

Supplementary Material:

Recaptured Screen Image Demoiréing

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In this supplementary material, we first present the evaluation results based on image types, and screen and camera combinations. Then we give visual comparison results for another 15 test images which are captured by different devices. As mentioned in the main paper, we compare with the traditional recaptured screen image demoiréing method (MLD) proposed in [1] and the CNN-based demoiréing (DMCNN) method in [2]. For a fair comparison, we also retrain DMCNN using our dataset with their shared code and the results are named as R-DMCNN. To demonstrate that with our constructed dataset, the moiré removal and brightness improvement is still a difficult task for general image restoration CNNs, we also compare with the state-of-the-art noise removal method DNCNN [3], and rain removal method RESCAN [4] by retraining the two networks with our MRBI database.

Evaluation based on Image Types. Our testing set contains 340 images, including 135 color images, 135 webpages, and 70 gray text images. We provide the average demoiréing results on the three kinds of images in Table I. It can be observed that the PSNR and SSIM values of webpages and gray text images are better and those of the color images are the worst. This is not due to the unbalance of webpage, color, and text images but due to the different complexity of the contents in the three kinds of images. The webpages and text images usually contain large white background regions, which tend to have larger PSNR and SSIM values after reconstruction. In contrast, the color images usually have complex textures which tend to have lower PSNR and SSIM values after reconstruction. Therefore, although the text and color patches are roughly balanced in the training set, the average SSIM value of the text images in the testing set is the best and that of the color images is the worst. In addition, Fig. 1 presents the demoiréing results for the three kinds of images. It can be observed that the moiré patterns are all removed clearly but the PSNR and SSIM values of the color image are the worst.

Evaluation based on Screen and Camera Combinations. To demonstrate the generalization of the trained model in dealing with images captured by different devices, we provide the results evaluated on

TABLE I

COMPARISON OF DEMOIRÉING RESULTS IN TERMS OF AVERAGE PSNR AND SSIM VALUES FOR WEBPAGE, COLOR, AND TEXT IMAGES IN OUR TEST SET.

Image Types	Webpage images	Color images	Text images
PSNR	20.32	18.86	20.02
SSIM	0.826	0.785	0.864

