

# MBLLEN: Low-Light Image/Video Enhancement Using CNNs

## Supplementary Material

BMVC 2018 Submission # 700

## 1 Additional Quantitative Comparisons

	PSNR	SSIM	VIF	LOE	TMQI	AB
Input	12.80	0.43	0.38	606.85	0.79	-54.62
AMSR	8.82	0.17	0.10	4377.32	0.42	-80.38
CVC	11.13	0.29	0.27	912.45	0.75	-65.18
LDR	12.92	0.41	0.36	703.75	0.79	-53.86
SRIE	15.84	0.59	0.43	788.53	0.82	-37.02
BPDHE	15.01	0.59	0.39	<b>607.43</b>	0.81	-37.38
HE	15.00	0.65	0.42	753.66	<b>0.88</b>	34.60
MSRCR	13.30	0.64	0.44	1235.92	0.83	47.08
LIME	15.16	0.60	0.44	1215.58	0.82	10.90
MF	18.48	0.67	0.45	882.24	0.84	-23.24
Dong	17.80	0.64	0.37	1398.35	0.82	-16.43
NPE	17.65	0.68	0.43	1051.15	0.84	-25.28
DHECI	18.18	0.68	0.43	<b>606.98</b>	<b>0.87</b>	<b>-1.21</b>
WAHE	17.64	0.67	<b>0.48</b>	648.29	0.84	-30.28
Ying	<b>19.66</b>	<b>0.73</b>	<b>0.47</b>	892.56	0.86	<b>2.57</b>
BIMEF	<b>19.80</b>	<b>0.74</b>	<b>0.48</b>	675.15	0.85	-20.22
Ours	<b>26.56</b>	<b>0.89</b>	<b>0.55</b>	<b>478.02</b>	<b>0.91</b>	<b>-0.96</b>

Table 1: Comparison of low-light image enhancement without additional noise.

	PSNR	SSIM	VIF	LOE	TMQI	AB
Input	13.63/13.59	0.42/0.42	0.34/0.34	739.63/ 739.59	0.79/0.79	-47.96/-49.00
AMSR	9.57/ 9.91	0.18/0.18	0.09/0.09	4357.38/4357.40	0.43/0.45	-74.49/-68.47
CVC	11.83/11.80	0.28/0.29	0.25/0.25	1006.25/1006.33	0.75/0.75	-58.80/-59.34
LDR	13.64/13.61	0.40/0.41	0.32/0.32	817.24/ 817.28	0.79/0.78	-47.26/-48.56
SRIE	16.84/17.07	0.58/0.58	0.37/0.37	828.63/ 828.28	0.83/0.82	-27.09/-29.84
BPDHE	15.90/15.80	0.60/0.59	0.33/0.32	<b>688.33/ 688.44</b>	0.81/0.81	-31.47/-33.99
HE	14.50/16.49	0.58/0.60	0.36/0.36	853.38/ 853.36	<b>0.87/0.86</b>	38.93/ 19.42
MSRCR	12.64/13.37	0.62/0.63	0.36/0.36	1249.31/1249.17	<b>0.83/0.84</b>	53.07/ 47.91
LIME	14.36/15.26	0.59/0.60	0.37/0.37	1250.82/1250.75	0.81/0.82	19.23/ 14.84
MF	<b>19.37/19.66</b>	0.67/0.67	0.39/0.38	896.67/ 896.46	0.84/ <b>0.84</b>	-13.77/-16.88
Dong	17.80/18.42	0.63/0.64	0.32/0.31	1390.64/1390.82	0.82/0.82	<b>-6.43/ -9.69</b>
NPE	18.55/18.55	0.67/0.68	0.36/0.36	1070.94/1070.64	0.84/ <b>0.84</b>	-17.88/-20.85
DHECI	18.03/18.71	0.67/0.68	0.36/0.36	<b>687.60/ 687.61</b>	<b>0.86/0.86</b>	<b>3.75/ 0.16</b>
WAHE	17.91/17.37	0.62/0.59	<b>0.40/0.40</b>	771.34/ 771.33	0.83/0.82	-26.41/-30.04
Ying	18.61/ <b>19.69</b>	<b>0.70/0.71</b>	<b>0.40/0.39</b>	928.13/ 927.83	<b>0.86/0.86</b>	10.99/ <b>6.99</b>
BIMEF	<b>20.27/17.56</b>	<b>0.73/0.70</b>	<b>0.41/0.39</b>	725.72/ 725.61	0.85/0.83	-11.58/-31.13
Ours	<b>25.97/26.39</b>	<b>0.87/0.87</b>	<b>0.49/0.49</b>	<b>573.14/ 573.14</b>	<b>0.98/0.89</b>	<b>1.45/ -1.57</b>

Table 2: Comparison of low-light image enhancement with additional Poisson noise. As described in the paper, the numbers on the right indicate the brightness-scaled results by using ground truth for reference.

## 2 More Image Enhancement Results

1. Figure 1 - Figure 15: comparison on images without additional noise
2. Figure 16 - Figure 25: comparison on images with additional Poisson noise
3. Figure 26 - Figure 30: comparison on natural low-light images
4. Figure 31: more results on on natural low-light images

In order to see the visual difference more clearly, it is recommended to first check the same dark regions in the input images and zoom in on the images if necessary.

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Figure 1: Low-light image enhancement without additional noise.

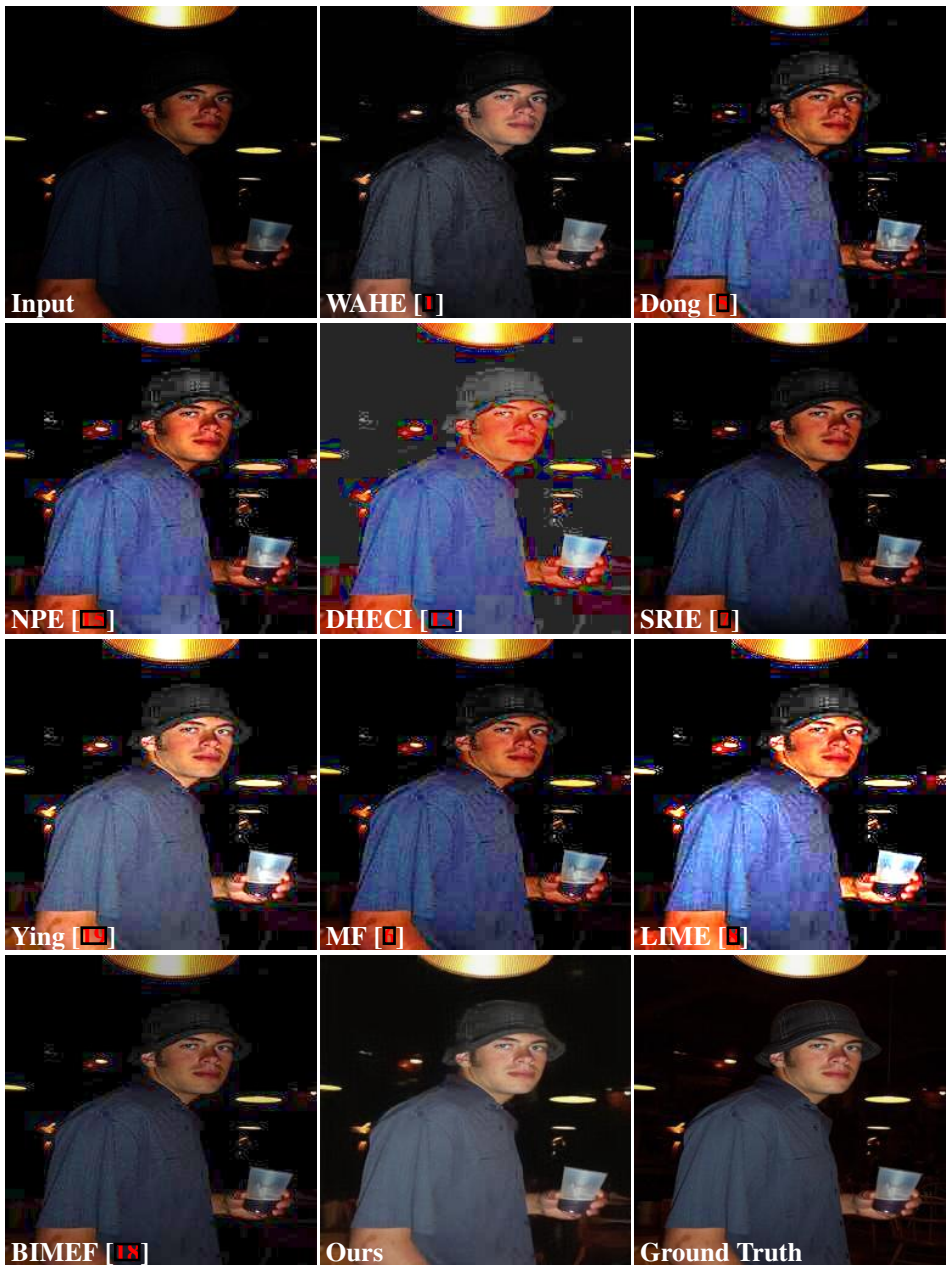


Figure 2: Low-light image enhancement without additional noise.

