

Clustered Saliency Prediction

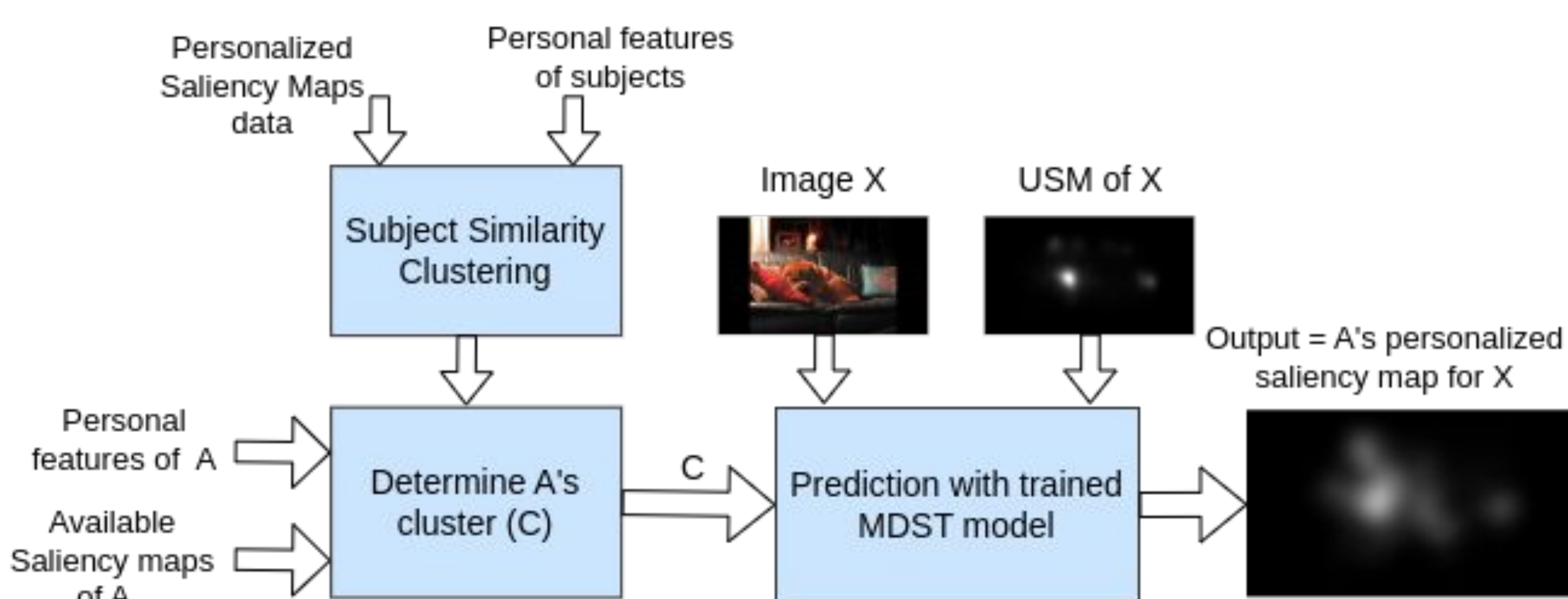
Overview

Image saliency prediction by our approach called Clustered Saliency Prediction:

- Divides subjects into clusters
- Generates an image saliency model conditioned on the cluster label

