

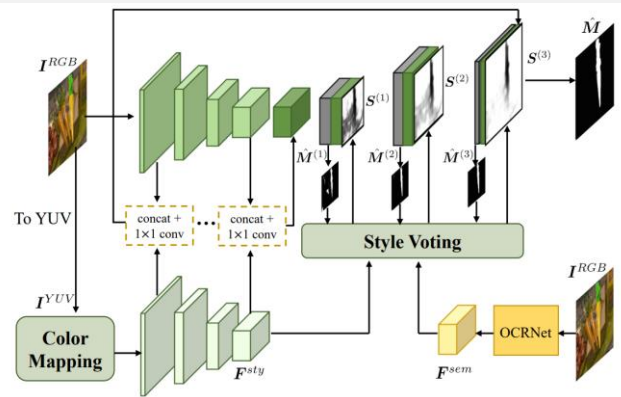
Inharmonious images

Image editing operations: copy-paste, appearance adjustment

Inconsistent color and illumination characteristics in manipulated region

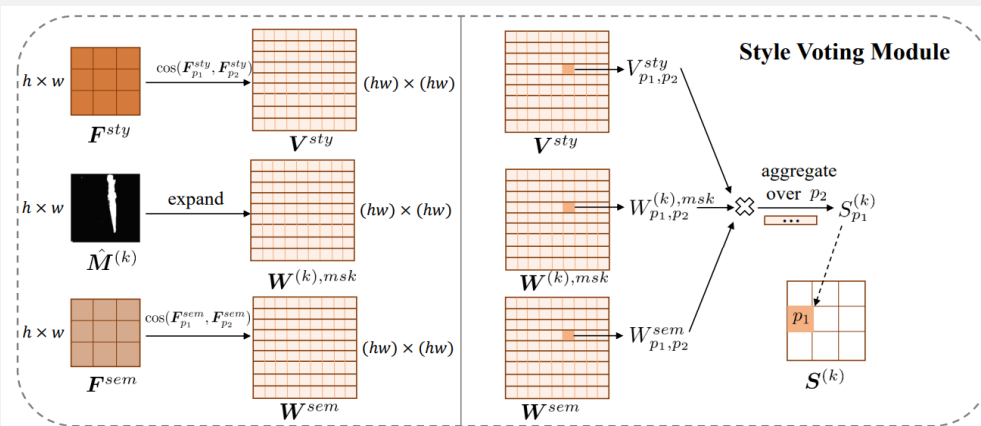


In this work, we propose AustNet to auxiliary style feature directly and utilize it to discriminate the inharmonious region effectively



Codes and pre-trained models are at <https://github.com/bcml/AustNet-Inharmonious-Region-Localization>

Style Voting Module



Vote for other pixels based on style features -> Inharmonious & background pixels

Semantic Guided Voting

Add Semantic priors into voting process: objects of similar semantic categories are prone to share similar color or illumination characteristics

Color-mapping Module

RGB -> YUV (decorrelated color space) -> Pixel-wise linear transformation

$$\hat{I}_{c,p} = A_{c,p} \times I_{c,p}^{YUV} + B_{c,p},$$

Style Feature loss to enforce task-relevant color and illumination information

$$s_{inter} = \frac{1}{|\mathcal{P}_{inter}|} \sum_{(p_1, p_2) \in \mathcal{P}_{inter}} \cos(\mathbf{F}_{p_1}^{sty}, \mathbf{F}_{p_2}^{sty}), s_{intra} = \frac{1}{|\mathcal{P}_{intra}|} \sum_{(p_1, p_2) \in \mathcal{P}_{intra}} \cos(\mathbf{F}_{p_1}^{sty}, \mathbf{F}_{p_2}^{sty}).$$

