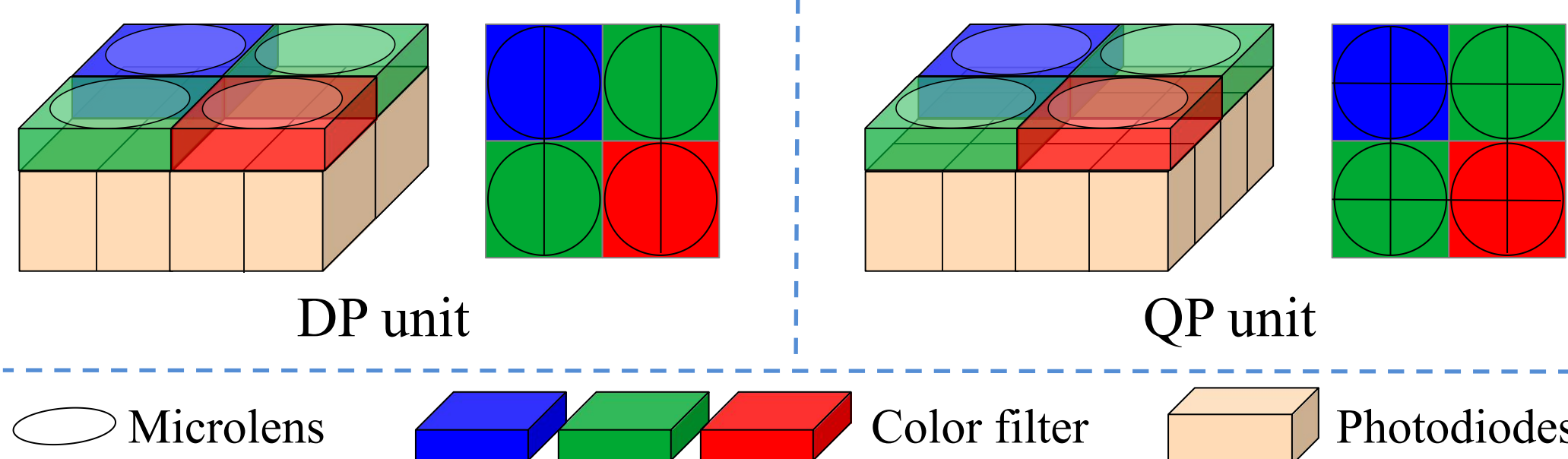




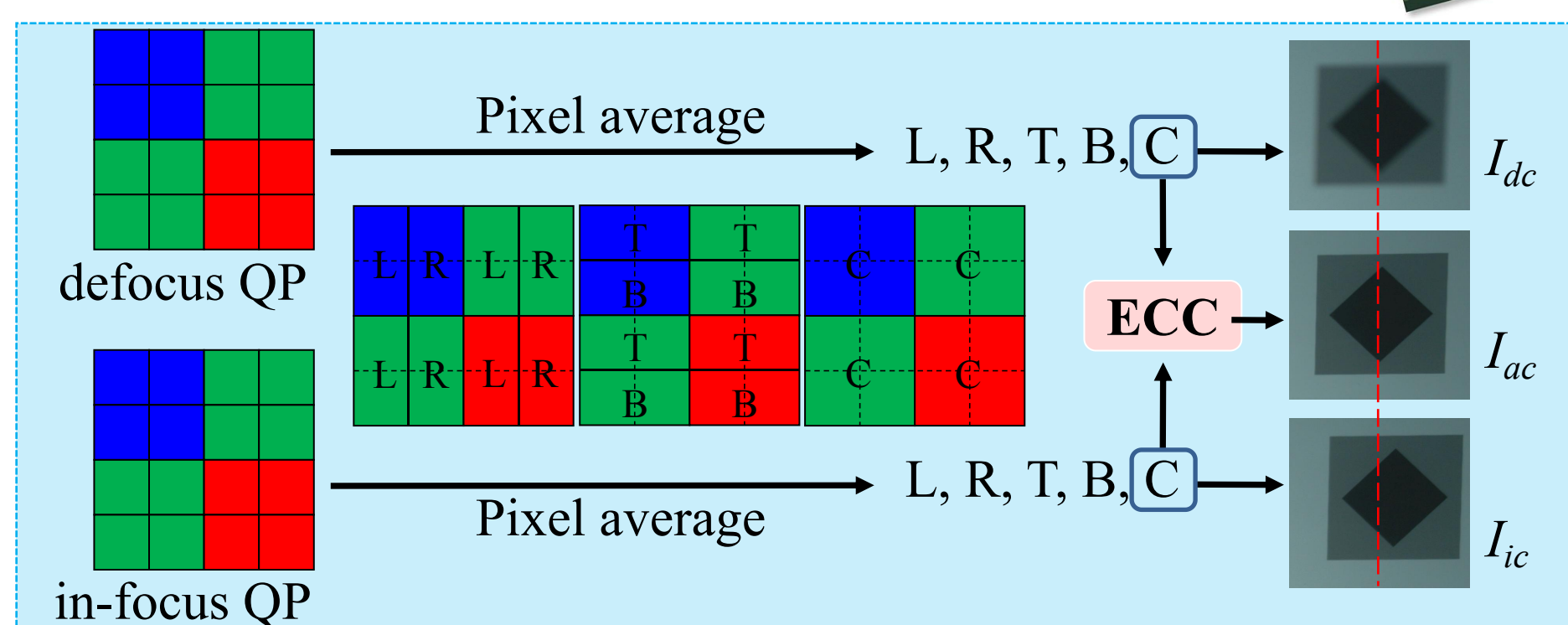
Motivation

- **Single Camera Defocus Deblurring** is a challenging task.
- **Quad-pixel (QP)** sensors represent an advanced evolution of **dual-pixel (DP)** sensors, providing disparity in two directions. The **disparity d** is correlated with the amount of **defocus blur b** .
- **QP** sensors are widely used in various smartphones, such as **OMNIVISION 50A, 50E, 50H, 50X**, etc.