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Figure 3: Low-light image enhancement without additional noise.



Figure 4: Low-light image enhancement without additional noise.

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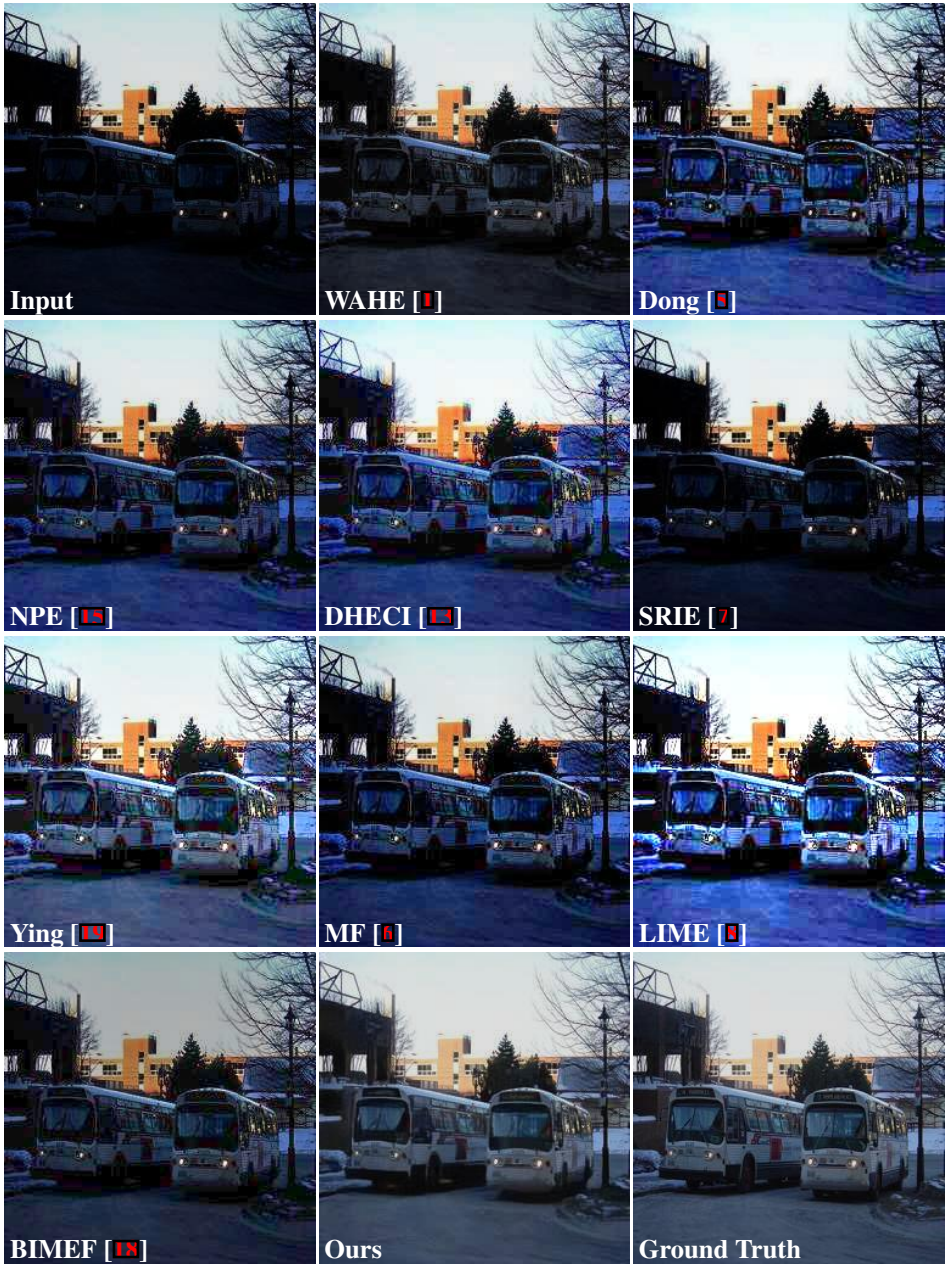


Figure 5: Low-light image enhancement without additional noise.

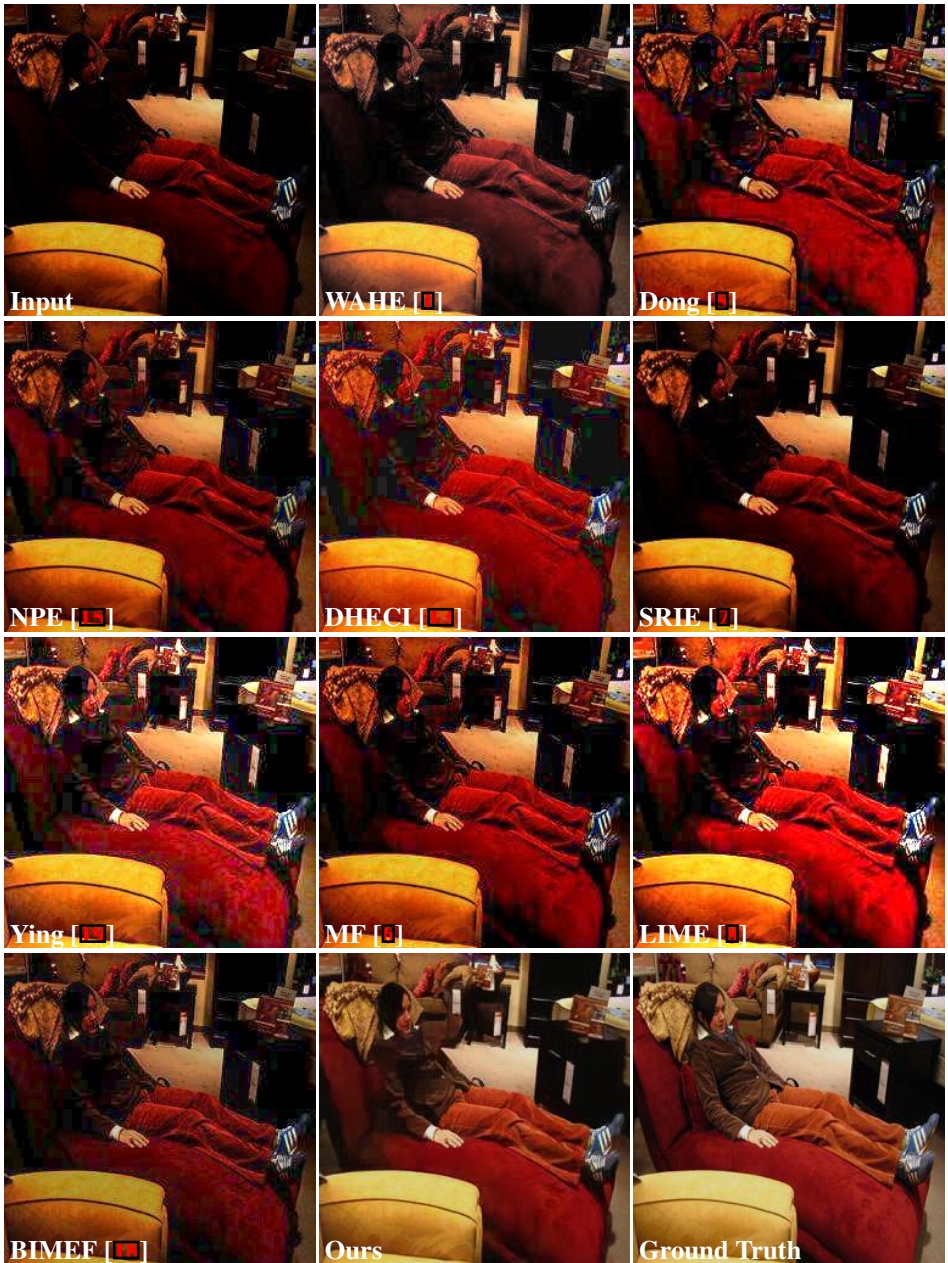


Figure 6: Low-light image enhancement without additional noise.

