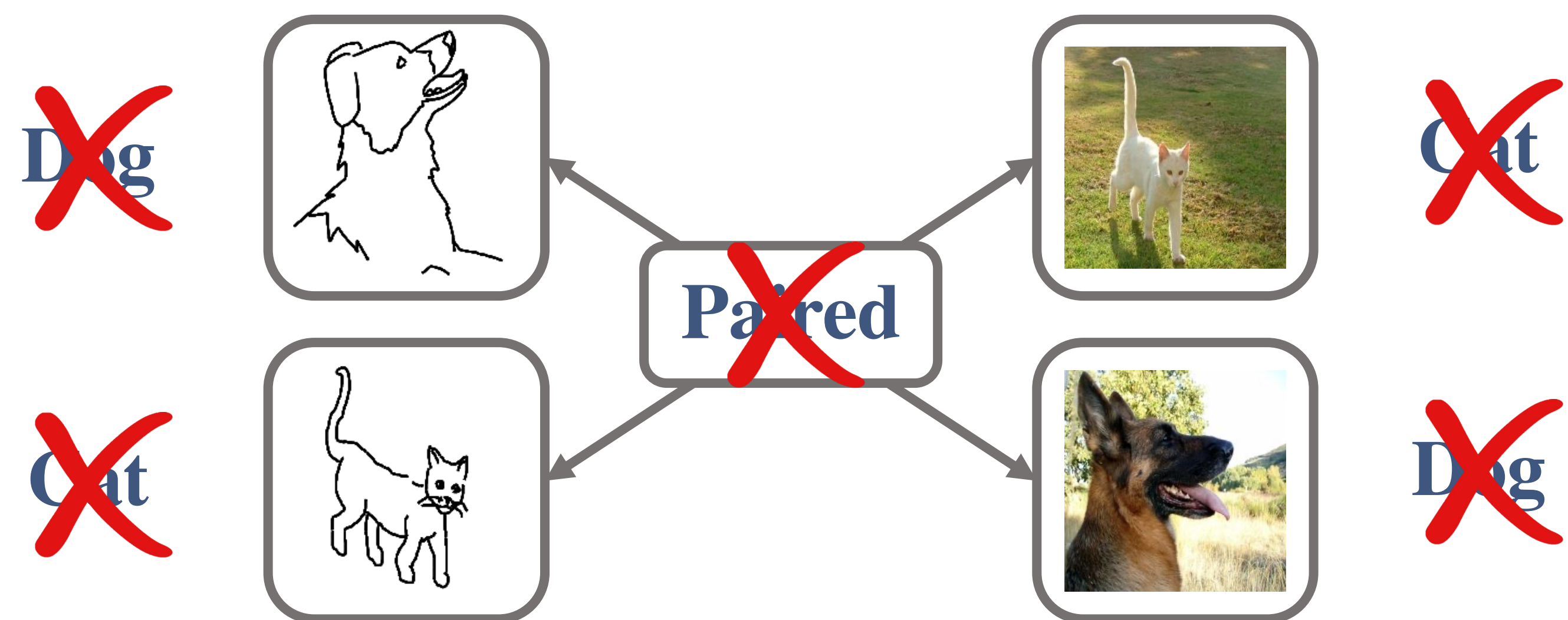# Towards Unsupervised Sketch-based Image Retrieval

Conghui Hu[1]   Yongxin Yang[2]   Yunpeng Li[3]   Timothy M. Hospedales[2]   Yi-Zhe Song[3]