$$\ell_{sty} = \max(s_{inter} - s_{intra} + m, 0).$$

Experiments

Method	All			HCOCO			HAdobe5k			HFlickr			Hday2night		
	AP	F1	IoU	AP	F1	IoU	AP	F1	IoU	AP	F1	IoU	AP	F1	IoU
UNet	74.90	0.6717	64.74	68.11	0.5869	56.57	89.26	0.8380	80.85	80.72	0.7683	74.58	35.74	0.2362	19.60
DeepLabv3	75.69	0.6902	66.01	69.09	0.6070	58.21	90.20	0.8591	81.56	80.01	0.7698	74.91	35.87	0.2550	21.38
HRNet-OCR	75.33	0.6765	65.49	68.89	0.5981	57.69	89.63	0.8387	80.98	79.62	0.7489	74.55	34.98	0.2477	21.34
SegFormer	78.05	0.7249	66.55	72.46	0.6578	58.78	89.43	0.8531	80.44	85.19	0.7986	75.02	45.16	0.3856	32.75
MantraNet	64.22	0.5691	50.31	56.55	0.4811	41.04	81.07	0.7510	68.50	67.52	0.6302	58.51	28.88	0.2019	16.71
MAGritte	71.16	0.6907	60.14	64.75	0.6058	51.77	85.50	0.8630	76.36	75.02	0.7725	70.25	31.20	0.2549	17.05
SPAN	65.94	0.5850	54.27	58.41	0.4906	45.07	82.57	0.7786	72.49	69.22	0.6510	62.20	29.58	0.2171	19.41
F3Net	61.46	0.5506	47.48	54.17	0.4703	40.03	74.31	0.6944	60.08	72.53	0.6582	59.31	30.08	0.2563	20.83
GATeNet	62.43	0.5296	46.33	55.07	0.4568	38.89	75.19	0.6634	59.18	74.13	0.6256	57.51	30.98	0.2174	19.38
MINet	77.51	0.6822	63.04	71.74	0.6022	55.79	89.58	0.8379	77.23	83.86	0.7761	72.51	37.82	0.2710	19.38
DIRL	80.02	0.7317	67.85	74.25	0.6701	60.85	92.16	0.8801	84.02	84.21	0.7786	73.21	38.74	0.2396	20.11
MadisNet(UNet)	81.15	0.7372	67.28	79.02	0.7108	63.31	88.31	0.8219	77.41	79.24	0.7182	68.12	49.60	0.3851	32.52
MadisNet(DIRL)	85.86	0.8022	74.44	83.78	0.7741	70.50	92.45	0.8850	84.75	85.65	0.8032	75.49	57.40	0.4672	40.47
AustNet	92.20	0.8453	79.63	95.11	0.8866	83.30	89.01	0.8047	76.55	87.72	0.7777	72.61	74.01	0.5554	51.31
AustNet-S	93.01	0.8571	80.96	95.92	0.8963	84.61	89.38	0.8113	76.93	88.21	0.8012	75.16	84.10	0.6438	60.47

Qualitative Comparison

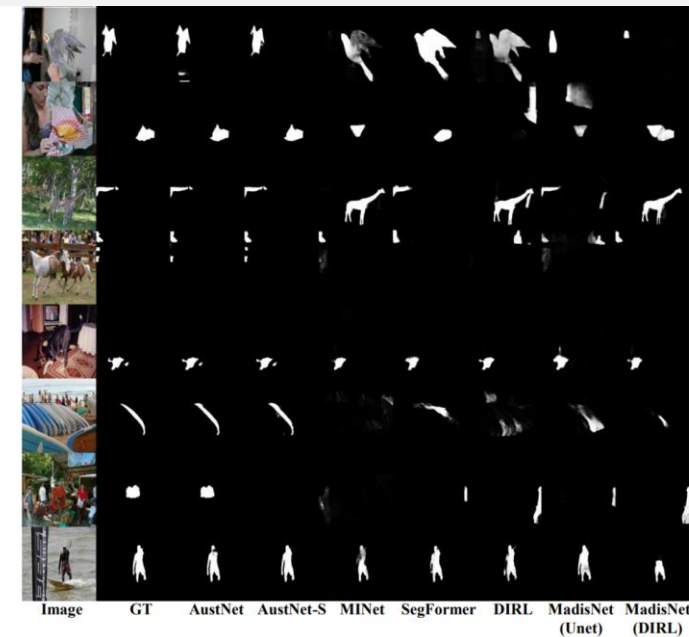


Image GT AustNet AustNet-S MINet SegFormer DIRL MadisNet MadisNet (Unet) (DIRL)