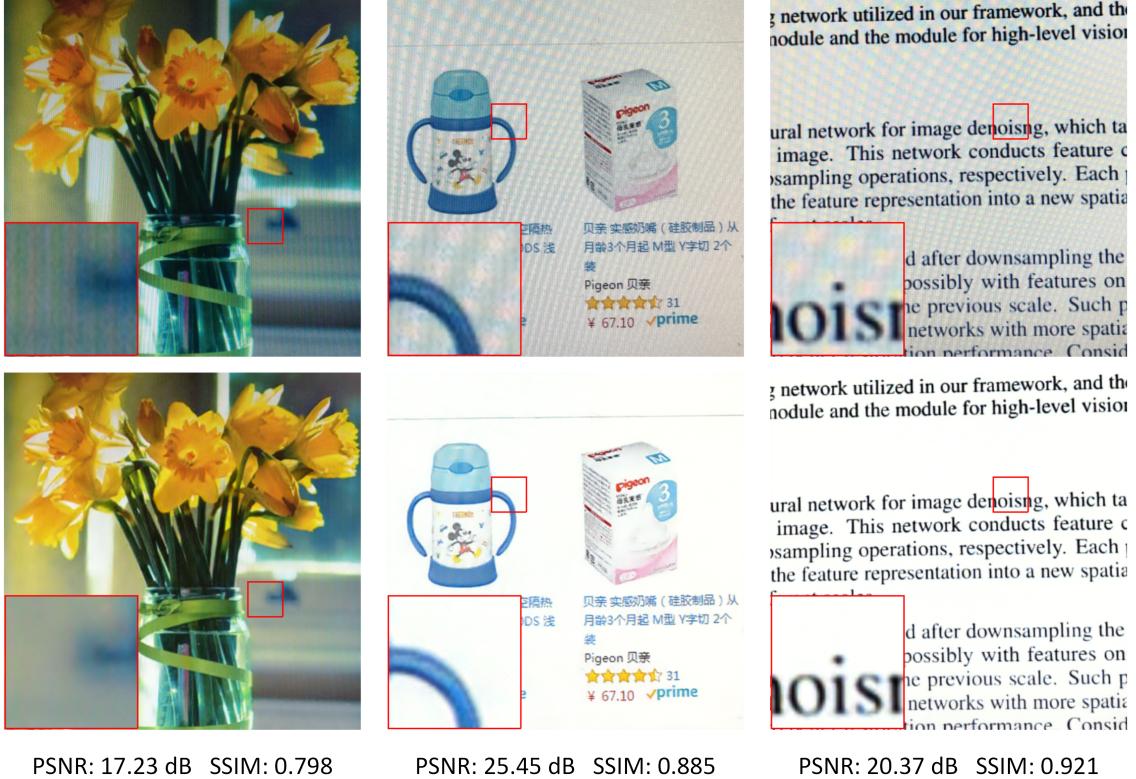


Fig. 1. Comparison of demoiréing results for three kinds of images. From left to right: the color image, the webpage image, and the gray text image. The top row is the input moiré images and the bottom row is the corresponding demoiréing results.

the new screen and phone combinations in Table II. It can be observed that our method still achieves the best demoiréing results on these images captured by the screen and camera combinations which are not included in the training set construction. Although the superiority is not as strong as that in the images captured by screen and camera combinations used in the training set construction, this also demonstrates that our trained model has a good generalization ability in dealing with moiré images captured by different devices.

TABLE II

COMPARISON OF AVERAGE PSNR AND SSIM RESULTS ON THE IMAGES CAPTURED BY NEW SCREEN AND PHONE COMBINATIONS. THE BEST RESULTS ARE HIGHLIGHTED IN BOLD.

Screen	Phone Manufacturer	Num	Moiré image		DNCNN		RESCAN		DMCNN		R-DMCNN		Ours	
			PSNR	SSIM	PSNR	SSIM	PSNR	SSIM	PSNR	SSIM	PSNR	SSIM	PSNR	SSIM
AOC TFT19W80PS	MIUI5	20	16.73	0.664	17.44	0.656	19.49	0.700	19.33	0.805	19.36	0.772	19.78	0.781
Philips MWX12201	Huawei Honor 10	10	11.56	0.621	17.34	0.694	20.59	0.750	16.99	0.845	21.13	0.860	21.43	0.863
	Huawei Nova 2	10	16.83	0.686	18.68	0.695	19.06	0.729	19.35	0.844	17.79	0.803	20.00	0.836
	Iphone 6	6	15.96	0.757	19.48	0.752	21.30	0.815	18.70	0.857	22.08	0.889	21.99	0.907
Laptop (Dell P39F)	Huawei P20 Pro	31	11.18	0.675	16.60	0.685	18.07	0.767	15.43	0.824	19.46	0.834	19.36	0.852
	Iphone 6	34	13.79	0.580	15.93	0.622	17.37	0.641	16.27	0.760	18.74	0.802	18.78	0.811
AOC 230LM00029	Samsung Galaxy S7	20	14.35	0.637	14.35	0.613	19.74	0.706	18.77	0.781	19.66	0.788	20.02	0.789
MacBook Pro	Samsung Galaxy S7	20	14.94	0.684	16.07	0.662	18.64	0.719	17.56	0.746	19.21	0.783	19.34	0.804
Total		151	14.01	0.649	16.49	0.658	18.76	0.714	17.35	0.795	19.38	0.808	19.66	0.821

Visual Comparisons for Another 15 Images. Figs. 2-16 present the visual comparison results for another 15 images and the combinations of screen and camera used for seven images are not included in the training set construction. It can be observed that our method achieves the best demoiréing results.

REFERENCES

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- [4] X. Li, J. Wu, Z. Lin, H. Liu, and H. Zha, “Recurrent squeeze-and-excitation context aggregation net for single image deraining,” *ECCV*, 2018.

