Supplemental Material: Blind Image Super-Resolution with Degradation-Aware Adaptation*

Yue Wang[1], Jiawen Ming[1], Xu Jia[1**], James H. Elder[2], and Huchuan Lu[1**]

[1] Dalian University of Technology, Dalian, 116024, China
[2] York University, Toronto, M3J 1P3, Canada

1 Additional Visualization Results

In this supplemental material, we present more visualization results which include in-domain and out-domain synthetic data on Set14 in Fig. 1, and real-world data (RealSR) in Fig. 2.

According to Fig. 1 (a) for in-domain data, we notice that DASR and our method can achieve comparable results which are better than other methods. It is mainly because both DASR and our method apply the implicit degradation representation learning and degradation-aware adaptation for blind-SR, which would be more effective. For the out-domain data in Fig. 1 (b), our method can provide better result compared to not only DASR, but also all other methods. It indicates that our proposed ranking loss as well as region-aware modulation can further improve the generalization ability of our method.

For these methods trained with only synthetic data, we further directly test them on RealSR without re-training or fine-tuning on any real-world data. More visualization results are presented in Fig. 2. It shows that the HR predictions of our method have cleaner details with less artifacts compared to most of the other methods. BSRNet may also provide clearer results, however, it may be over-smoothing which prevents it from restoring some details. It proves that our method can also improve the generalization ability to real-world data.

2 Additional Results on the other Synthetic datasets

Meanwhile, we apply two different benchmark datasets, B100 [2] and Urban100 [1], to generate in-domain and out-domain synthetic data for testing. The quantitive results are shown in Tab. 1 and Tab. 2.

It shows that on the in-domain data of B100, the performance of our proposed method is slightly better than DASR, even though our model size is only half

* Partially supported by the Natural Science Foundation of China, No. 62106036, and the Fundamental Research Funds for the Central University of China, DUT21RC(3)026.
** Corresponding authors. Email address: {xjia, lhchuan}@dlut.edu.cn

Table 1: Quantitive results (×4 SR) on in-domain and out-domain synthetic test sets from B100. The best two results are in Red and Blue.

Method	Params (M)	Flops (G)	In-domain 3.5/2.0/45/15 PSNR	SSIM	4.0/3.0/165/25 PSNR	SSIM	4.0/4.0/180/15 PSNR	SSIM	Out-domain 2.0/4.5/30/40 PSNR	SSIM	3.5/4.5/60/40 PSNR	SSIM	5.0/5.0/180/40 PSNR	SSIM
DnCNN+IKC	6.0	24.3	24.219	0.5689	23.300	0.5314	23.416	0.5328	22.704	0.5166	22.492	0.5072	22.189	0.4969
DnCNN+DAN	5.0	81.1	24.075	0.5640	23.239	0.5318	23.292	0.5315	22.706	0.5187	22.487	0.5102	22.187	0.5007
DnCNN+CF+RCAN	26.3	68.1	23.485	0.5543	22.519	0.5042	22.677	0.5088	21.942	0.4831	21.663	0.4665	21.293	0.4490
DnCNN+SRMDNF+Predictor	2.2	9.1	23.941	0.5586	23.175	0.5297	23.210	0.5290	22.675	0.5179	22.465	0.5098	22.171	0.5006
DnCNN+MANet	10.6	40.8	22.068	0.5129	21.856	0.4982	22.057	0.5036	21.507	0.4874	21.597	0.4898	21.559	0.4881
BSRNet	16.7	73.5	23.467	0.5675	21.532	0.5243	22.986	0.5446	19.642	0.4894	19.634	0.4860	19.521	0.4808
DASR	6.0	13.1	24.685	0.5897	23.784	0.5525	23.978	0.5565	22.942	0.5241	22.752	0.5154	22.396	0.5032
Ours	2.9	6.2	24.719	0.5911	23.789	0.5530	24.031	0.5587	23.051	0.5293	22.868	0.5208	22.507	0.5081

Table 2: Quantitive results (×4 SR) on in-domain and out-domain synthetic test sets from Urban100. The best two results are in Red and Blue.

