Supplementary Material: Image Demoireing in RAW and sRGB Domains

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In this supplementary material, we first conduct the additional ablation study for SCDM in Sec. 1. Then, a limitation of our proposed RRID is discussed in Sec. 2. Lastly, more visual comparisons between RRID and several state-of-the-art models are provided in Sec. 3.

1 Additional Ablation Study for SCDM

Table 1 presents the effectiveness and efficiency of the special design in SCDM, where the demoiréing modules, GFM and FSM, are embedded in the skip-connections of SCDM. In this ablation study, we compare the proposed SCDM with the following cases:

- A_1. In the RAW branch, DCAB is replaced with GFM, while in the RGB branch, DCAB is replaced with FSM. The demoiréing modules embedded in the skip-connections remain unchanged for both branches.
- A_2. In the RAW branch, DCAB is replaced with GFM, while in the RGB branch, DCAB is replaced with FSM. The demoiréing modules embedded in skip-connections are removed for both branches.
- A_3. RRID with the original SCDM design.

Table 1: Ablation Study for SCDM.

Models	PSNR↑	SSIM↑	Inference time(s)
A_1	27.11	0.927	4.589
A_2	26.68	0.923	3.909
A_3 (RRID)	**27.88**	**0.938**	**0.089**

From A_1 in Table 1, it can be observed that replacing DCAB with GFM and FSM results in a noticeable decline by 0.77dB in PSNR and 0.011 in SSIM. A more significant concern arises from the substantial increase in inference time

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to 4.589 seconds, primarily caused by the Block DCT utilized in FSM. This observation underscores the crucial role of DCAB in encoding and decoding informative features as a pivotal block in SCDM. Moreover, even when we remove the demoiréing modules from the skip-connections in A_1, the inference time remains relatively long for A_2. This observation emphasizes the effectiveness and efficiency of incorporating demoiréing modules within skip-connections.

2 Limitation

While we propose to utilize paired RAW and sRGB images for moiré pattern removal and design RGISP to learn a device-dependent ISP, performing color restoration in scenes with significant color deviations remains a challenging task.

(a) Input (b) Ours (c) GT

Fig. 1: Failure cases in correcting color deviations.

Fig. 1 demonstrates two scenes where the moiréd input images exhibit noticeable color discrepancies compared to the ground-truth images. While our proposed method effectively removes moiré patterns and partially corrects the color, it falls short of fully mapping the colors to those present in the ground-truth images. Currently, there is only one dataset, TMM22 dataset [1], available for image demoiréing with the RAW-sRGB image pairs. However, the images in the training set of TMM22 are limited to a size of 256×256, which may constrain the model's capacity to learn global color mapping. To overcome this limitation, one possible solution is to collect a new paired RAW-sRGB image demoiréing dataset with a higher resolution, which will be our future work.

3 More Qualitative Comparison on TMM22 Dataset

More visual comparisons with state-of-the-arts methods are presented in Figs. 2-3. The results demonstrate the superiority of our proposed RRID in demoiréing and restoring color. For instance, in the first scene depicted in Fig. 2, the input image suffers from both severe moiré pattern contamination and noticeable color deviation. Previous methods struggle to remove moiré patterns and encounter difficulties in accurately restoring the petal color to pink. In contrast, our approach successfully eliminates moiré patterns and restores the original color.

The last scene depicted in Fig. 3 presents a moiréd document. Despite the relatively subtle moiré contamination in this scene, the majority of methods successfully eliminate the moiré patterns. However, the colored area at the top of the image deserves attention, as most methods incorrectly correct it as blue. In contrast, the ground truth image reveals that this area is actually cyan. Remarkably, our method excels in accurately restoring the original color.

