Supplementary for Image Shooting Parameter-Guided Cascade Image Retouching Network: Think Like an Artist

I. How to Plug ECM to Existing Methods

Automatic retouching methods can be divided into local-based and global-based, CSRNet [1] is a global adjustment method using 1×1 convolution, STAREnhancer [2] and CURL [3] are curve-based adjustment methods, and DUPE [4] and HDRNet [5] are local adjustment methods using the grid. For CSRNet [1], as shown in Figure 1, ECM changes the coefficients for global adjustments, and as shown in Figure 2 for STAREnhancer [2] we use ECM to change the form of the adjustment curve. Similarly, for DUPE [4] and HDRNet [4] we use ECM to change the color adjustment coefficients in their grid.

As shown in Figure 3 and Figure 4 we select some test pictures before and after plugging ECM for display.

II. Details of the Artist's Operations

A pie chart is used in the main paper to show the proportion of the artist's retouching operations, and the detailed operation data is in Table I. The artist's operation is obtained from the lightroom of the original dataset.

III. Hue Palette Loss Implementation Details

The hue palette loss design needs to specify the number of divided histogram intervals, that is, the number of classes of colors. The influence of the number of different intervals on the final SGCNet results is shown in the Table II. In this histogram, too wide of bin width can cause color confusion, while too narrow will cause similar colors to be divided into different ranges. We divide the H channels in the range of [0, 360] into 10 equal bins by experiments.

A. Qualitative comparison of SGCNet Modules

In the second row in Figure 5, ECM is used to map colors correctly and green is closer to the grass in nature. As shown in the top row of Figure 5 it's obvious that the clothes generated by Basic Net are darker. Using the extracted from GT and raw images, then apply them to raw inputs. The brighter images gained from $gainmap$ inputted to Basic Net can achieve a high 29.79 dB of PSNR. It can be seen that after adjusting the brightness to the appropriate range, the subsequent color processing is easier and more effective. The structure of the two-stage makes the luminance more realistic.

Hue palette loss is designed to focus on fewer colors in unbalanced datasets, in the last row of Figure 5, the white arm position is not affected by a dark background, and the blue saturation of the sky is higher and closer to reality.

References

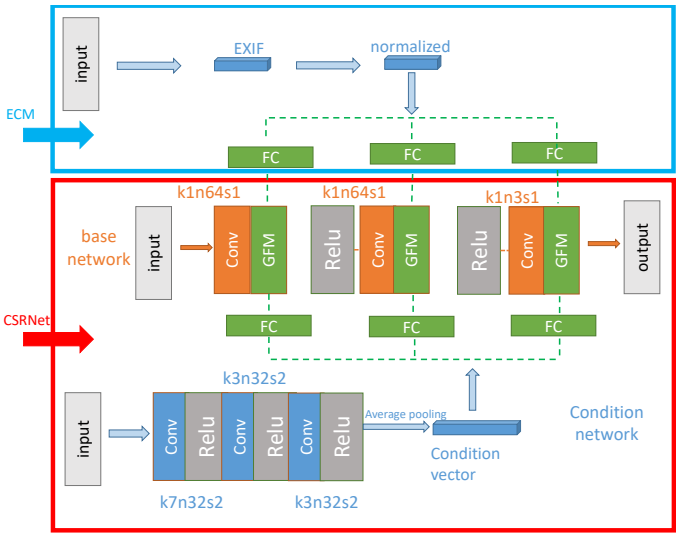
[1] H. Jingwen, L. Yihao, Q. Yu, and D. Chao, "Conditional sequential modulation for efficient global image retouching," in *Computer Vision – ECCV 2020*, V. Andrea, B. Horst, B. Thomas, and F. Jan-Michael, Eds. Cham: Springer International Publishing, 2020, pp. 679–695.

[2] S. Yuda, Q. Hui, and D. Xin, "Starenhancer: Learning real-time and style-aware image enhancement," in *Proceedings of the IEEE/CVF International Conference on Computer Vision (ICCV)*, October 2021, pp. 4126–4135.