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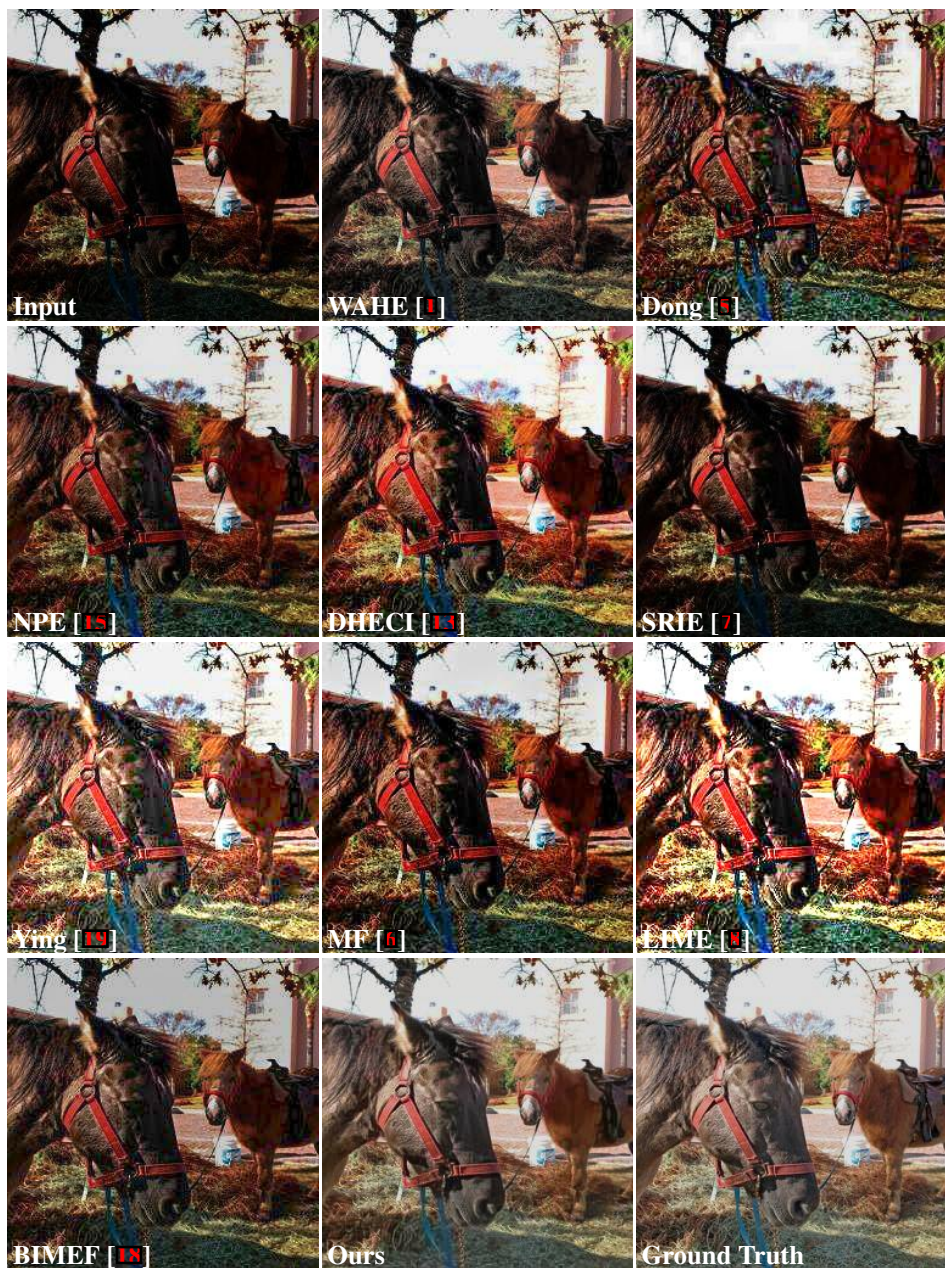


Figure 7: Low-light image enhancement without additional noise.



Figure 8: Low-light image enhancement without additional noise.

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Figure 9: Low-light image enhancement without additional noise.

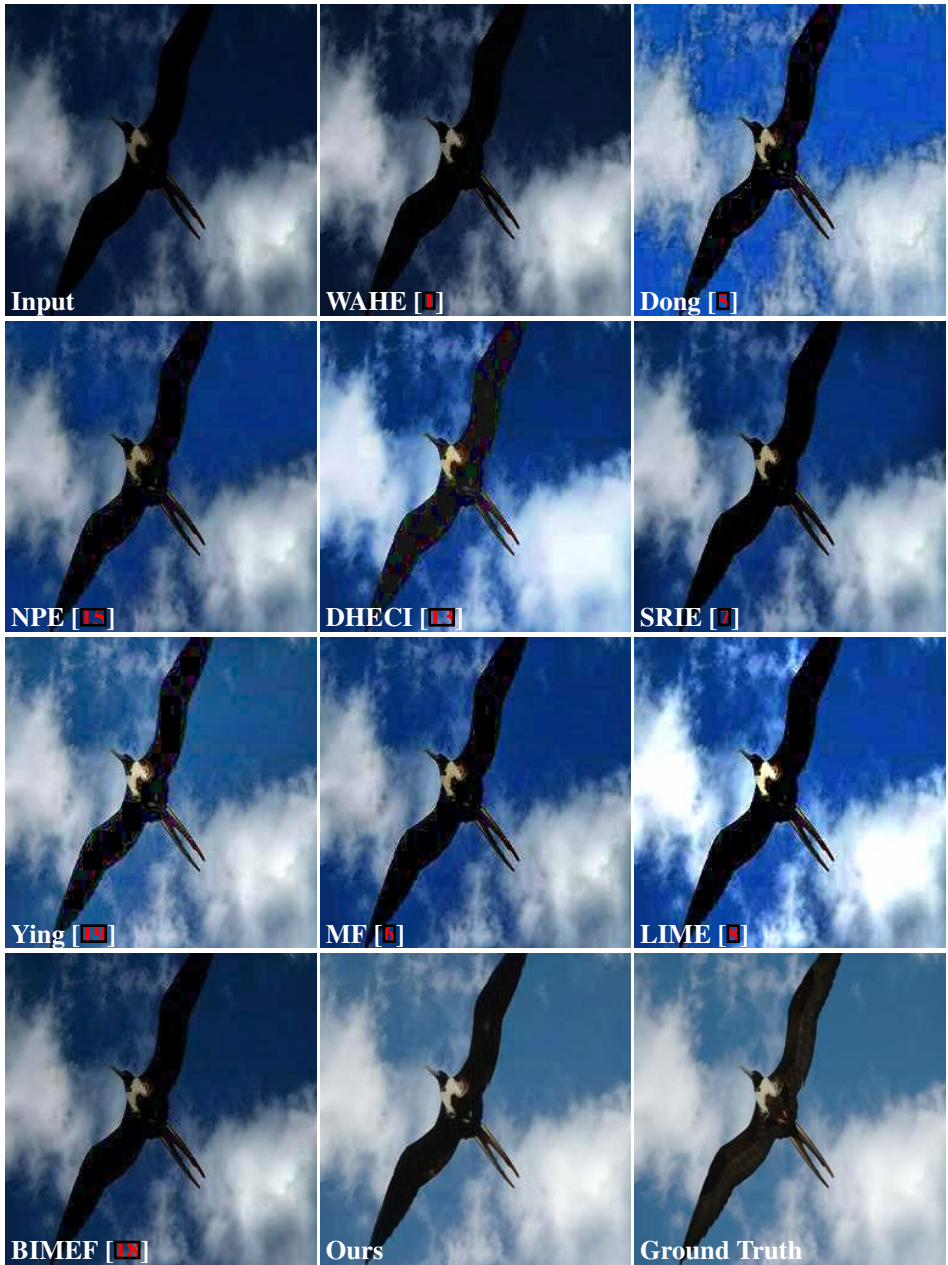


Figure 10: Low-light image enhancement without additional noise.

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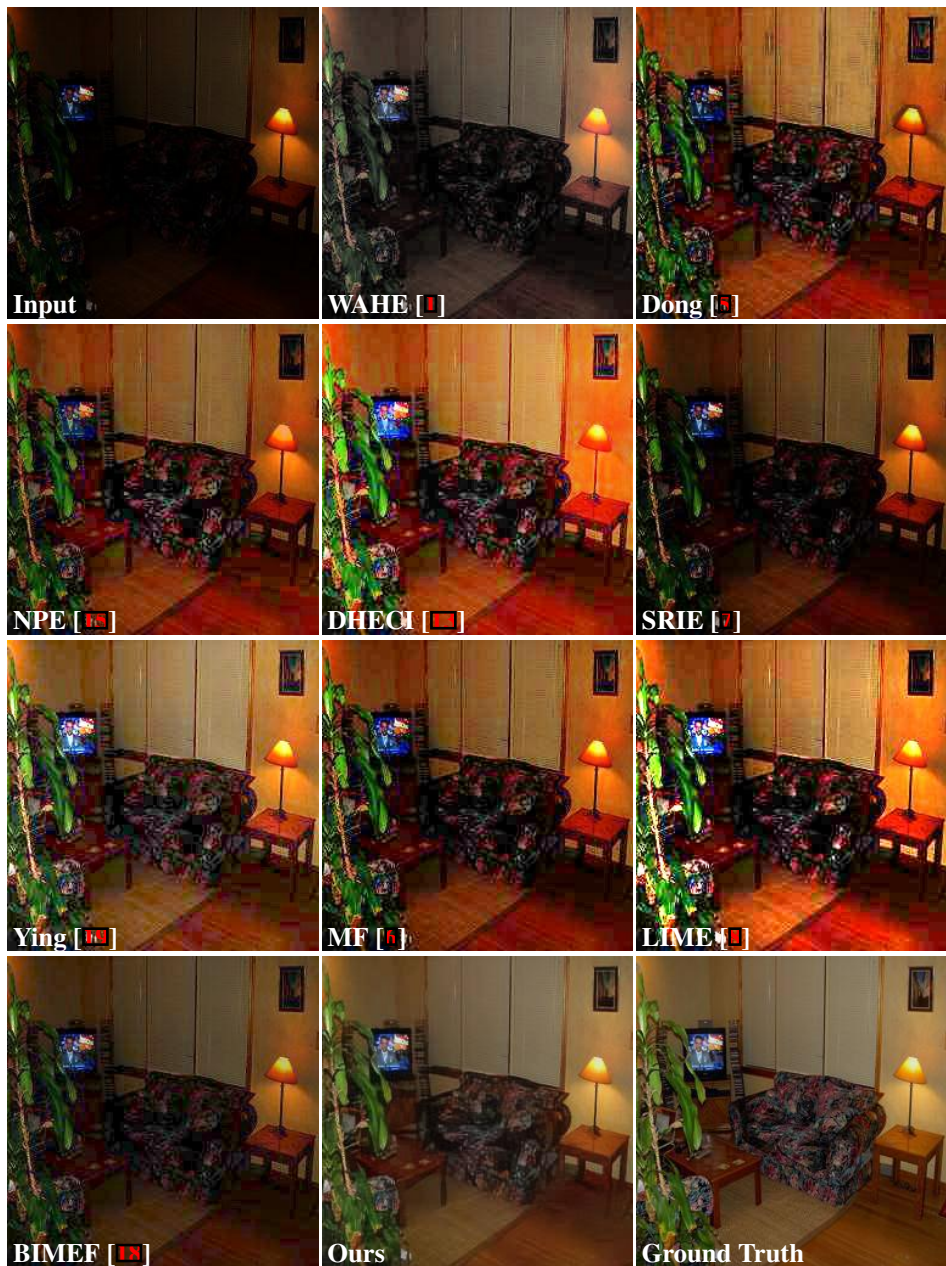