References

1. Yue, H., Cheng, Y., Mao, Y., Cao, C., Yang, J.: Recaptured screen image demoiréing in raw domain. IEEE Transactions on Multimedia (2022) 2, 4, 5

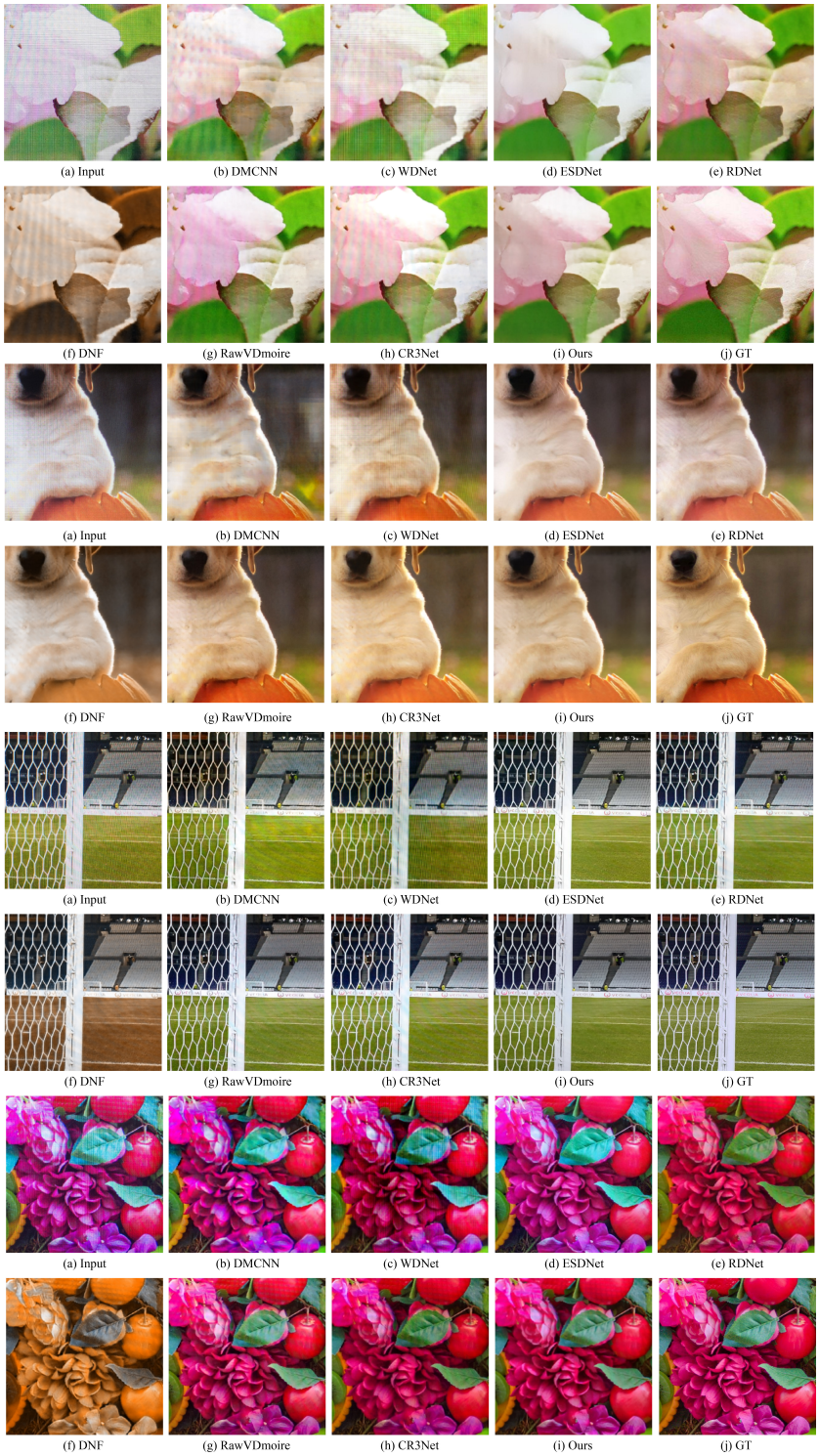

Fig. 2: Qualitative comparison on raw image demoiréing TMM22 dataset [1].