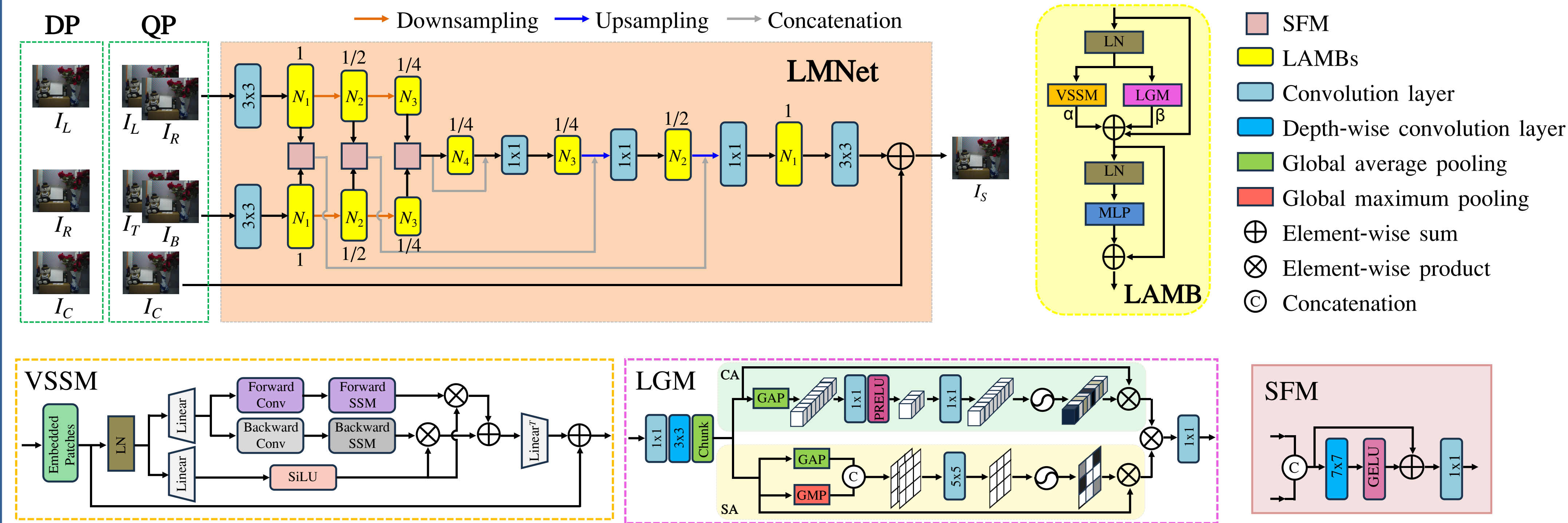
QPDD Dataset

- Hardware: **OMNIVISION 50A QPD sensor**.
- ECC alignment of defocus and in-focus images.



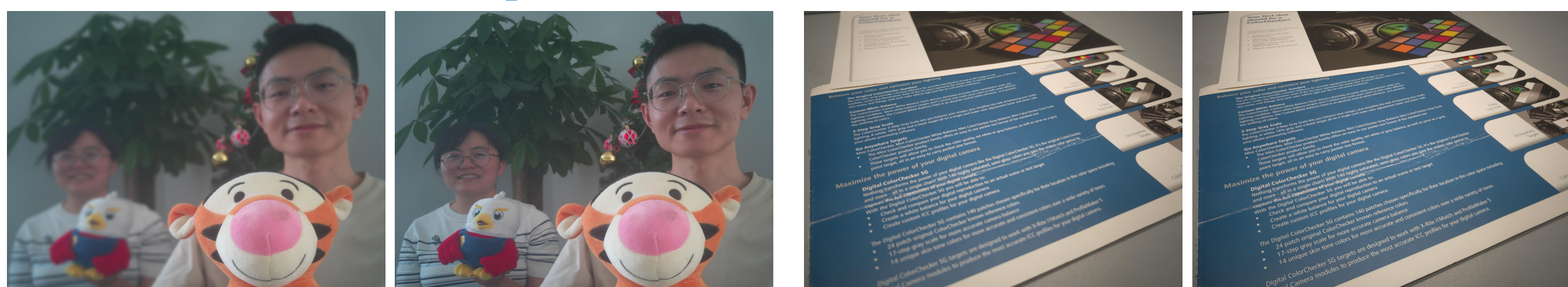
Dataset	Total Num	Nums	Image Size	Training	Testing	Validation