Figure 11: Low-light image enhancement without additional noise.

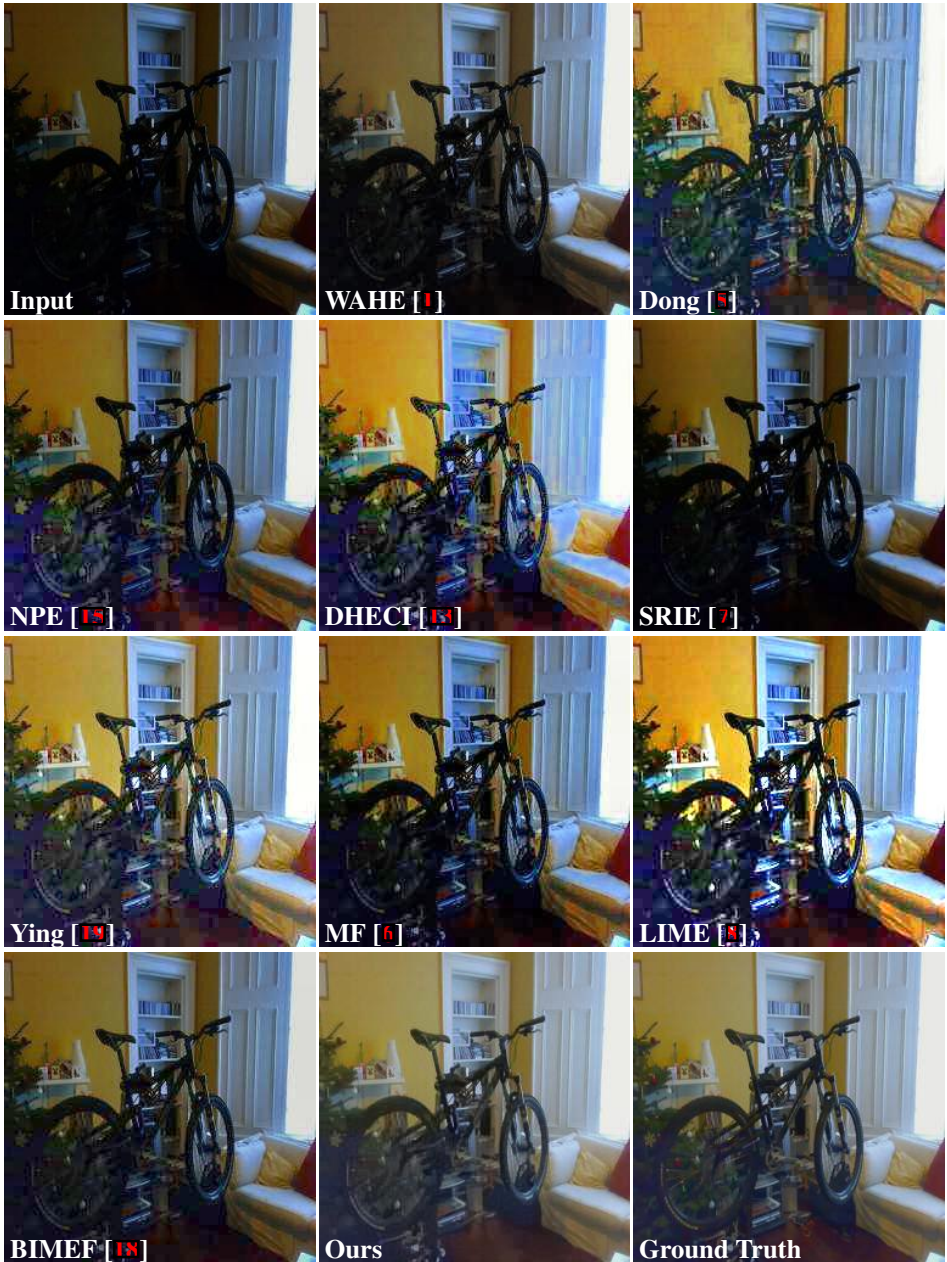


Figure 12: Low-light image enhancement without additional noise.

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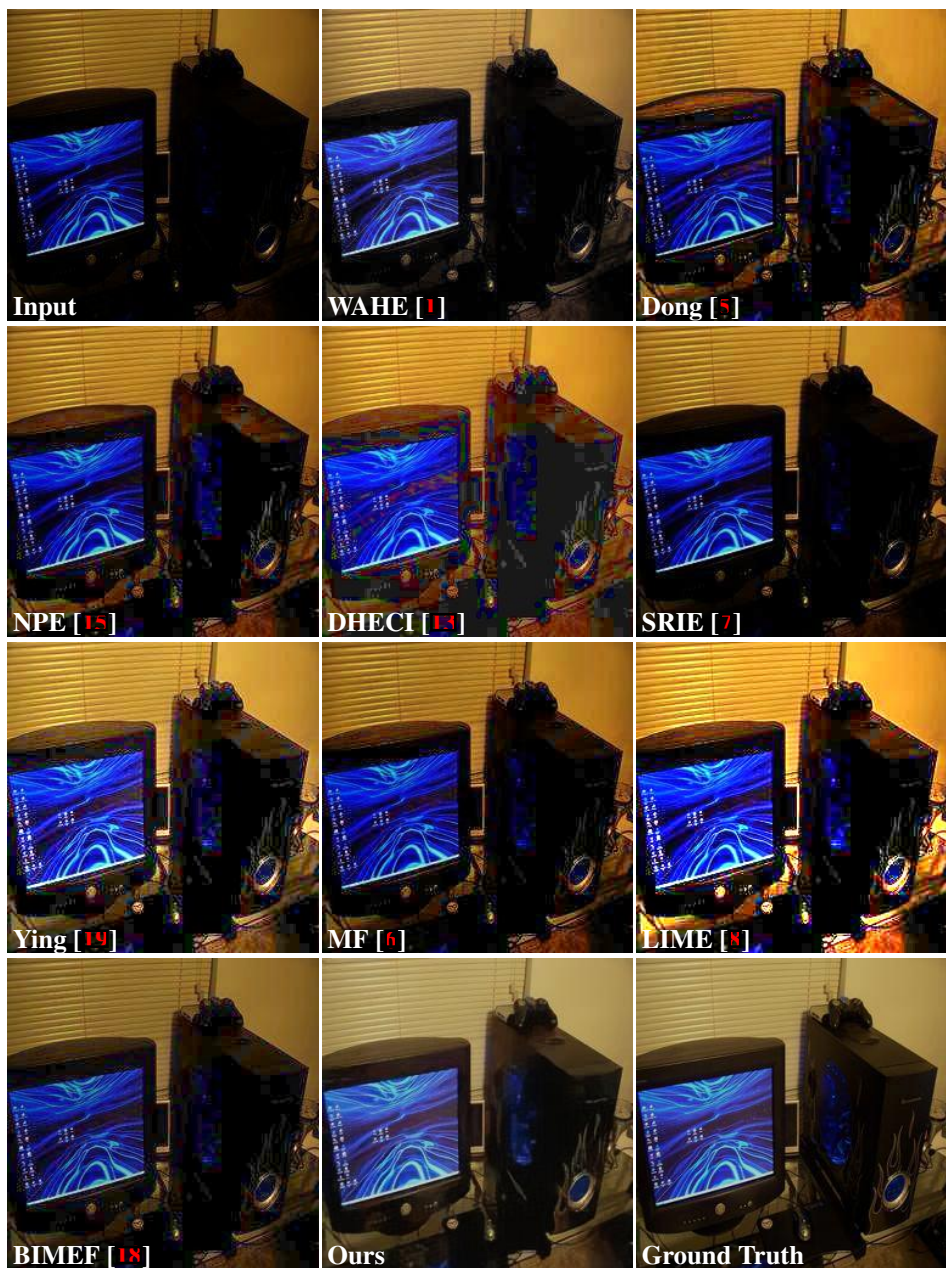


Figure 13: Low-light image enhancement without additional noise.