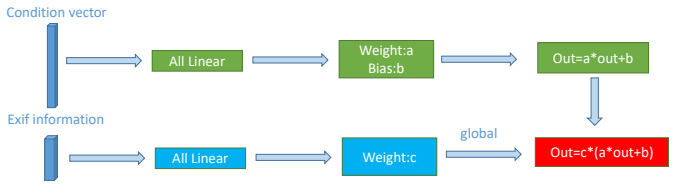
[3] M. Sean, M. Steven, and S. Gregory, "Curl: Neural curve layers for global image enhancement," in *2020 25th International Conference on Pattern Recognition (ICPR)*, 2021, pp. 9796–9803.

[4] W. Ruixing, Z. Qing, F. Chi-Wing, S. Xiaoyong, Z. Wei-Shi, and J. Jiaya, "Underexposed photo enhancement using deep illumination estimation," in *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, June 2019.

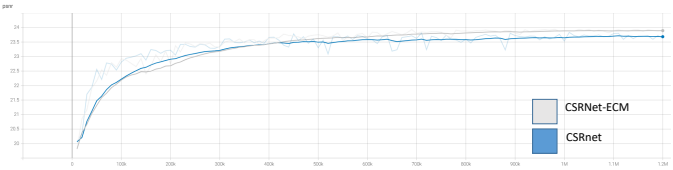
[5] G. Michaël, C. Jiawen, B. J. T., H. S. W., and D. Frédo, "Deep bilateral learning for real-time image enhancement," *ACM Trans. Graph.*, vol. 36, no. 4, jul 2017. [Online]. Available: https://doi.org/10.1145/3072959.3073592



(a) Main Structure of CSRNet and CSR-ECM



(b) EXIF Generating Global Coefficient c



(c) Test Set PSNR Curves for CSRNet and CSRNet-ECM (after smoothing).

Fig. 1: Original CSRNet and CSRNet-ECM.

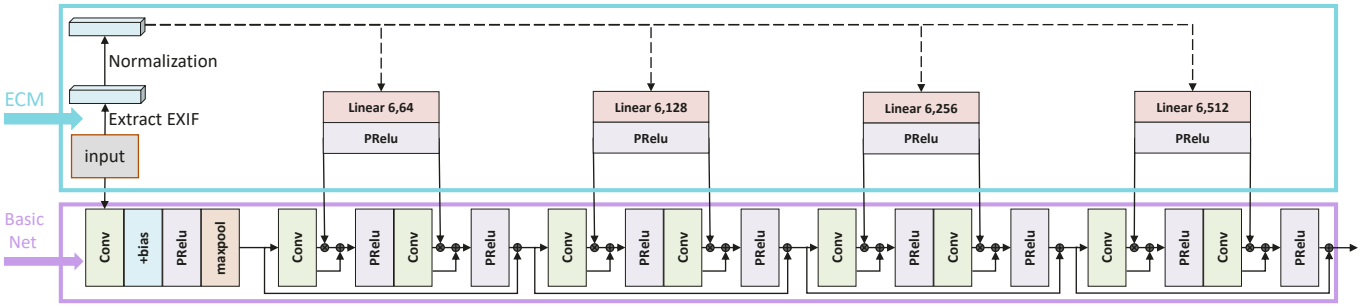


Fig. 2: Original STAREnhancer and STAREnhancer-ECM.

TABLE I: The specific statistics of the artist's operations, the total number of operations in the last two steps is less than 500 because the operation steps of some pictures are less than 5 steps. Operations not involved are marked as ("/").

Operations	The first step	The second step	The third step	The fourth step	The fifth step
Black Clipping	5	26	174	75	60
Brightness	/	1	/	6	6
Contrast	4	5	42	53	46
Dark Tones	/	1	2	7	15
Exposure	447	41	30	11	15
Fill light	/	1	6	13	14
Highlight Recovery	17	391	41	27	15
Light Tones	/	/	/	2	13
Midtone Split	/	/	/	/	1
Highlight Tones	/	/	/	/	4
Saturation	/	/	1	9	23
Shadow Tones	/	/	1	1	5
Temperature	2	2	5	24	42
Tint	/	1	4	5	7
Vibrance	/	8	133	173	108
White Balance	25	23	60	89	86
Total	500	500	500	495	460

TABLE II: The Effect of the Number of Colors on Hue Loss(480P).

number of intervals	5	6	8	9	10	12	20	30
PSNR	25.74dB	25.69dB	25.68dB	25.77dB	25.82dB	25.68dB	25.70dB	25.68dB

CSRnet CSRNet-ECM GT

Fig. 3: Qualitative comparison for CSRNet and CSRNet-ECM on MIT-Adobe FiveK.