DPDD [1]	500	500	1680 * 1120	350	76	74
QPDD	4935	2689	2160 * 1280	3735	600+100	600
		2093	1280 * 1792			
		153	1080 * 1280			

Method



Applications

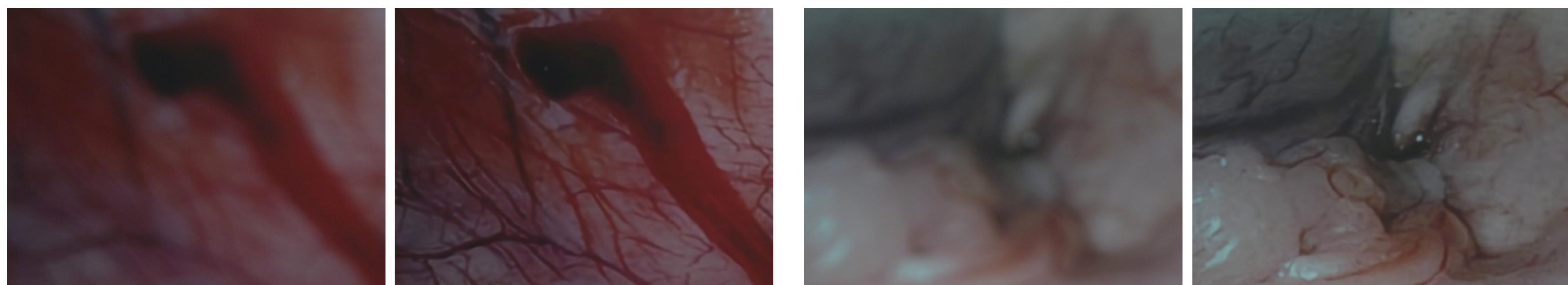
Mobile Phone (Extended Depth of Field)