Method	Params (M)	Flops (G)	In-domain 2.0/1.0/10/0 PSNR	SSIM	3.5/2.0/45/15 PSNR	SSIM	Out-domain 2.0/0.5/0/40 PSNR	SSIM	3.5/4.5/60/40 PSNR	SSIM	4.5/5.0/120/40 PSNR	SSIM
DnCNN+IKC	6.0	24.3	24.815	0.7412	21.709	0.5714	21.636	0.5794	19.977	0.4891	19.690	0.4759
DnCNN+DAN	5.0	81.1	24.472	0.7233	21.525	0.5630	21.663	0.5776	19.941	0.4905	19.662	0.4785
DnCNN+CF+RCAN	26.3	68.1	23.656	0.7289	21.364	0.5604	20.724	0.5524	19.620	0.4575	19.277	0.4367
DnCNN+SRMDNF+Predictor	2.2	9.1	23.530	0.6792	21.332	0.5533	21.611	0.5751	19.903	0.4892	19.635	0.4779
DnCNN+MANet	10.6	40.8	17.540	0.4153	19.329	0.4842	18.452	0.4489	18.971	0.4579	18.982	0.4581
BSRNet	16.7	73.5	24.478	0.7210	21.587	0.5927	18.856	0.5349	18.179	0.4843	18.050	0.4756
DASR	6.0	13.1	24.945	0.7424	22.510	0.6173	21.793	0.5835	20.293	0.5029	19.938	0.4862
Ours	2.9	6.2	25.169	0.7479	22.643	0.6222	22.107	0.6027	20.462	0.5140	20.077	0.4955

of DASR. For out-domain data of B100 as well as both in-domain and out-domain data of Urban100, we can also achieve better results than all the listed state-of-the-art methods which indicate the effectiveness of our method. Some visualization results are presented in Fig. 3 and Fig. 4.

References

1. Huang, J.B., Singh, A., Ahuja, N.: Single image super-resolution from transformed self-exemplars. In: Proceedings of the IEEE conference on computer vision and pattern recognition. pp. 5197–5206 (2015)
2. Martin, D., Fowlkes, C., Tal, D., Malik, J.: A database of human segmented natural images and its application to evaluating segmentation algorithms and measuring ecological statistics. In: Proceedings Eighth IEEE International Conference on Computer Vision. ICCV 2001. vol. 2, pp. 416–423. IEEE (2001)

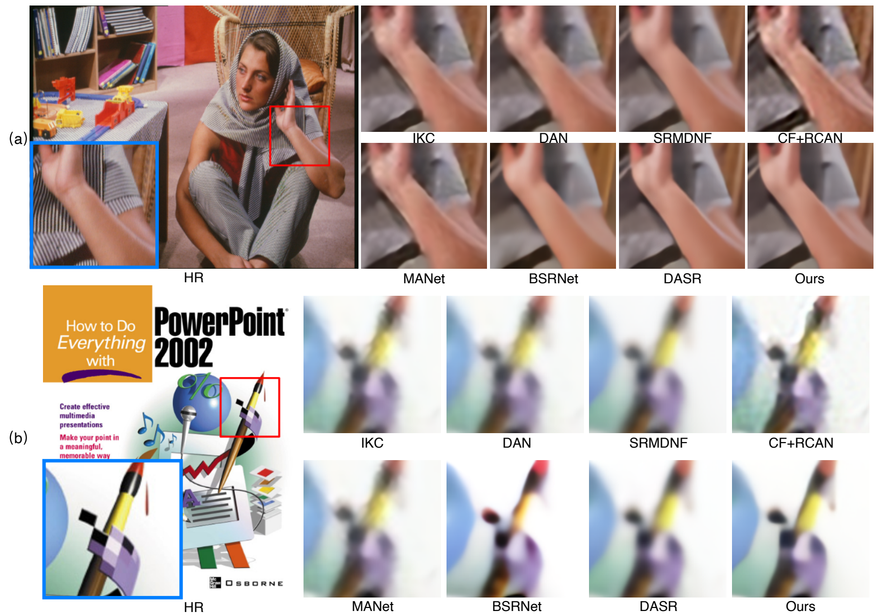

Fig. 1: Visual results($\times 4$ SR) on in-domain and out-domain synthetic test sets on Set14. Here, (a) are results of in-domain data, (b) are results of out-domain data. For better view, we zoom in the red HR patches and show it in blue patches.