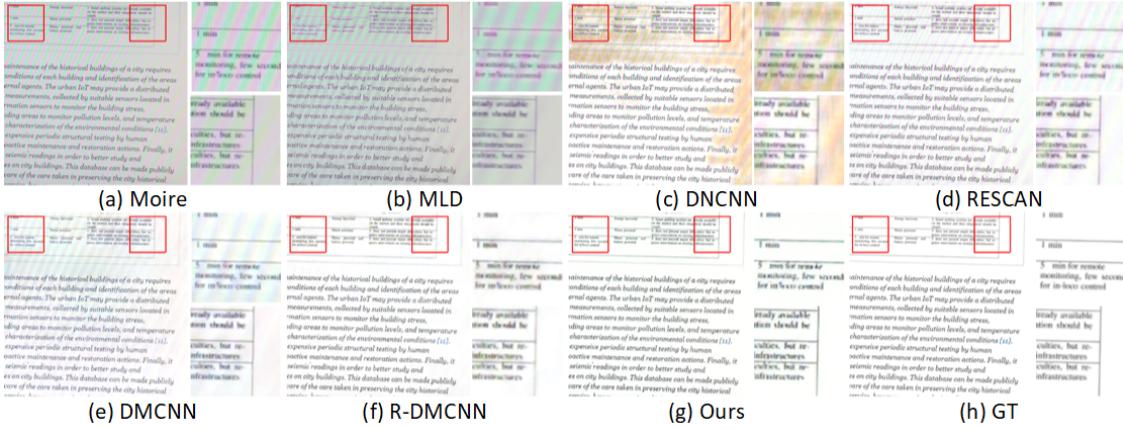


Fig. 2. Visual quality comparisons for one image captured by Huawei Honor 6X with the screen AOC TFT19W80PS.



Fig. 3. Visual quality comparisons for one image captured by Iphone 8 with the screen AOC TFT19W80PS.

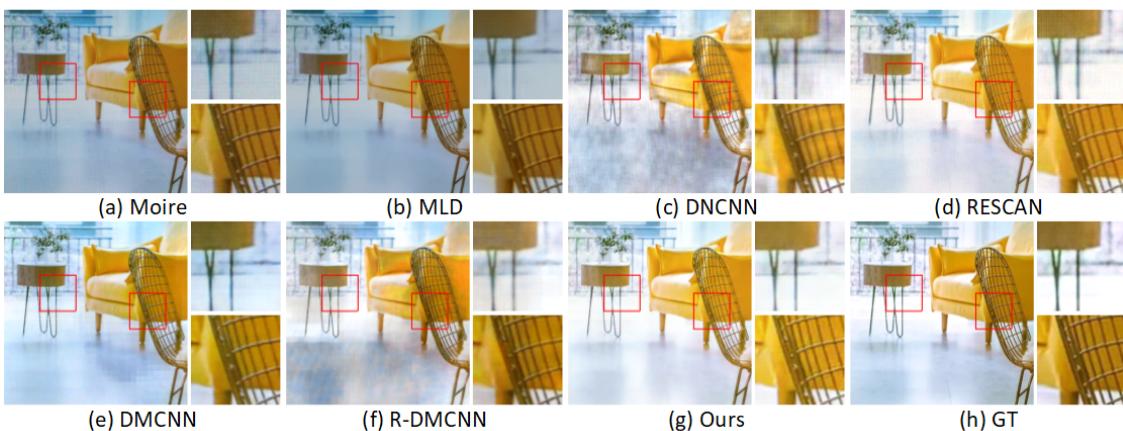


Fig. 4. Visual quality comparisons for one image captured by MIUI5 with the screen AOC TFT19W80PS.



Fig. 5. Visual quality comparisons for one image captured by OPPO R9 with the screen AOC TFT19W80PS.