Figure 14: Low-light image enhancement without additional noise.

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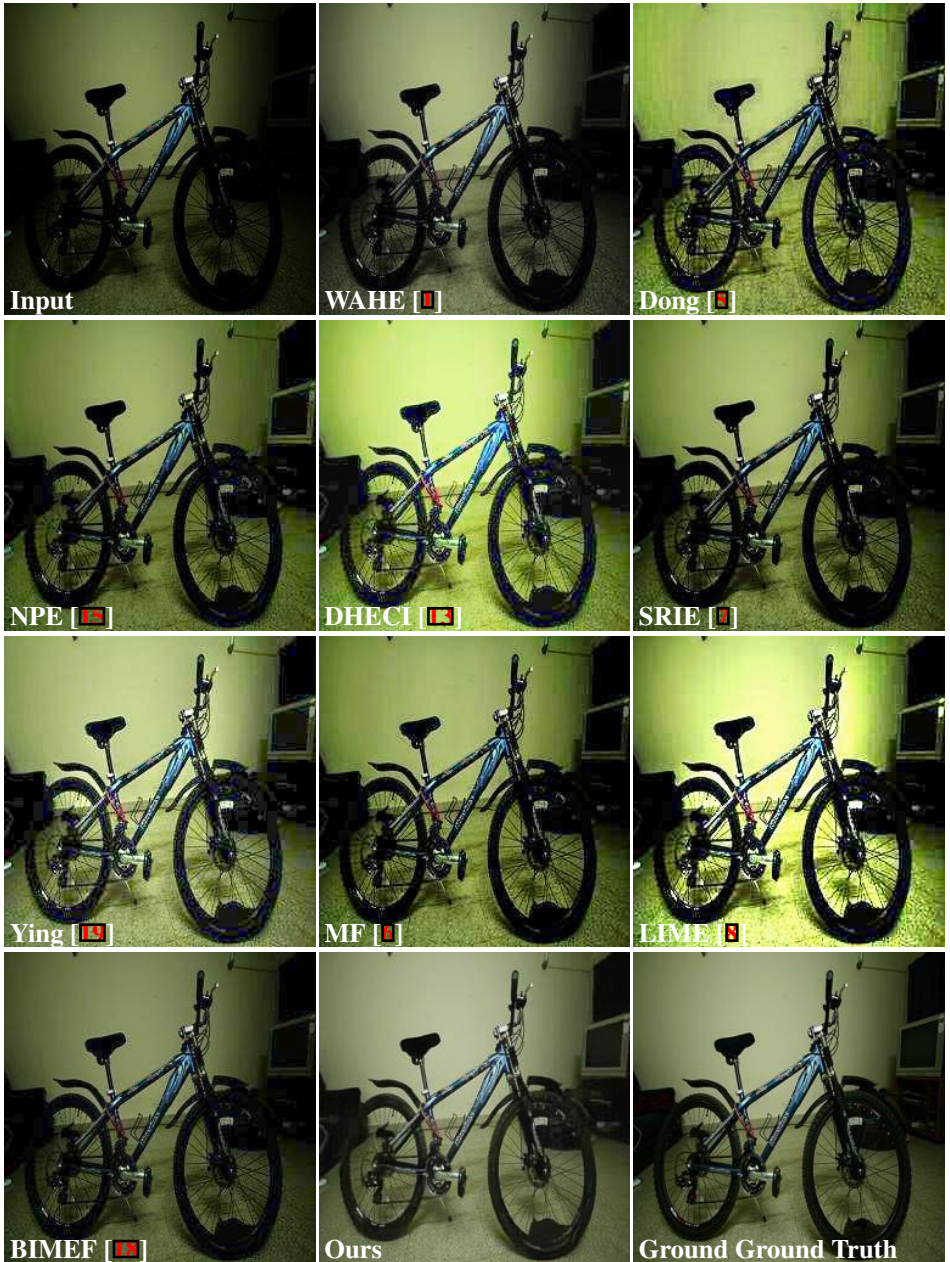


Figure 15: Low-light image enhancement without additional noise.

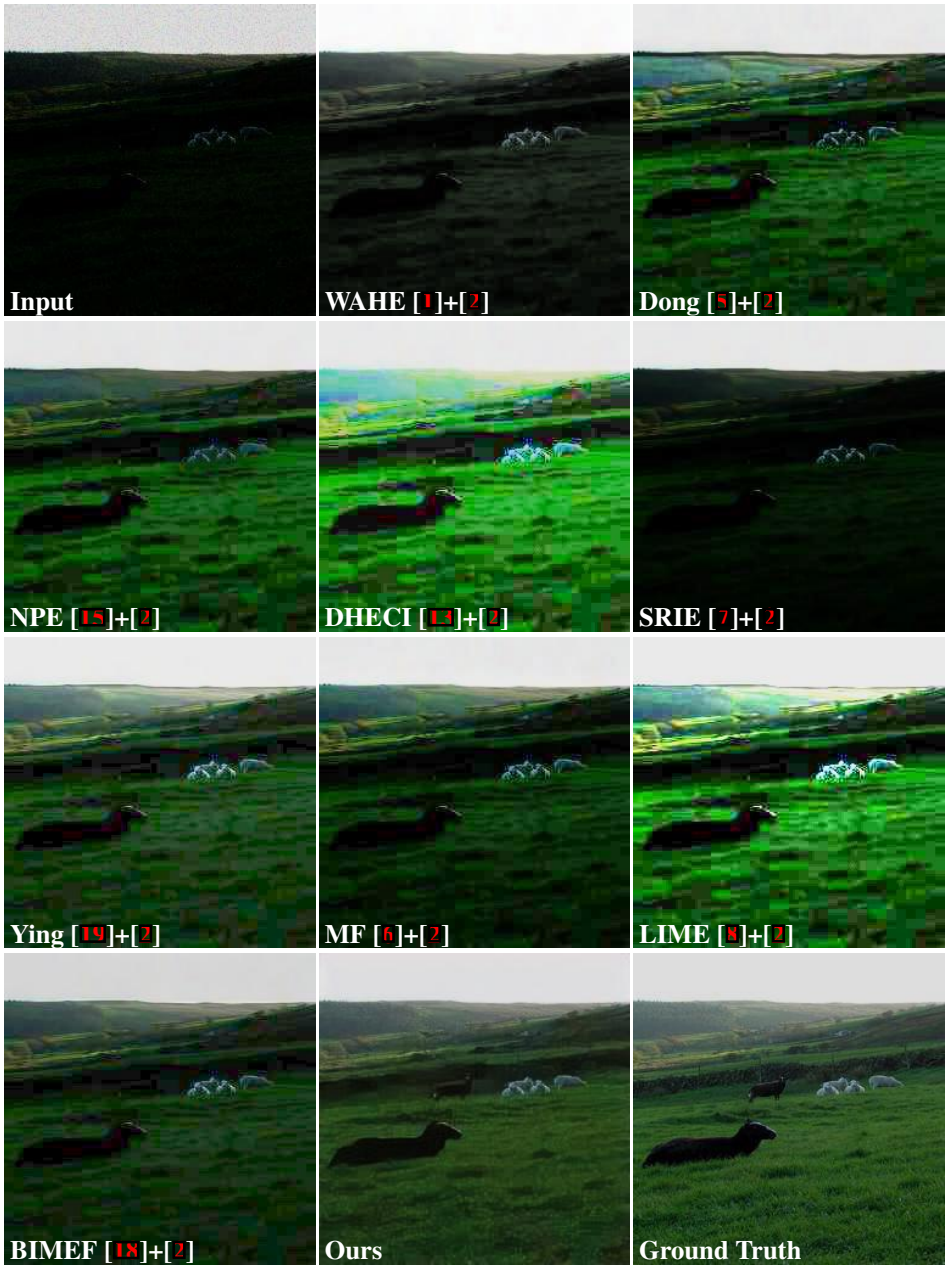


Figure 16: Low-light image enhancement with additional Poisson noise.