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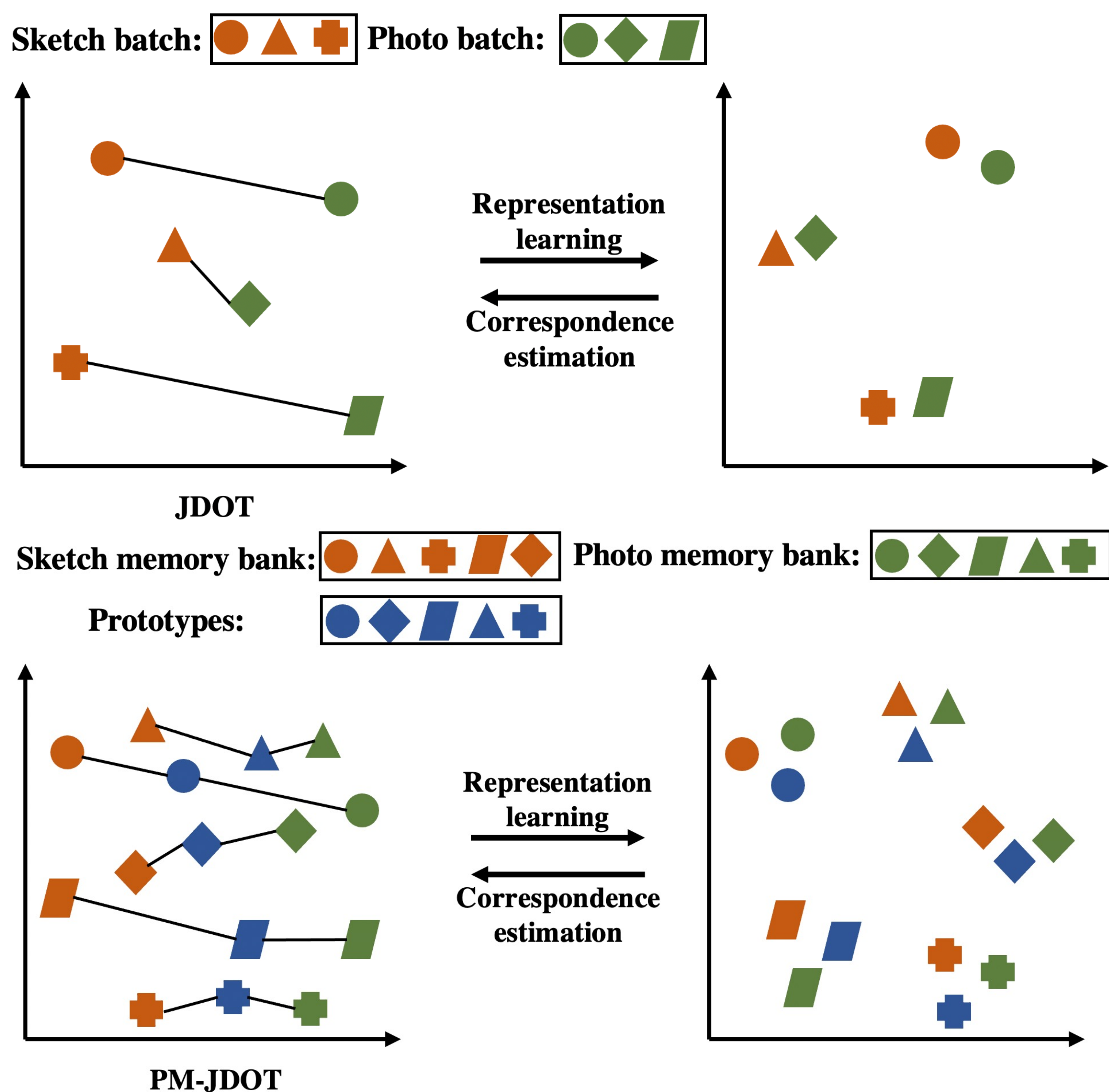## Unsupervised Sketch-based Image Retrieval:

Problem definition:

retrieve photos of the same category as input sketch with
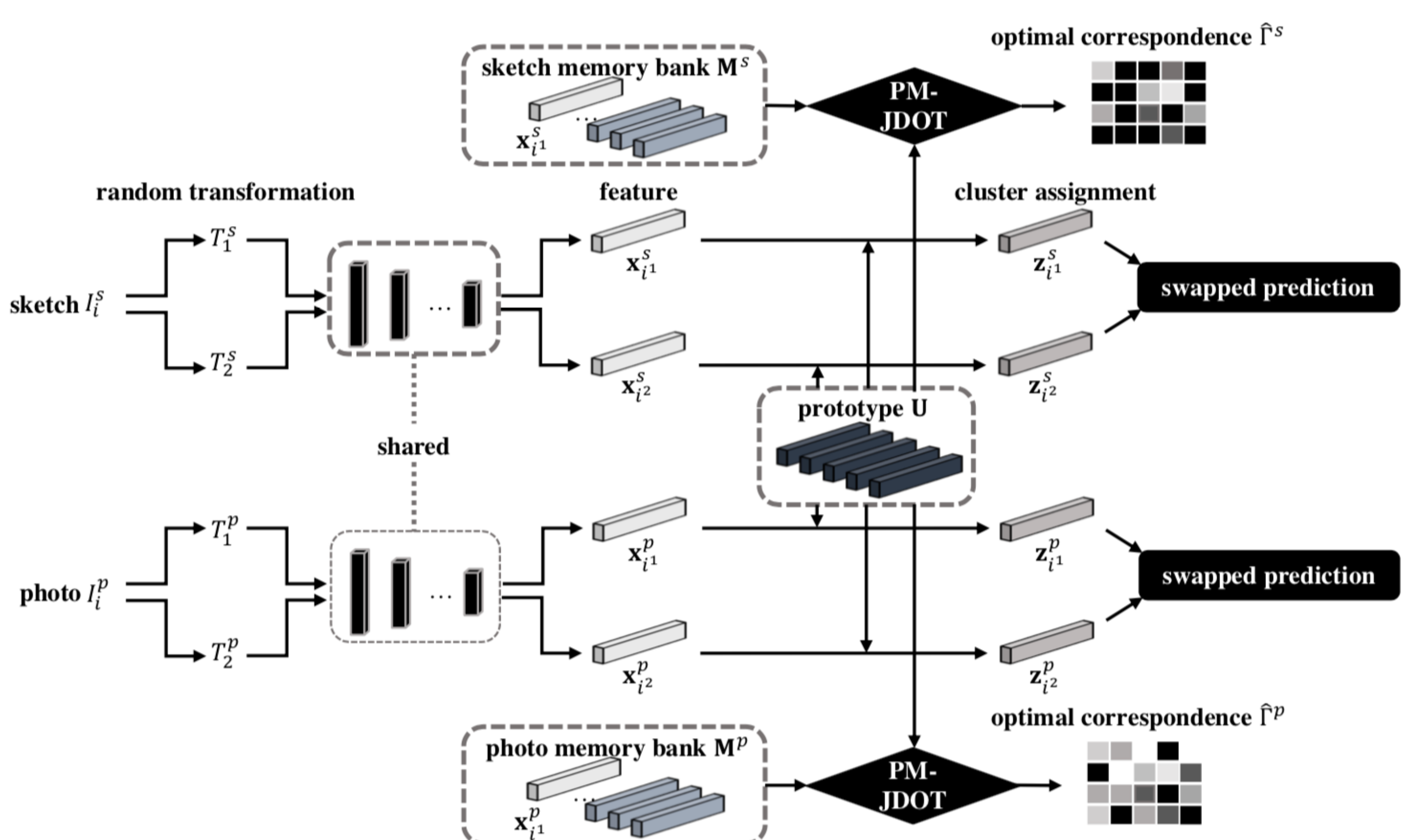- no category annotations
- no sketch-photo pairing

