

A Survey on All-in-One Image Restoration: Taxonomy, Evaluation and Future Trends

- <https://arxiv.org/pdf/2410.15067>

AiOIR(All-in-One Image Restoration)

- image degradationとしてnoise, blur, weather effectsなど様々
- そのすべてのimage degradationに対応するimage restorationの手法をAll-in-One Image Restoration(AiOIR)という
- All in oneでないImage Restorationとしては以下などがある
 - denoising
 - dehazing
 - desnowing
 - deraining
 - deblurring
 - low-light image enhancement
- これらはすべてAiOIRのsub task

Dataset

- Super Resolution
 - BSD100
 - Manga109
 - Urban100
- draining
 - RainDrop
 - Outdoor-Rain
 - SPA
 - Rain-100H
- deblurring
 - GoPro
 - HIDE
- low-light image enhancement

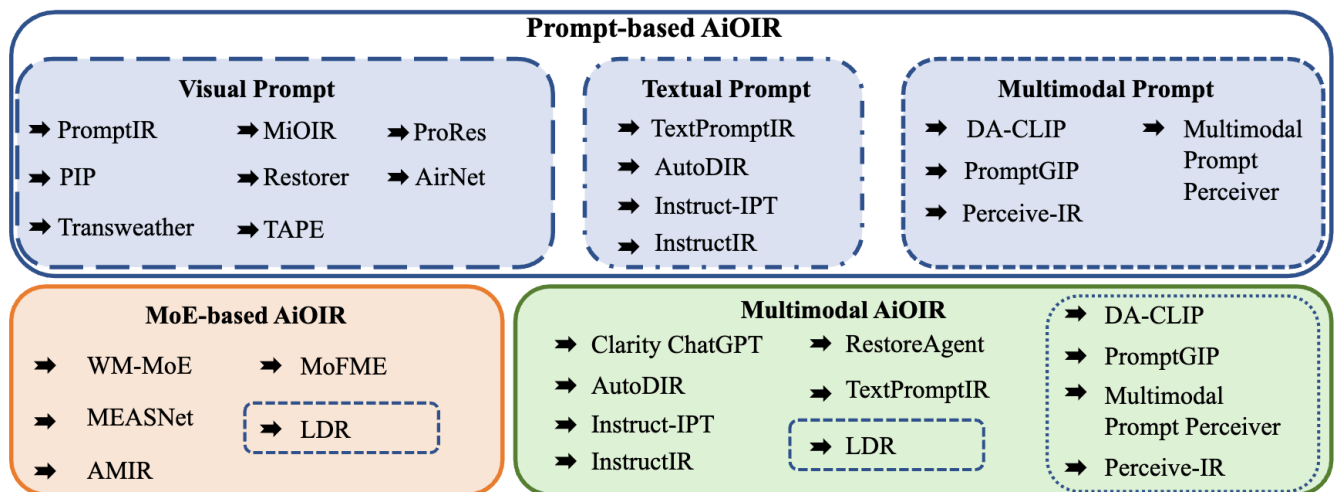
- LOL

タスクの分類

- blind / non-blind
 - image degradationの計算方法が事前にわかっているものをnon-blindという
 - noiseならgaussian distributionのパラメータ
 - blurならblur kernelの値
 - 逆に事前にわからないものをblindという
- Open-set/Closed-set
 - test dataに含まれるimage degradationの方法が必ずtrain dataにも含まれているものをClosed-setという
 - 逆にtrain dataには含まれていないimage degradationがtest dataに現れるデータセットをOpen-setという

model

- MoE(Mixture of Experts)
 - <https://qiita.com/cvusk/items/c5f9622d7b87c36bf4f5>
- prompt-based, MoE-based, Multimodal AiOIRに分類



- 以下データセット

Task	Dataset	Year	Training	Testing	Short Description	Type
Image Deblurring	GoPro [33]	2017	2103	1111	Blurred images at 1280x720	real
	HIDE [34]	2019	6397	2025	Blurry and sharp image pairs	real
	RealBlur [158]	2020	3758	980	182 different scenes	real
Image Denoising	Kodak [159]	1999	-	24	Lossless true color image suite	real
	Urban100 [160]	2015	-	100	100 images of urban scenes	real
	WED [161]	2016	4744	-	Images collected from Internet	real
	BSD400 [162]	2010	400	-	400 clean natural images	real
	CBSD68 [26]	2001	-	68	Images with different noisy levels	real
	McMaster [163]	2011	-	18	Crop size=500x500	real
Image Super-resolution	DIV2K [164]	2017	800	100	2K resolutions	real
	Flickr2K [165]	2017	2650	-	2K resolutions	real
	Set5 [166]	2012	-	5	Classic 5 images	real
	Set14 [167]	2012	-	14	Classic 14 images	real
	BSD100 [26]	2001	-	100	Objects, Natural images	real
	Manga109 [27]	2015	-	109	109 manga volumes	synthetic
	Urban100 [28]	2015	-	100	100 urban scenes	real
Shadow Removal	ISTD [168]	2018	1330	540	135 scenes with shadow mask images	synthetic
	SRD [169]	2017	2680	408	Large scale dataset for shadow removal	real
Image Desnowing	Snow100k [170]	2017	50000	50000	Including 1369 realistic snowy images	real and synthetic
	CSD [15]	2021	2000	-	A large-scale dataset called Comprehensive Snow Dataset	synthetic
	REVIDE [171]	2021	1698	284		real
	RealSnow+ [67]	2023	1650	240	Containing various resolutions	real
	KITTI-snow [172]	2023	50	-	Two intensity levels: severe and extremely severe	synthetic
	WeatherStream [173]	2023	176100	11400	Three weather conditions, i.e., rain, snow, and fog	real
Image Deraining	RainDrop [29]	2018	1119	-	Various scenes and raindrops	real
	Outdoor-Rain [30]	2019	9000	1500	Degraded by both fog and rain streak	synthetic
	SPA [31]	2019	295000	1000	Various natural rain scenes	real
	Rain1400 [174]	2017	12600	1400	Diverse rainfall directions and levels	synthetic
	Rain100L/H [32]	2017	200	100	Five rain streaks	synthetic
Image Dehazing	Dense-Haze [175]	2019	33	-	Out-door hazy scenes	real
	RESIDE-OTS [176]	2019	313950	-	Outdoor training set	real
	RESIDE-ITS [176]	2019	110000	-	Indoor training set	synthetic
	RESIDE-HSTS [176]	2019	-	20	Hybrid subjective testing set	synthetic and real
Low-light Image Enhancement	LOL [35]	2018	485	15	Low- and normal-light images at 400x600	real

英語

- elucidate : 解明する
- mediocre : 平凡な
- unforeseen : 予期せぬ