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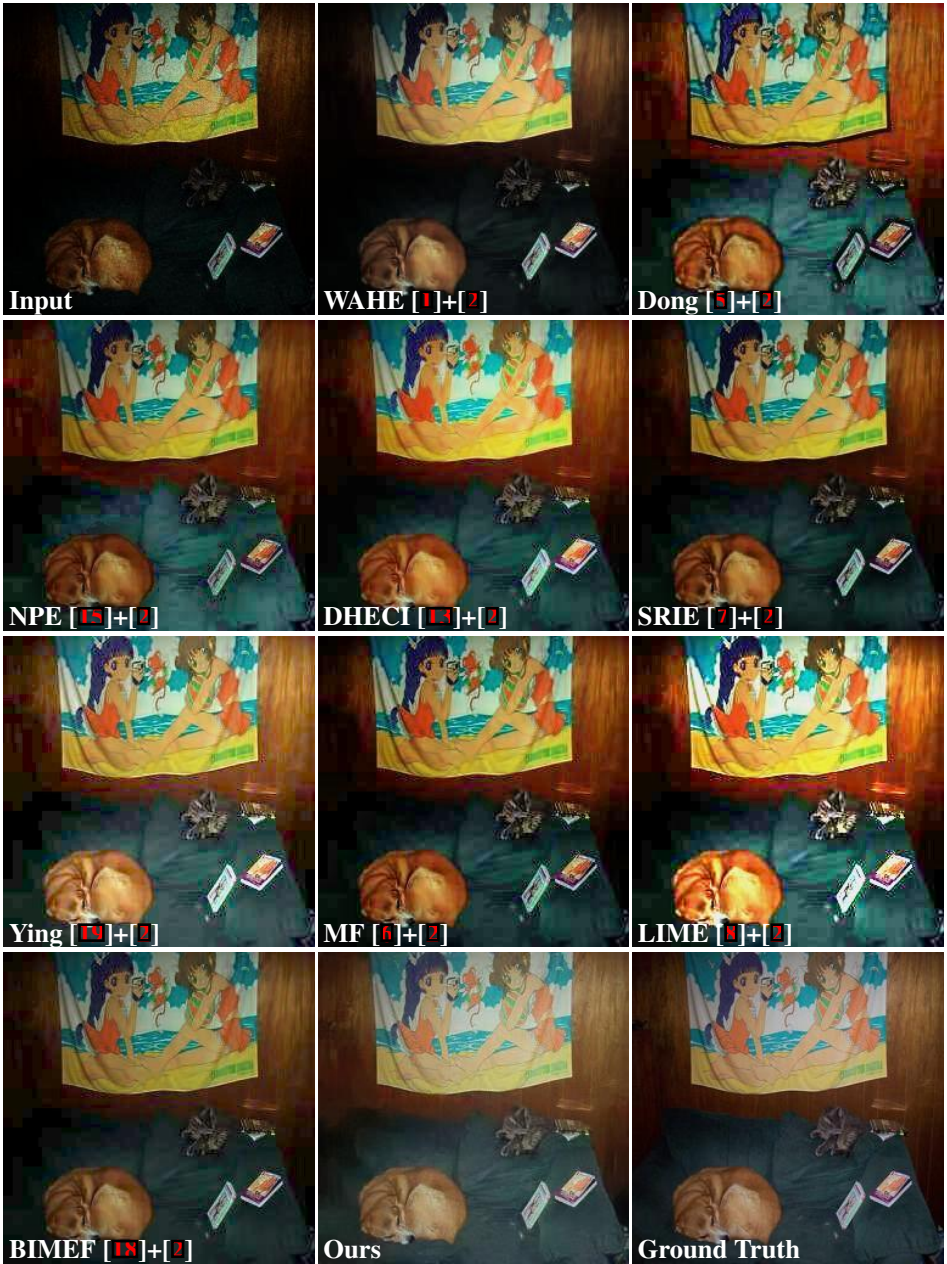


Figure 17: Low-light image enhancement with additional Poisson noise.

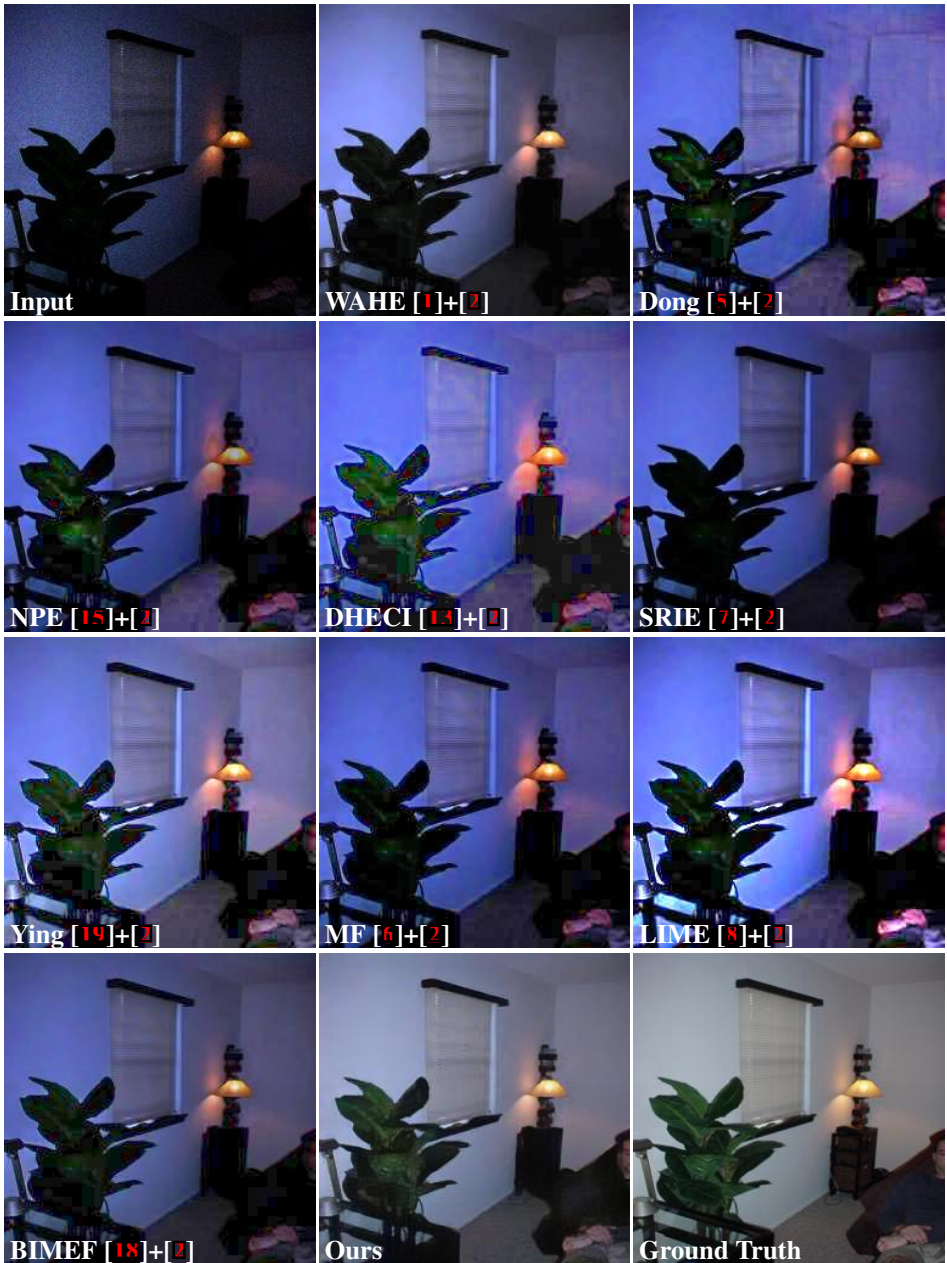


Figure 18: Low-light image enhancement with additional Poisson noise.