STAREnhancer STAREnhancer-ECM GT

Fig. 4: Qualitative comparison for STAREnhancer and STAREnhancer-ECM on MIT-Adobe FiveK.

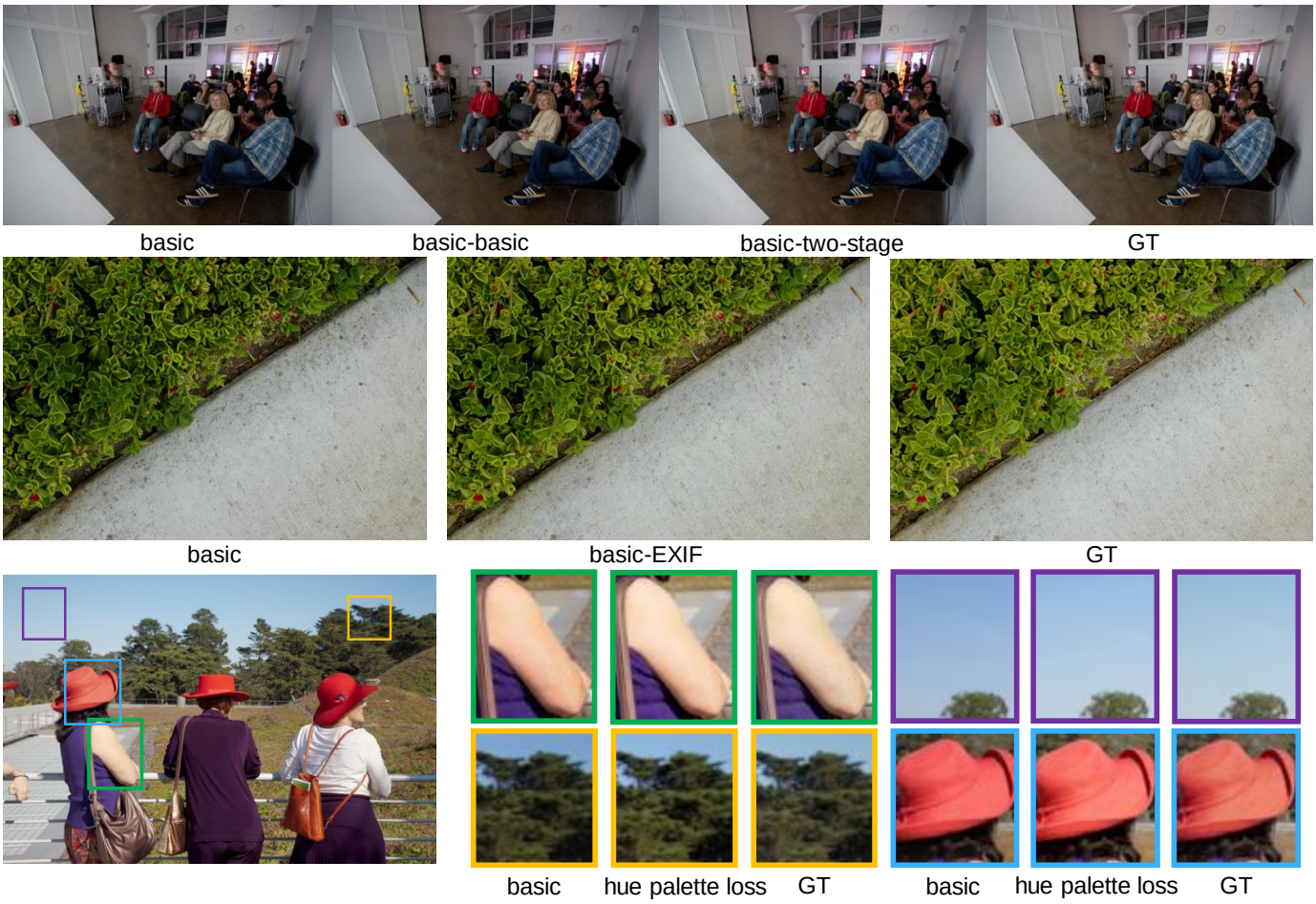


Fig. 5: The effect of basic model and adding different modules that we proposed.