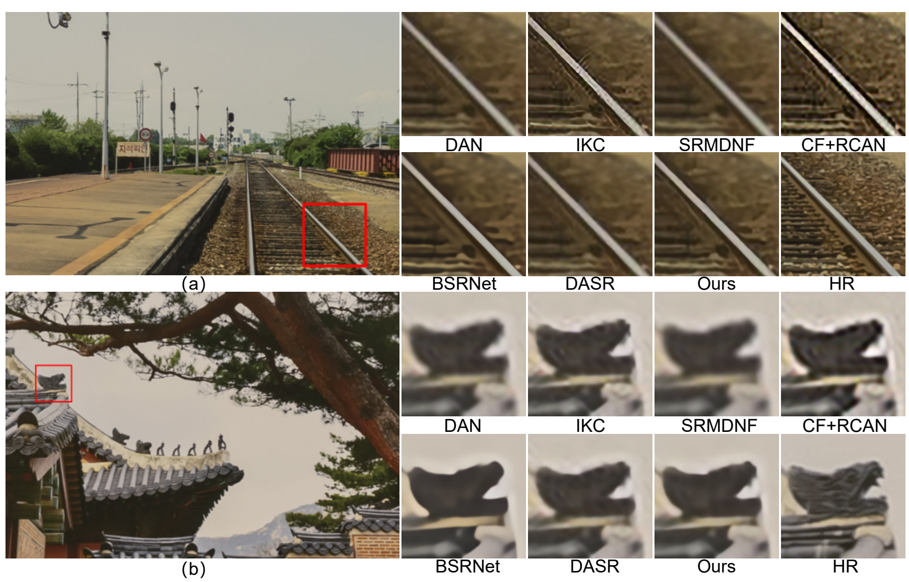

Fig. 2: Visual results($\times 4$ SR) on RealSR test set.

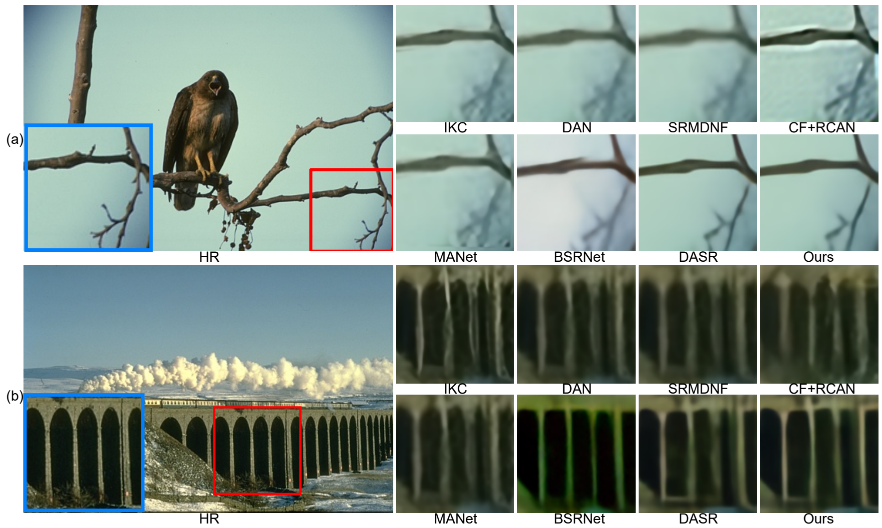

Fig. 3: Visual results (×4 SR) on synthetic test sets on B100. For better view, we zoom in the red HR patches and show them in blue patches.

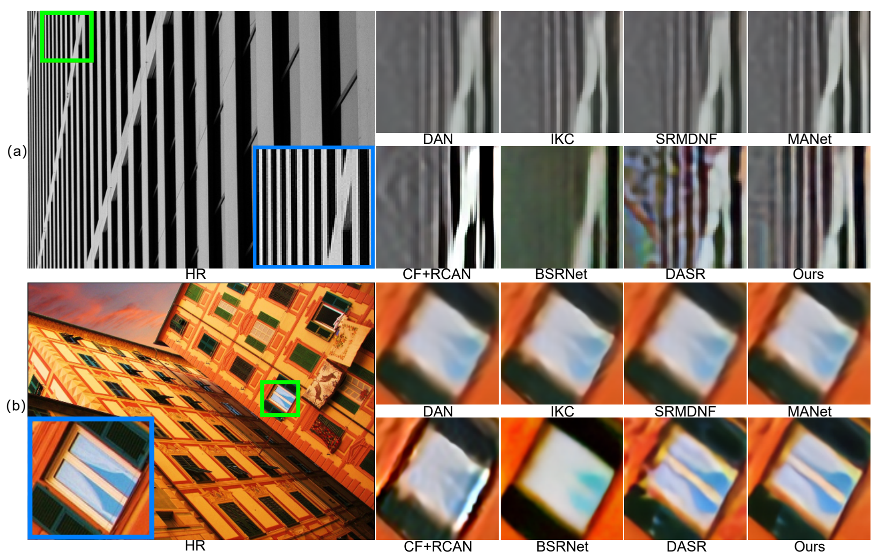

Fig. 4: Visual results (×4 SR) on synthetic test sets on Urban100. For better view, we zoom in the green HR patches and show them in blue patches.