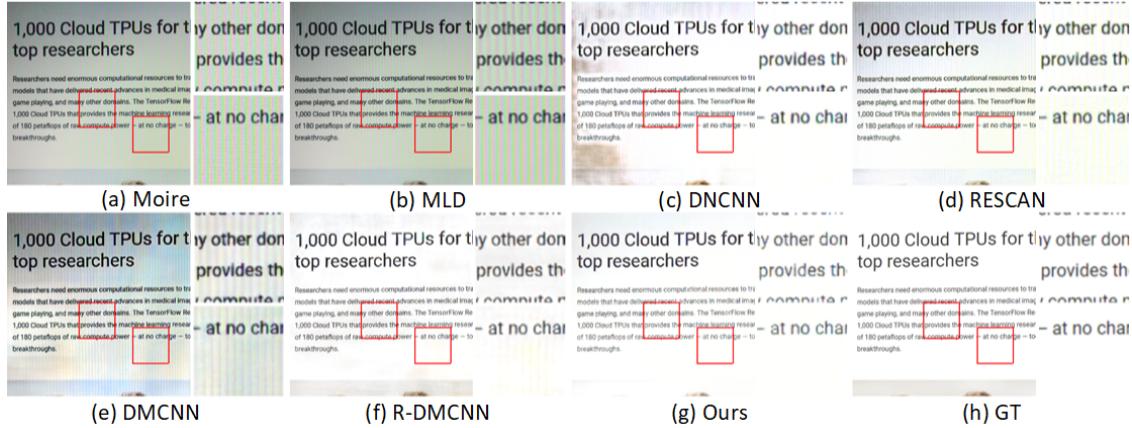


Fig. 6. Visual quality comparisons for one image captured by Huawei Honor 6X with the screen Lenovo B5400.

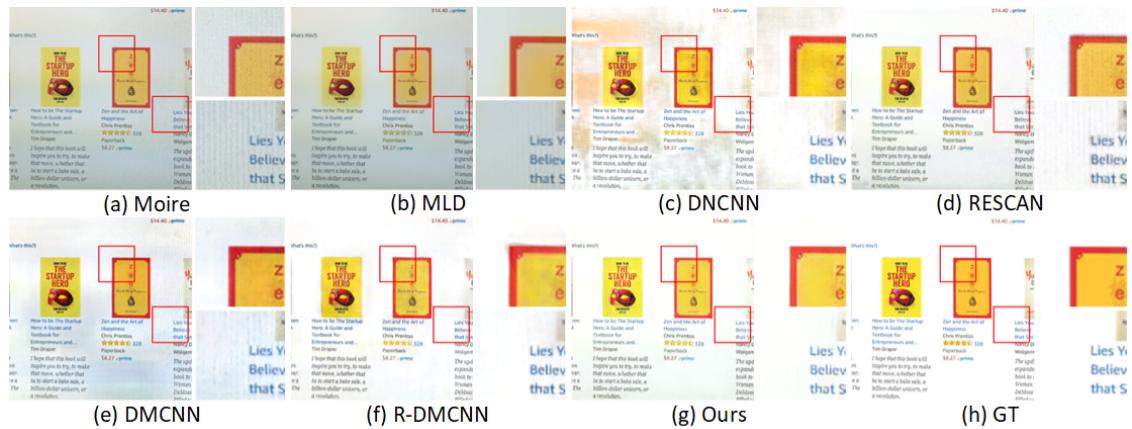


Fig. 7. Visual quality comparisons for one image captured by Iphone 6 with the screen Philips MWX12201.

