch size



TRAINING 4D SCORING FUNCTION

Proxy model for training 4D Neighborhood Consensus based scoring function

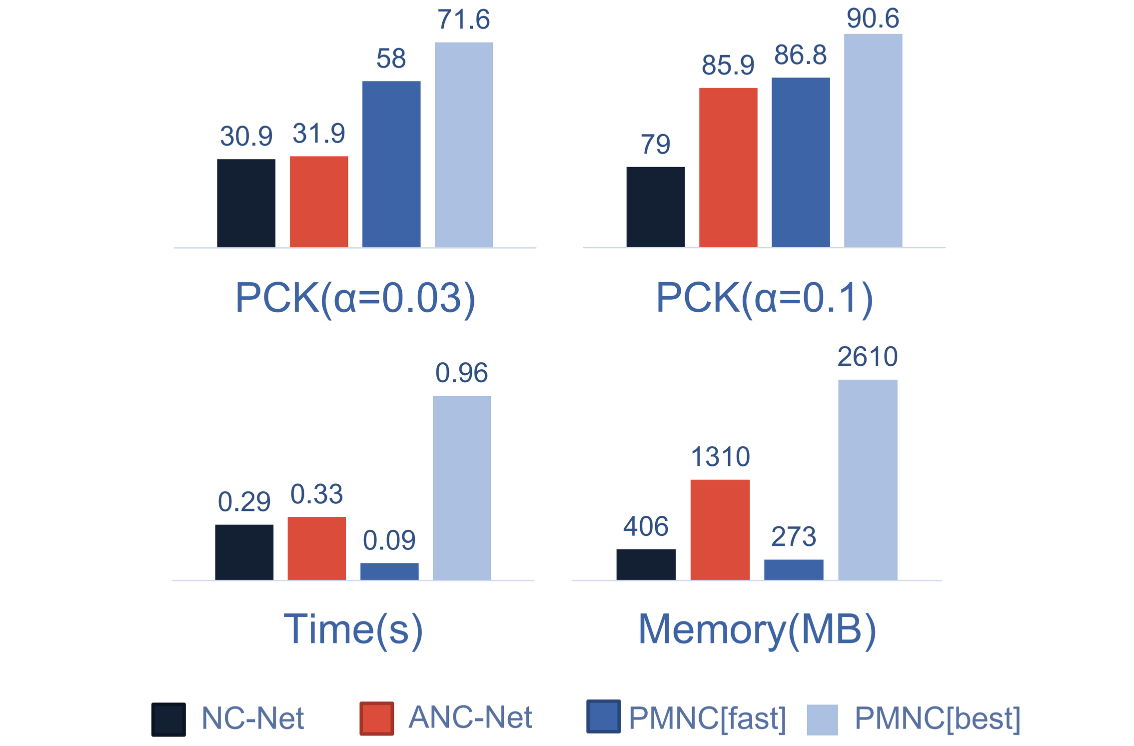
- For each annotation in the source image
- Computes 2D matching probability distribution of all pixels on the target image
- Loss given by cross entropy between expected and the ground truth annotation