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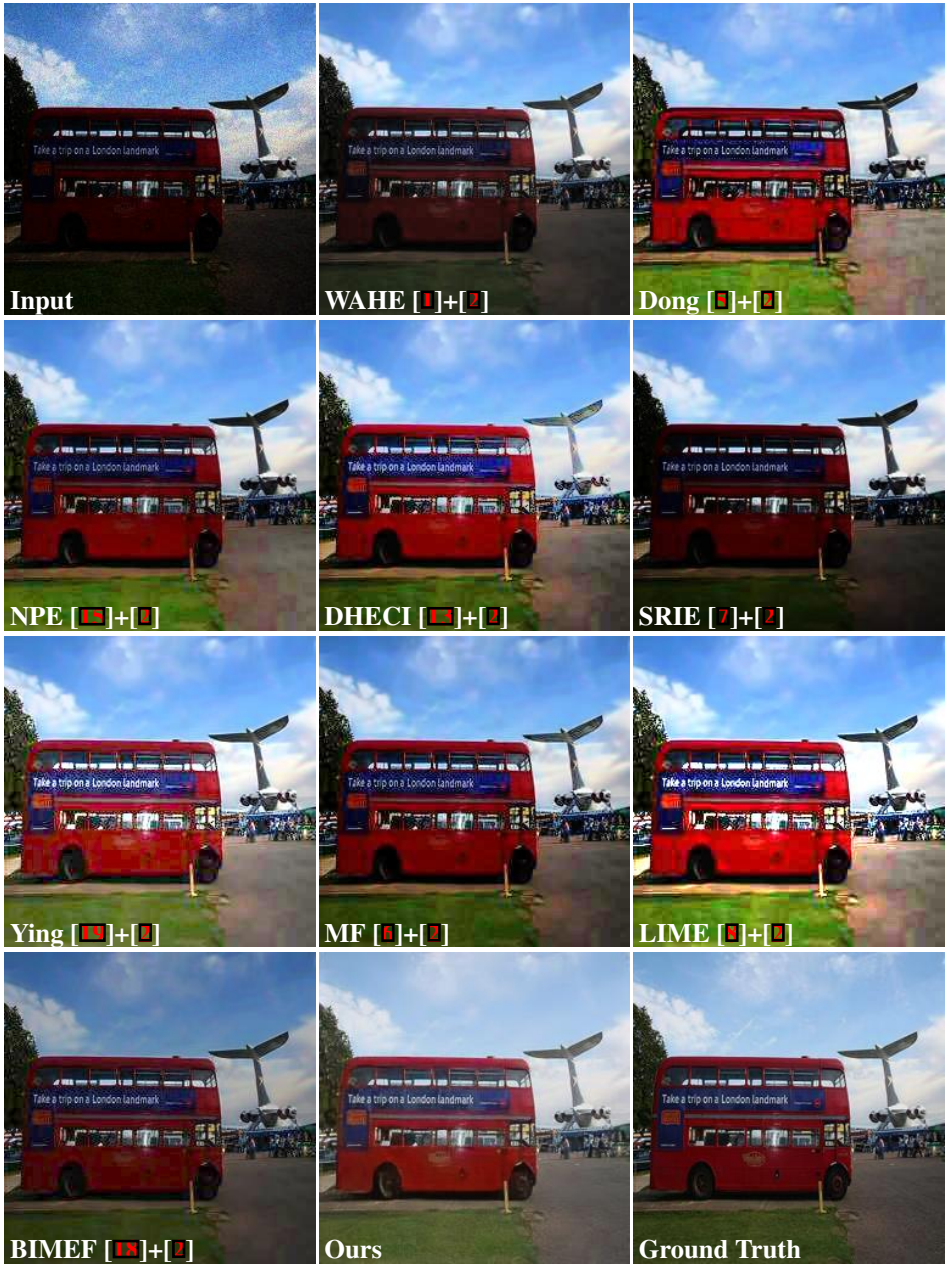


Figure 19: Low-light image enhancement with additional Poisson noise.

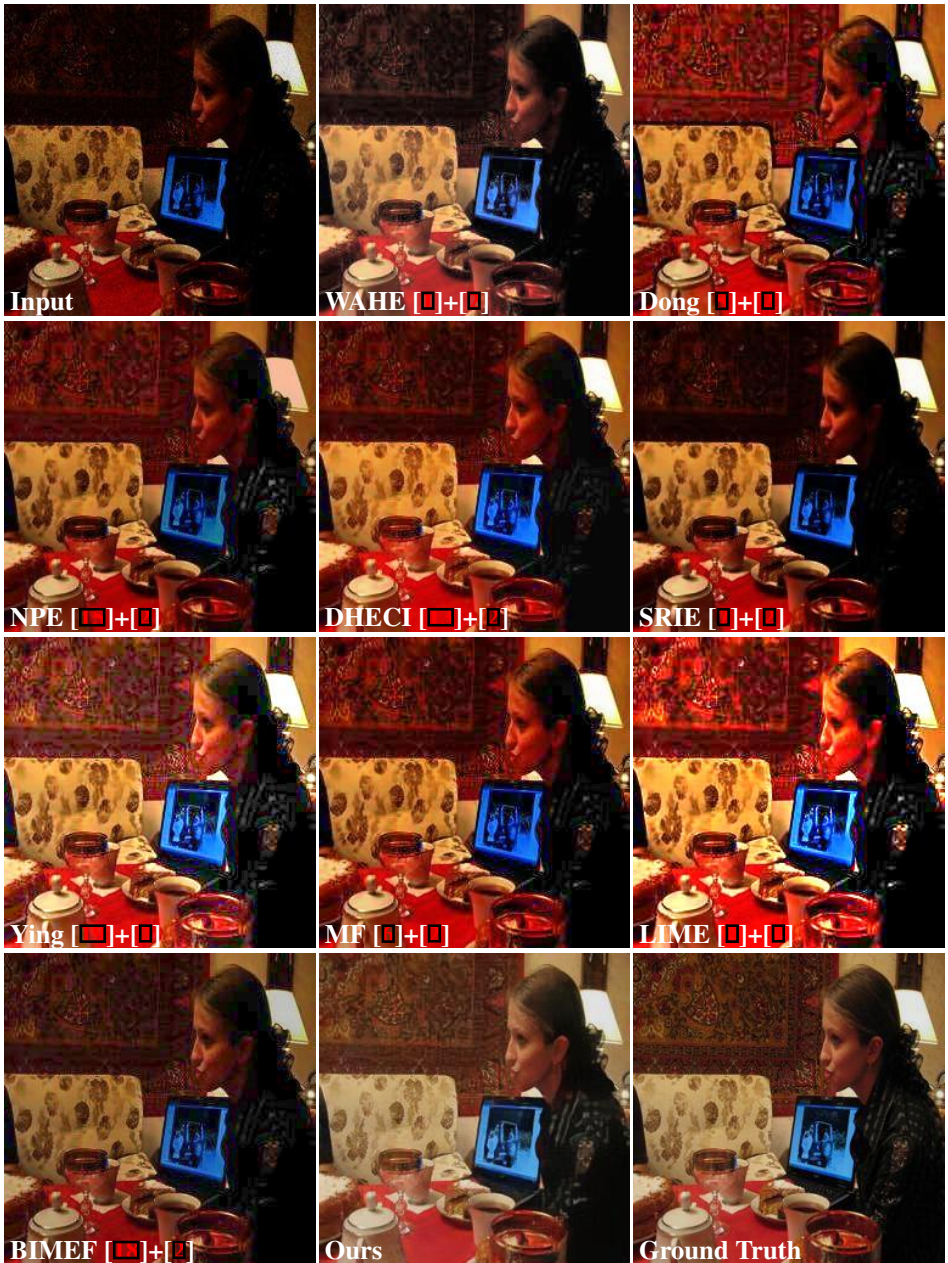


Figure 20: Low-light image enhancement with additional Poisson noise.

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Figure 21: Low-light image enhancement with additional Poisson noise.

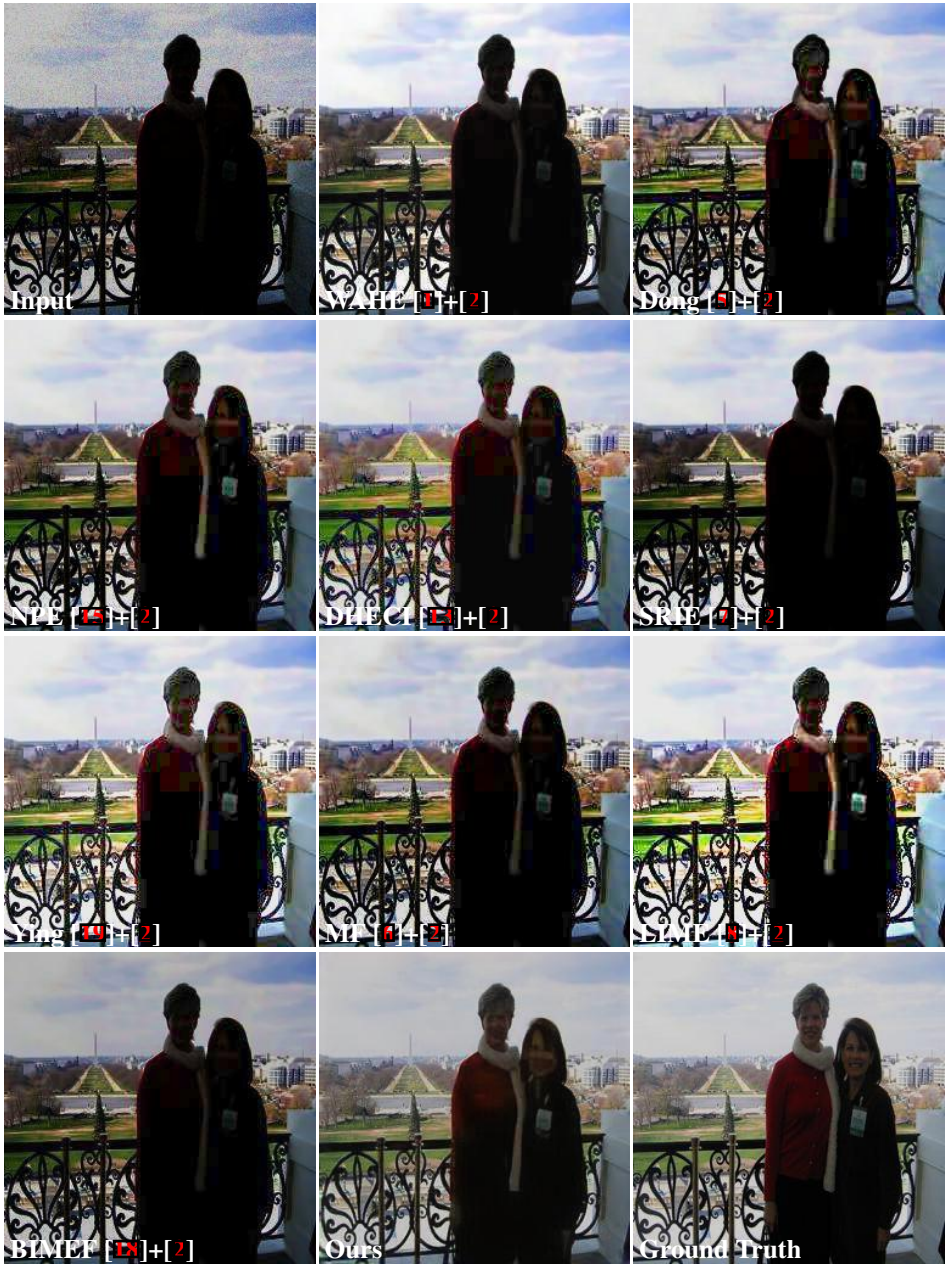


Figure 22: Low-light image enhancement with additional Poisson noise.