Proposed solution

- compute a soft correspondence between sketch and photo domains
- learn a representation that aligns sketch and photo features under the soft correspondence, and is also semantically meaningful.
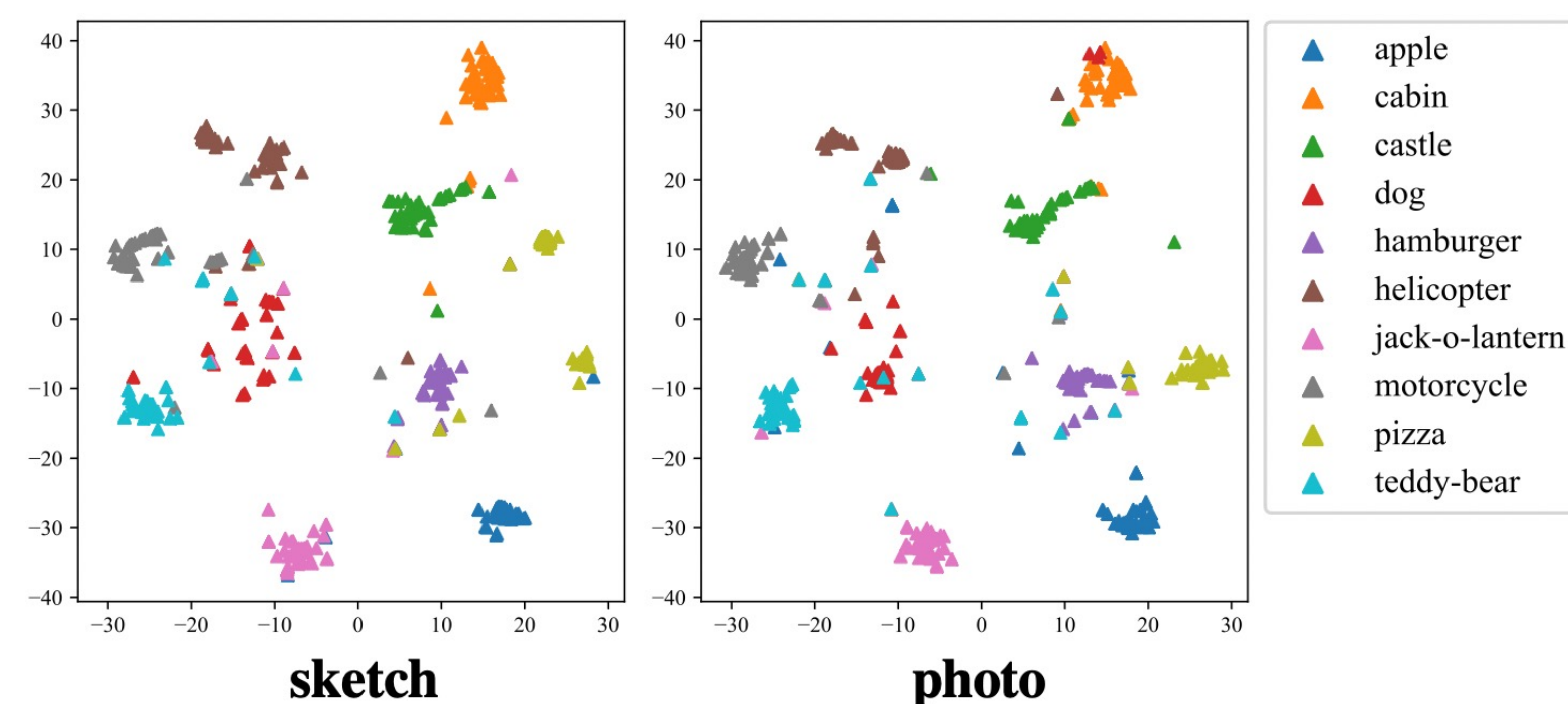

Sketch batch: **Photo batch:**

Representation learning

Correspondence estimation

JDOT

Sketch memory bank: **Photo memory bank:**

Prototypes:

PM-JDOT

Our framework:

Results:

Retrieval accuracy on Sketchy-Extended:

Method	Sketchy-Extended dataset		
	Prec@200(%)	mAP@200 (%)	mAP (%)
RotNet [17]	2.26	4.89	1.54
ID [38]	3.41	5.26	2.45
CDS [20]	2.37	3.58	1.88
GAN [18]	2.45	4.66	1.43
SwAV [5]	10.87	12.51	10.15
DSM [29]	10.07	17.92	4.28
SwAV [5] + CycleGAN [45]	4.15	5.39	4.28
SwAV [5] + GAN [18]	22.96	25.48	18.82
Ours	**33.64**	**36.31**	**28.17**

Ablation study:

Method	JDOT	Proto.	Mem. bank	Sketchy-Extended dataset		
				Prec@200(%)	mAP@200 (%)	mAP (%)
v1	✗	✗	✗	10.87	12.51	10.15
v2	✓	✗	✗	21.07	23.19	18.53
v3	✓	✓	✗	25.60	28.62	20.98
v4	✓	✗	✓	24.83	27.67	20.78
v5	✓	✓	✓	**33.64**	**36.31**	**28.17**

Feature visualization:

sketch   photo

apple, cabin, castle, dog, hamburger, helicopter, jack-o-lantern, motorcycle, pizza, teddy-bear

Top 8 retrieval results:

SwAV

DSM

SwAV +GAN

Ours