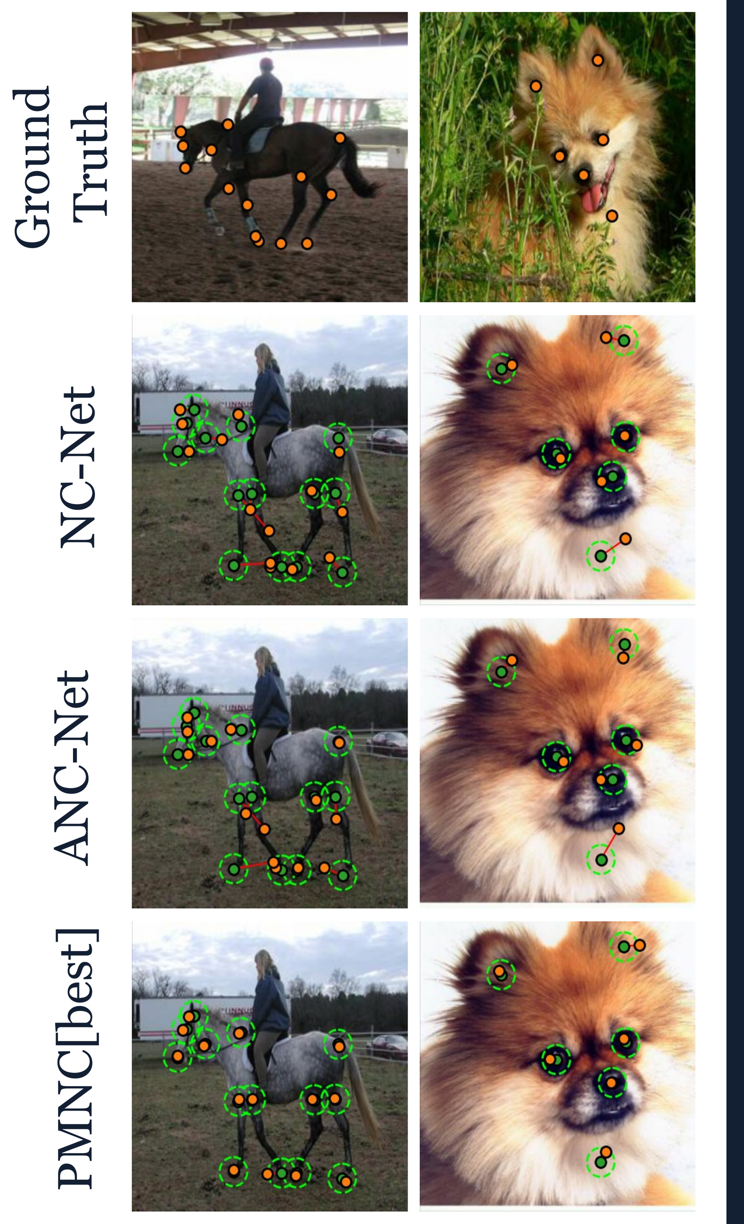


RESULTS

PF-Pascal

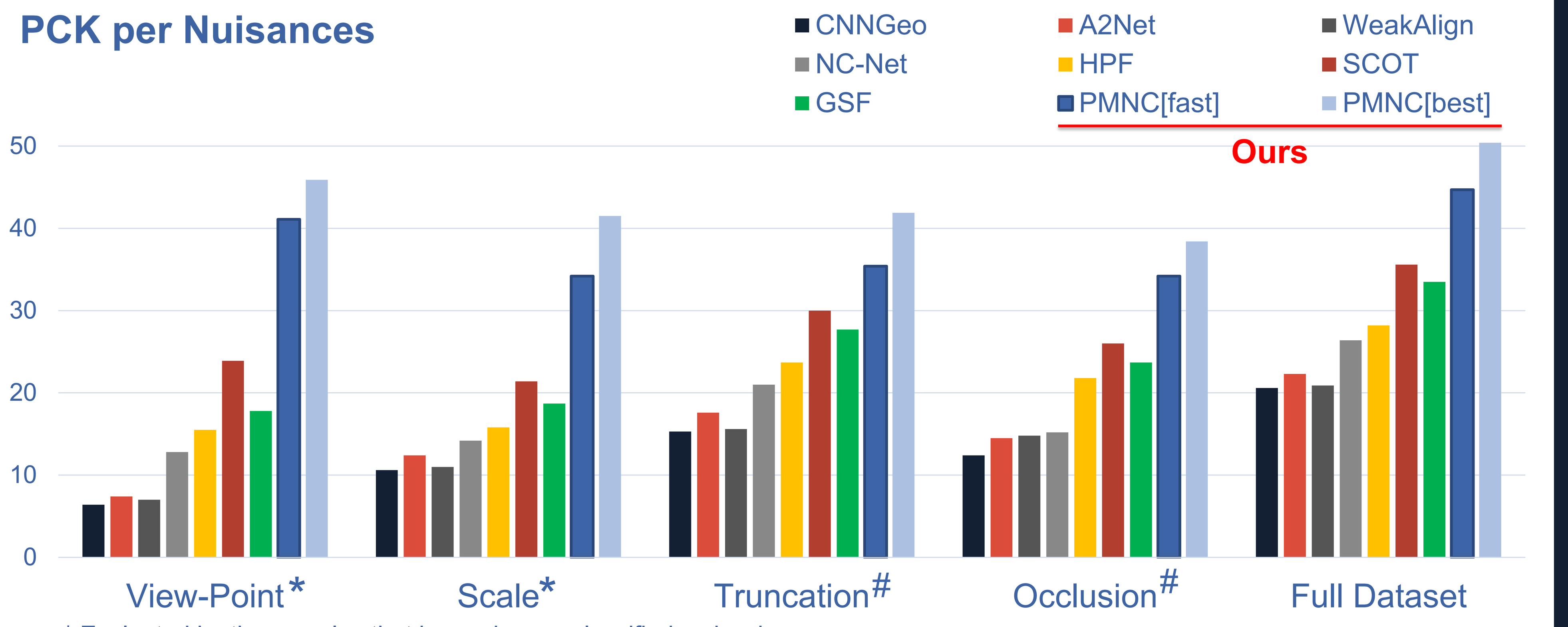
- State of the art performance for all thresholds
- The fastest and uses the least memory





SPair-71K

- State of the art performance (50.4%)
- Robust to different nuisances by a significant margin



* Evaluated by the samples that has nuisance classified as hard

\# Evaluated by the samples that contains nuisance in both source and target images