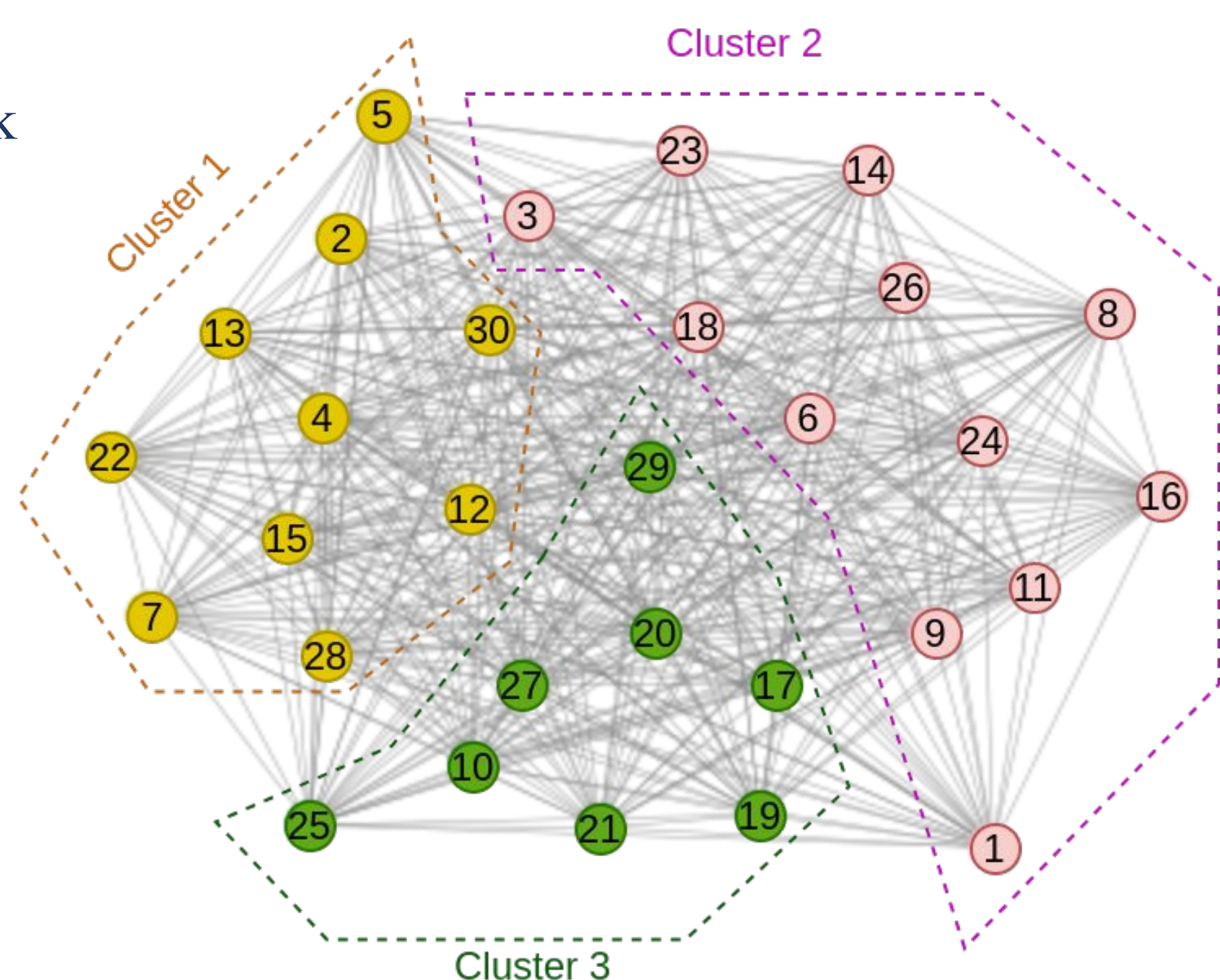
Methods

Pipeline of our Clustered Saliency Prediction model:



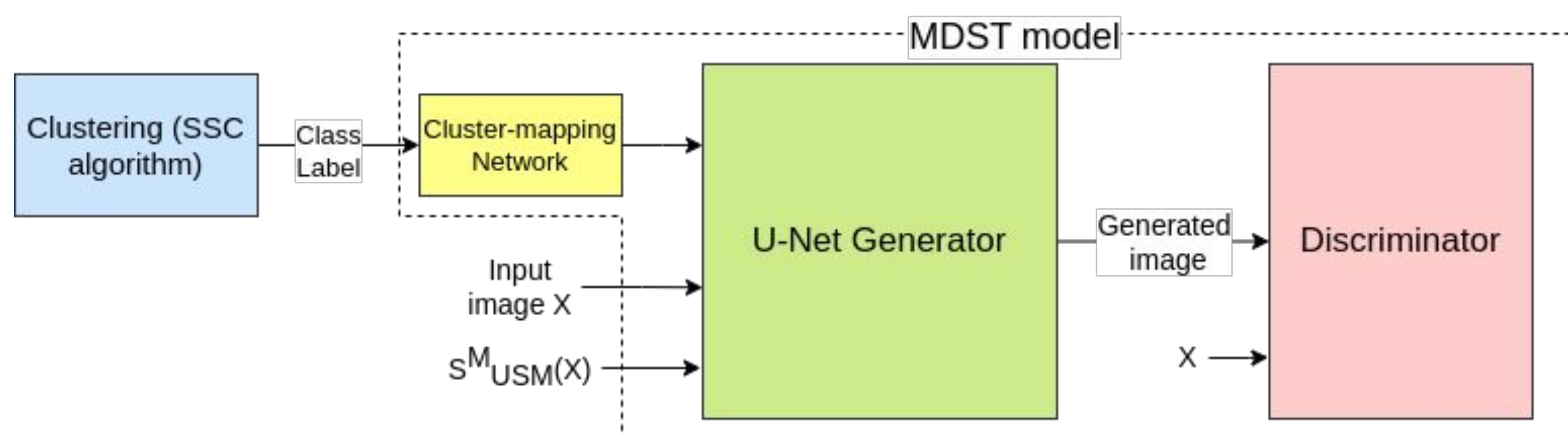
SSC algorithm for clustering the subjects:

- Create weighted complex network of the subjects
- Louvain community detection method on the network



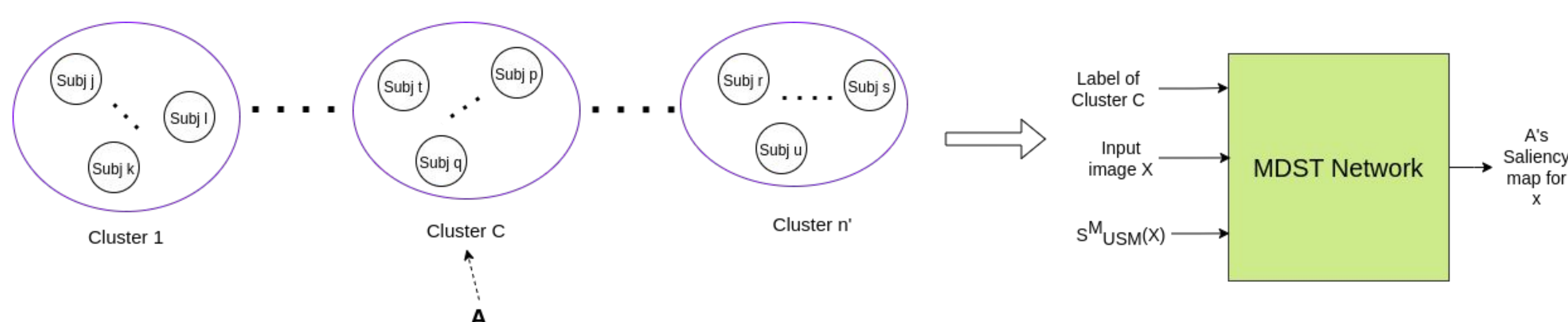
Multi-Domain Saliency Translation (MDST) model:

- Cluster-mapping network: cluster label \rightarrow point in the class space
- Generator and discriminator \approx Pix2Pix's U-Net generator and discriminator
- USMs: any universal saliency model