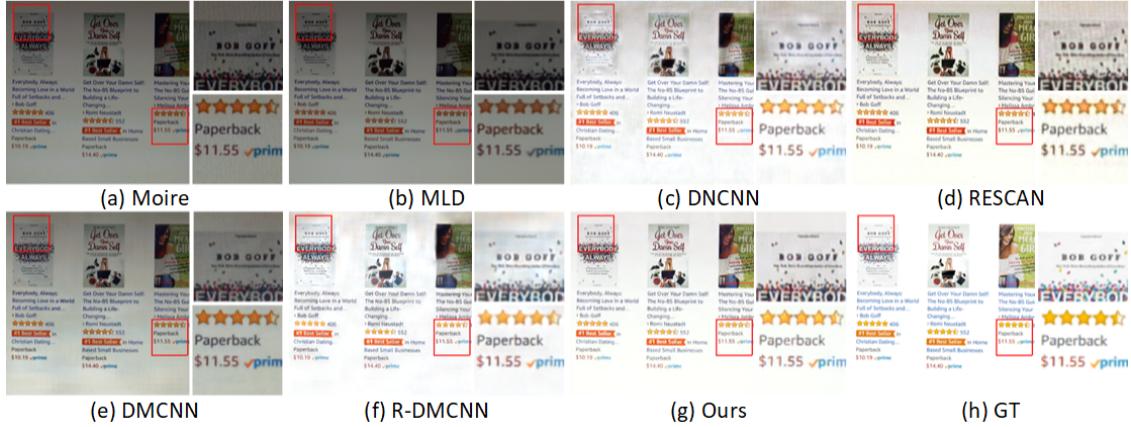


Fig. 8. Visual quality comparisons for one image captured by OPPO R9 with the screen Philips MWX12201.



Fig. 9. Visual quality comparisons for one image captured by Iphone 8 with the screen Samsung UA55HU5903J.

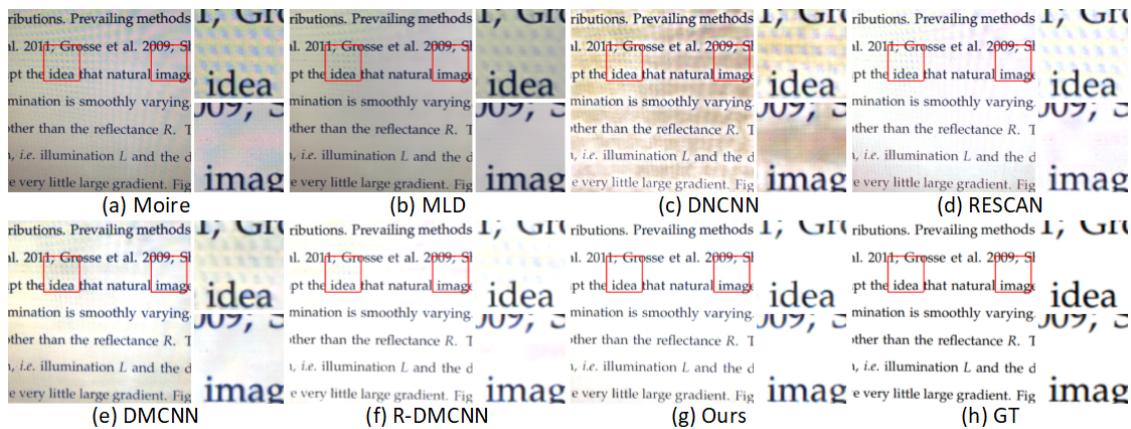


Fig. 10. Visual quality comparisons for one image captured by Iphone 6 with the screen Dell P39F.

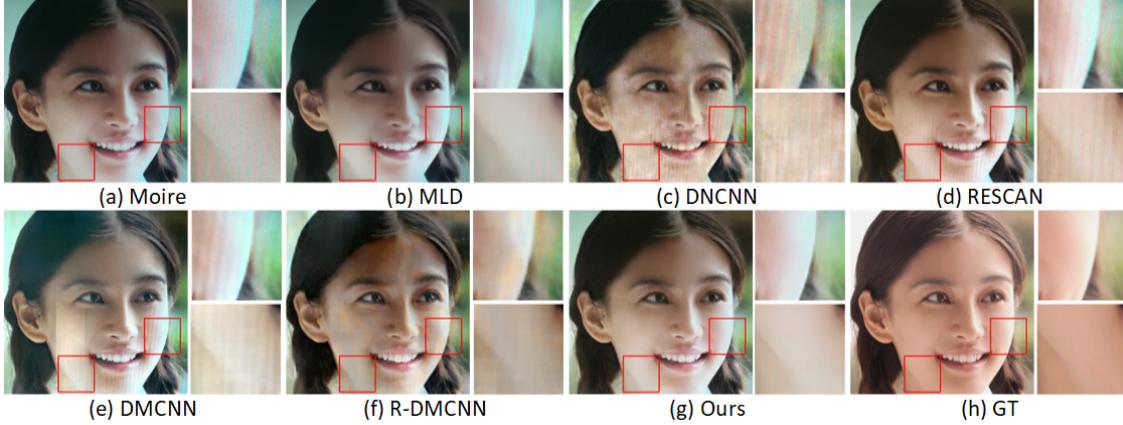


Fig. 11. Visual quality comparisons for one image captured by Huawei Honor 6X with the screen AOC TFT19W80PS.