Automobiles (Better detection and recognition)

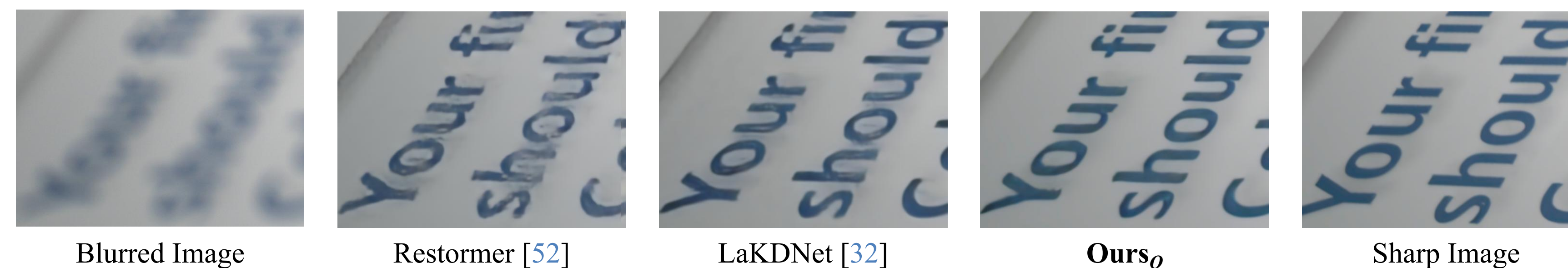


Medical Field (Endoscope, enhance diagnostic accuracy)



Results on QPDD

Methods	DPDNet _D [1]	UFormer _D [42]	MIRNetV2 _D [49]	DRBNet _D [31]	Restormer _D [52]	LaKDNNet _D [32]	Ours _D (sRGB)	Ours _D	Ours _Q
PSNR	33.24	33.63	33.86	34.18	34.36	34.64	36.25	36.48	36.75
SSIM	0.898	0.900	0.905	0.907	0.918	0.924	0.916	0.926	0.928
MAE	0.0143	0.0132	0.0135	0.0129	0.0124	0.0121	0.0109	0.0102	0.0099
Params (M)	31.03	50.88	5.86	11.69	26.13	38.42	18.18	18.18	23.86
FLOPs (G)	3150	2482	4045	1273	4458	5168	3227	3221	3224



Results on DPDD

Method	PSNR	SSIM	MAE	Params (M)	FLOPs (G)
DPDNet [1]	25.13	0.786	0.041	31.03	3150
RDPD [2]	25.39	0.772	0.040	24.28	901
UFormer [42]	25.65	0.795	0.039	50.88	2482
IFAN [19]	25.99	0.804	0.037	10.48	794
MIRNetV2 [49]	26.20	0.816	0.037	5.86	4045
DRBNet [31]	26.33	0.811	0.036	11.69	1273
BaMBNet [24]	26.40	0.821	0.036	4.50	1804
Restormer [52]	26.66	0.833	0.035	26.13	4458
LaKDNNet [32]	26.89	0.832	0.035	38.42	5168
K3DN [48]	27.06	0.835	0.034	15.90	3352
LDP [47]	27.24	0.840	0.028	19.6 + 88	-
Ours	27.25	0.845	0.033	18.18	3227

Contribution

- A QP defocus deblurring (QPDD) dataset, containing 4,935 defocus and all-in-focus image pairs.
- A novel Local-gate assisted Mamba Network (LMNet).
- **SOTA performances on QPDD and DPDD.**