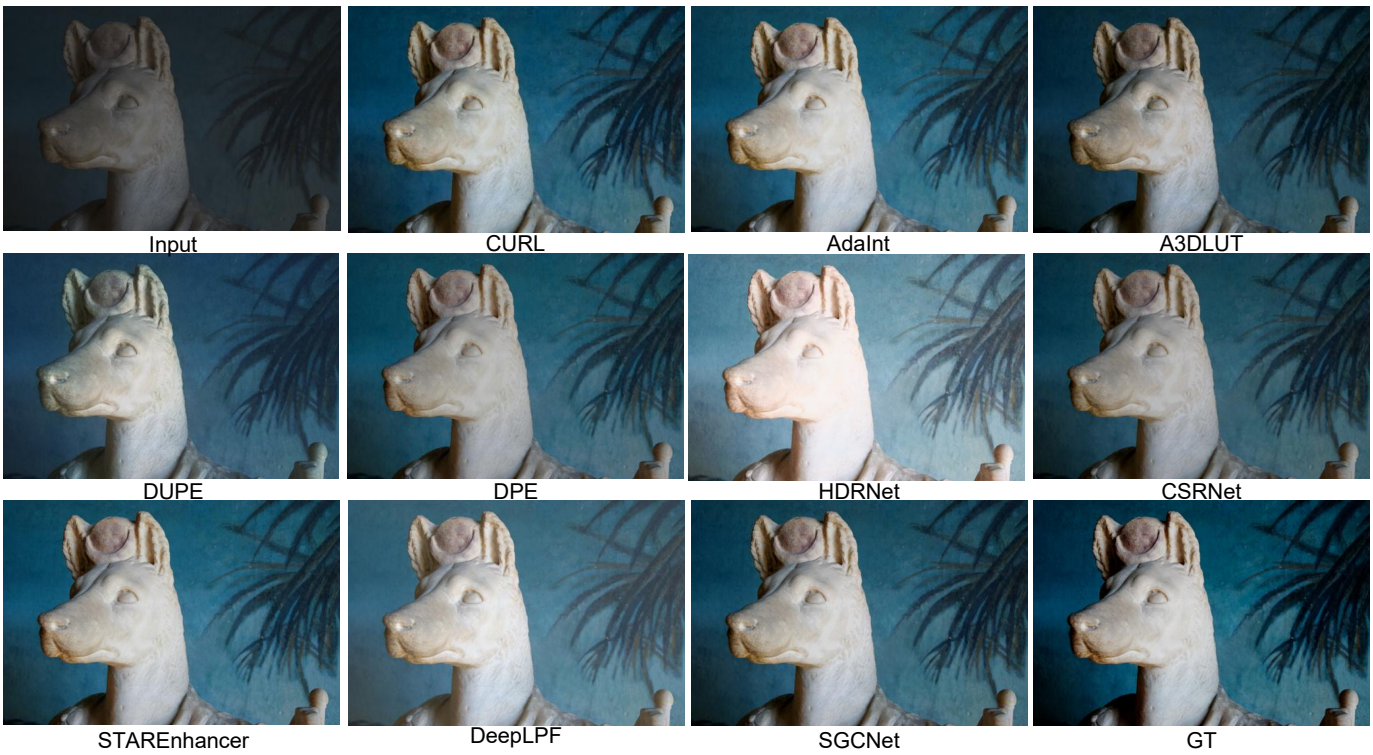


Fig. 6: Qualitative comparison with contemporaneous methods on MIT-Adobe FiveK.