

Deep-learning-based single-photon-counting compressive imaging via jointly trained subpixel convolution sampling: supplement

WEN-CHENG LI, QIU-RONG YAN,* YAN-QIU GUAN, SHENG-TAO YANG, CONG PENG, AND ZHE-YU FANG

School of Information Engineering, Nanchang University, Nanchang 330031, China

**Corresponding author: yanqirong@ncu.edu.cn*

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We design an experiment to explore the effect of sub-pixel convolution and E2-ception on reconstruction quality independently. We remove the deep reconstruction network of DR2 and get DR2/w, similarly, we remove the E2-ception of HRSC-Net and get HRSC-Net/w. The results are shown in Table. 1.

Table 1. Comparison of PSNR and SSIM between HRSC-Net and DR2, DR2/w or HRSC-Net/w denotes that not using deep reconstruction sub-network

Image name	Methods	MR=0.25		MR=0.1		MR=0.05		MR=0.015	
		PSNR/dB	SSIM	PSNR/dB	SSIM	PSNR/dB	SSIM	PSNR/dB	SSIM
Baby	DR2/w	36.67	0.949	33.02	0.891	30.24	0.814	26.26	0.684
	HRSC-Net/w	36.85	0.958	33.19	0.900	30.49	0.830	26.60	0.707
	DR2	36.70	0.952	32.87	0.886	30.39	0.820	26.45	0.696
	HRSC-Net	36.79	0.952	33.13	0.885	30.77	0.829	27.19	0.722
Bridge	DR2/w	27.54	0.838	24.68	0.673	22.99	0.528	21.04	0.369
	HRSC-Net/w	27.51	0.838	24.84	0.684	23.23	0.547	21.25	0.383
	DR2	27.62	0.840	24.61	0.659	23.03	0.527	21.07	0.371
	HRSC-Net	27.81	0.849	24.94	0.689	23.34	0.551	21.38	0.389
Head	DR2/w	33.09	0.831	30.59	0.733	28.76	0.654	26.74	0.468
	HRSC-Net/w	33.36	0.860	30.95	0.771	29.22	0.693	27.10	0.586
	DR2	33.00	0.821	30.48	0.695	28.95	0.644	26.76	0.546
	HRSC-Net	33.13	0.831	30.66	0.702	29.18	0.669	27.15	0.570
Man	DR2/w	29.01	0.848	26.05	0.727	24.24	0.610	21.88	0.464
	HRSC-Net/w	28.71	0.850	26.04	0.733	24.31	0.625	22.02	0.475
	DR2	29.25	0.852	26.23	0.725	24.46	0.625	21.98	0.473
	HRSC-Net	29.31	0.859	26.39	0.742	24.64	0.641	22.39	0.502
Pepper	DR2/w	34.19	0.890	30.60	0.832	28.11	0.774	24.71	0.679
	HRSC-Net/w	34.31	0.893	30.93	0.835	28.31	0.781	24.95	0.688
	DR2	34.87	0.895	31.21	0.844	28.56	0.791	24.94	0.691
	HRSC-Net	34.54	0.892	31.34	0.841	28.95	0.796	25.61	0.718
Mean	DR2/w	32.10	0.871	28.99	0.771	26.87	0.676	24.13	0.533
	HRSC-Net/w	32.15	0.880	29.19	0.785	27.11	0.695	24.38	0.568
	DR2	32.29	0.872	29.08	0.762	27.08	0.681	24.24	0.555
	HRSC-Net	32.32	0.877	29.29	0.772	27.38	0.697	24.75	0.580

As shown in Table 1, both sub-pixel convolution and E2-ception contributes to the excellent performance of HRSC-Net. Compared with DR2/w, HRSC-Net/w obtains higher PSNR at all measurement rates, which shows that sub-pixel convolution can improve the reconstruction quality of HRSC net. Compared with DR2 and E2-ception, it is obvious that E2-ception can further improve reconstruction quality. For instance, at MR 0.015, the HRSC-Net/w outperforms DR2/w by 0.25dB on PSNR, but after the deep reconstruction sub-network is employed, the HRSC-Net outperforms DR2 by 0.51dB. On the whole, sub-pixel convolution is better than E2 conception in improving reconstruction quality.