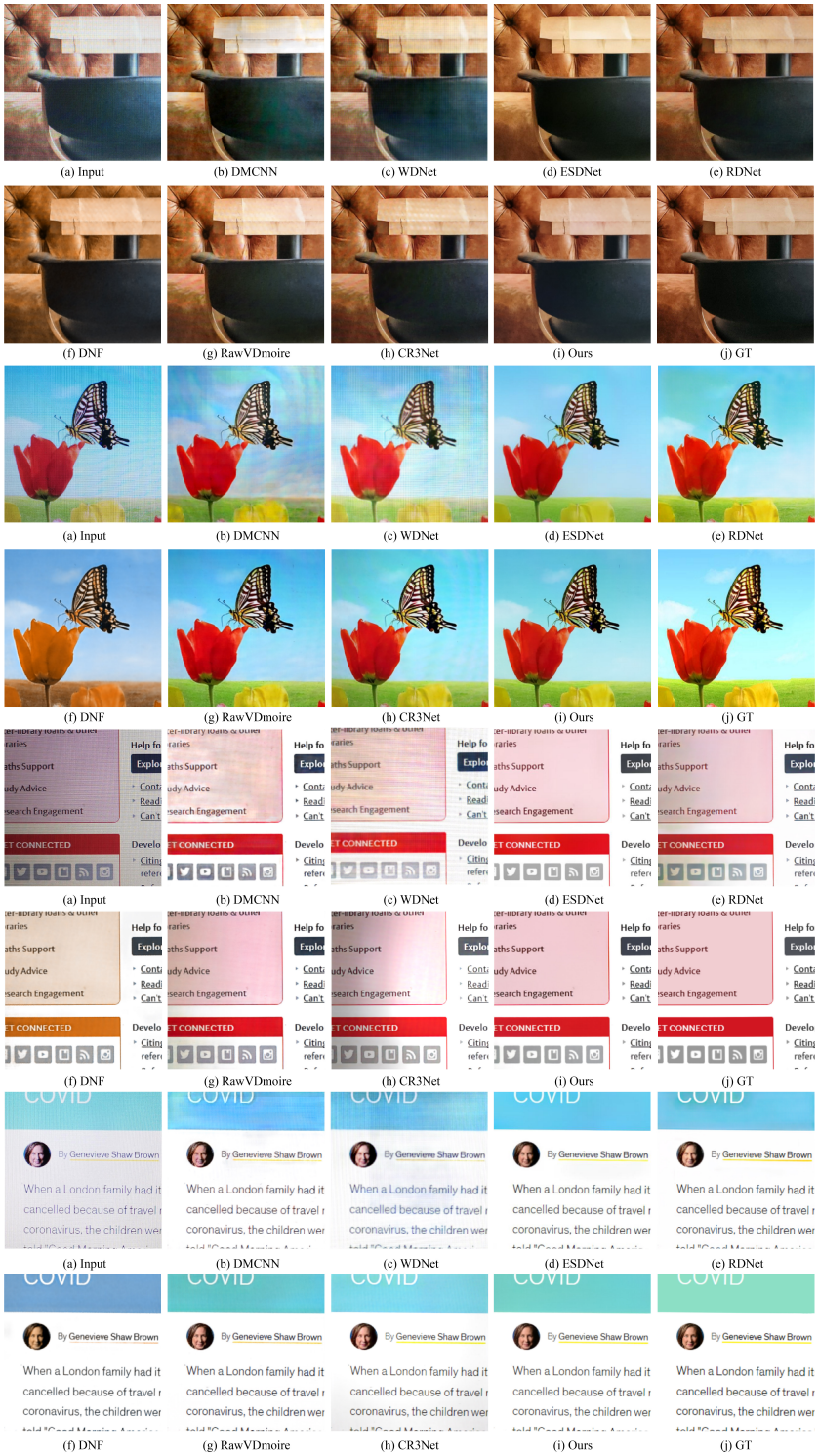

Fig. 3: Qualitative comparison on raw image demoiréing TMM22 dataset [1].