Fig. 12. Visual quality comparisons for one image captured by Huawei Honor 10 with the screen Philips MWX12201.



Fig. 13. Visual quality comparisons for one image captured by RedMI Note 4X with the screen AOC TFT19W80PS.



Fig. 14. Visual quality comparisons for one image captured by Samsung Galaxy S7 with the screen AOC 230LM00029.

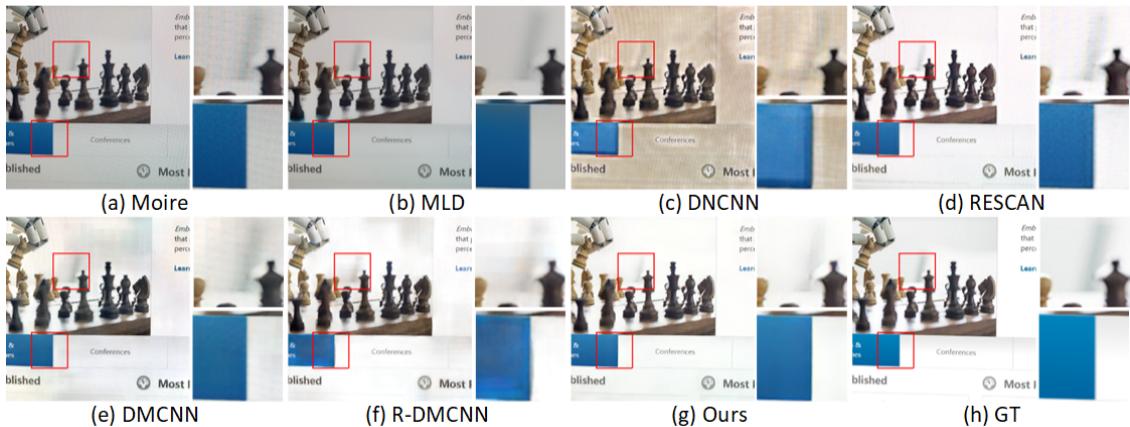


Fig. 15. Visual quality comparisons for one image captured by Samsung Galaxy S7 with the screen AOC 230LM00029.

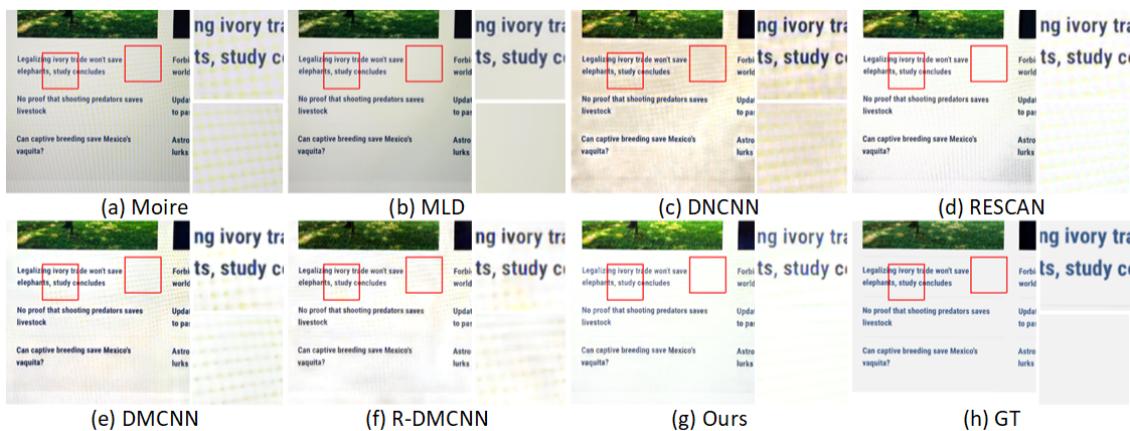


Fig. 16. Visual quality comparisons for one image captured by Samsung Galaxy S7 with the screen MacBook Pro.