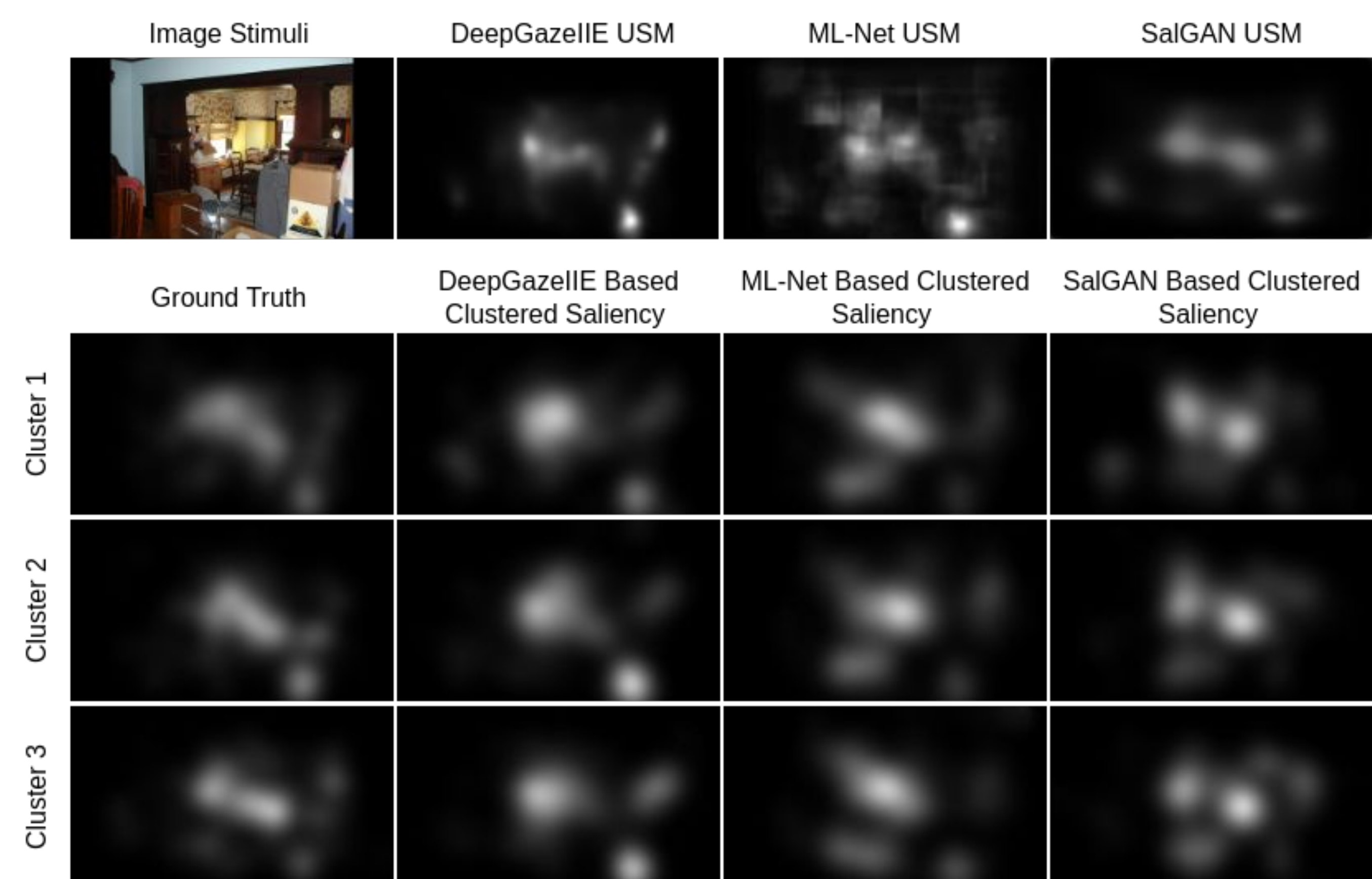
Saliency prediction for a new person:

- Assign the new person A to a cluster
- For image stimulus $x \Rightarrow$ MDST



Experimental Results

Clustered Saliency Prediction for the depicted stimulus image:



Mean performance of our Clustered Saliency Prediction for all subjects in PSM dataset:

Prediction Method	CC	SIM	AUC	NSS
DeepGaze IIE based Clustered	0.7418	0.6369	0.8862	2.2518
DeepGaze IIE	0.6768	0.5949	0.8972	2.6413
ML-Net based Clustered	0.7115	0.6145	0.8765	2.1360
ML-Net	0.6504	0.5701	0.8729	2.2585
SaIGAN based Clustered	0.6938	0.6026	0.8735	2.0772
SaIGAN	0.6606	0.5816	0.8757	2.0182

Performance of DeepGaze IIE based MDST network on different ways of clustering, averaged over 6 random splits:

Clustering		CC	SIM	AUC	NSS
SSC	Most populated cluster	0.7573	0.6483	0.8933	2.3376
	Average of all clusters	0.7418	0.6369	0.8862	2.2518
One cluster		0.7422	0.6368	0.8876	2.2519
3 Random clusters		0.7416	0.6368	0.8864	2.2487
30 clusters		0.7274	0.6295	0.8687	2.2736

Comparison of our methods under closed-set and open-set evaluation settings with other approaches:

Methods		CC	SIM	AUC	NSS
Xu et al., 2018 Closed-set	ML-Net based CNN-PIEF	0.6368	0.8095	0.8365	1.5105
	ML-Net based Multi-task CNN	0.6463	0.8077	0.8414	1.4960
Xu et al., 2018 Closed-set	ML-Net based CNN-PIEF	0.6450	0.8166	0.8559	1.6879
	ML-Net based Multi-task CNN	0.6117	0.7946	0.8534	1.5490
Moroto et al., 2020	Few-shot PSM prediction	0.7845	0.6557	-	-
Our method, closed-set	ML-Net based Clustered	0.7107	0.6167	0.8725	2.1057
	DeepGaze IIE based Clustered	0.7417	0.6398	0.8819	2.2181
Our method, open-set	ML-Net based Clustered	0.7030	0.5981	0.8852	2.2019
	ML-Net based Non-Chosen Clustered	0.6976	0.5954	0.8842	2.1876
	DeepGaze IIE based Clustered	0.7336	0.6216	0.8945	2.3157
	DeepGaze IIE based Non-Chosen Clustered	0.7274	0.6184	0.8936	2.3004