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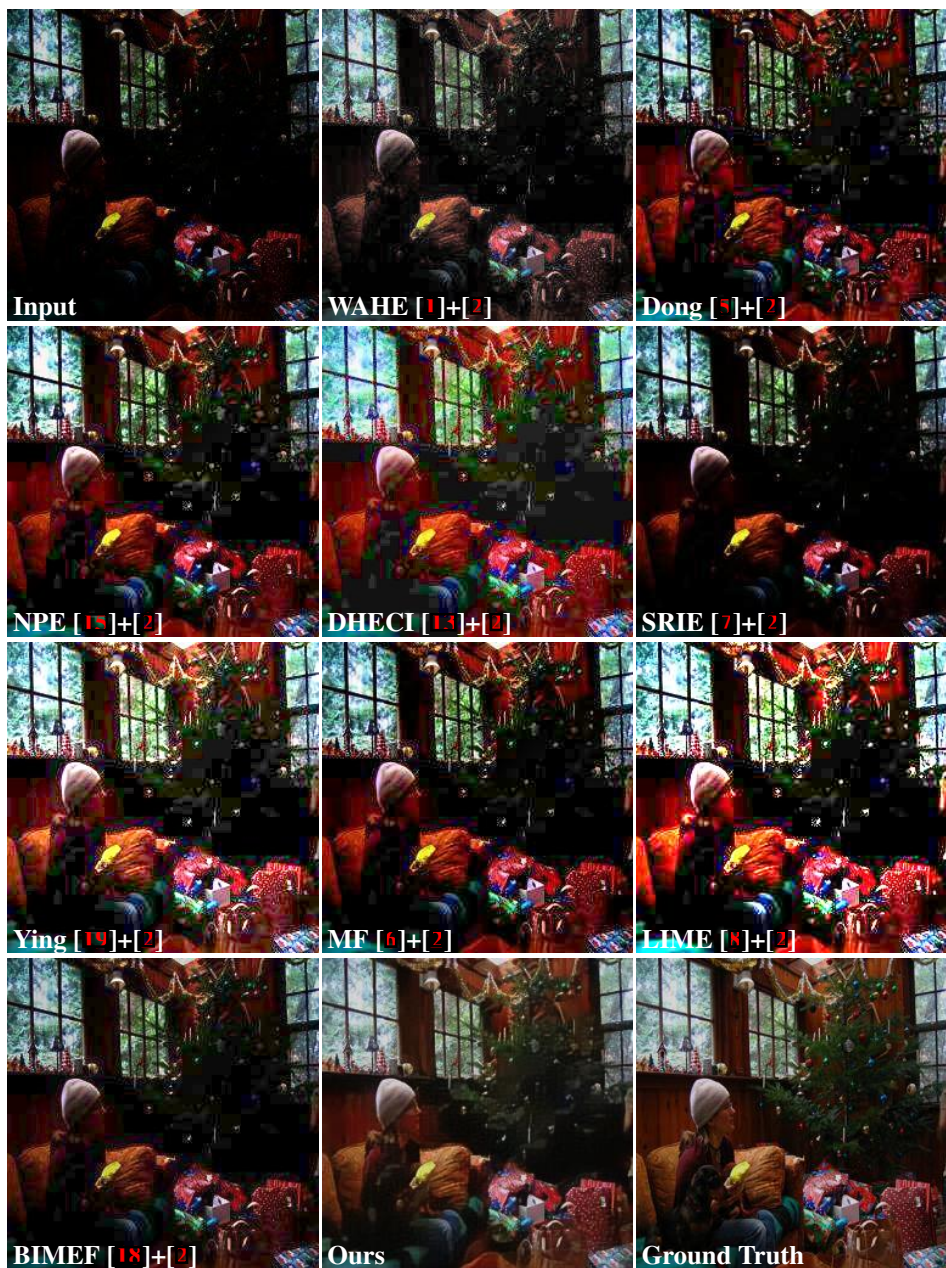


Figure 23: Low-light image enhancement with additional Poisson noise.

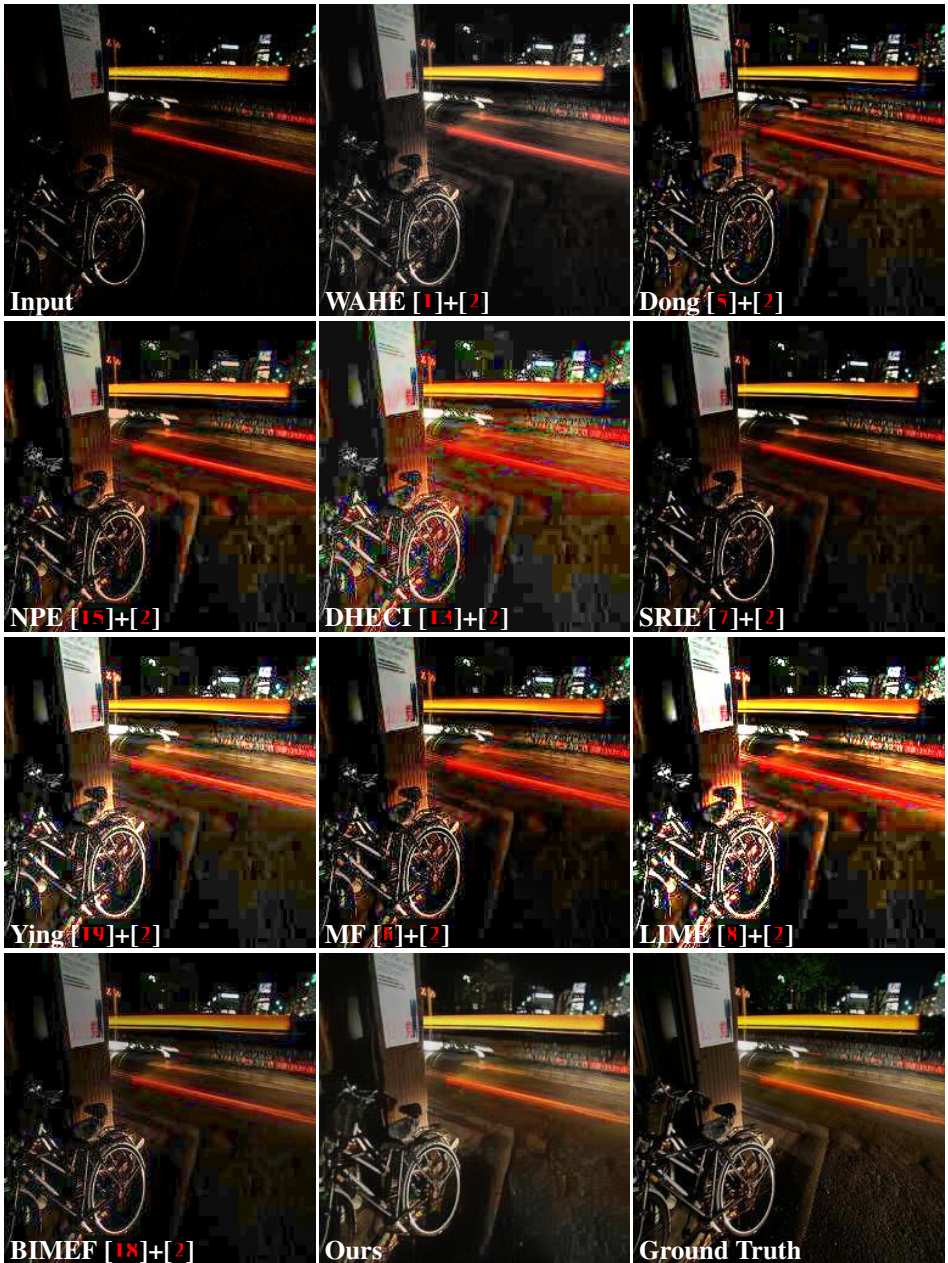


Figure 24: Low-light image enhancement with additional Poisson noise.

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Figure 25: Low-light image enhancement with additional Poisson noise.

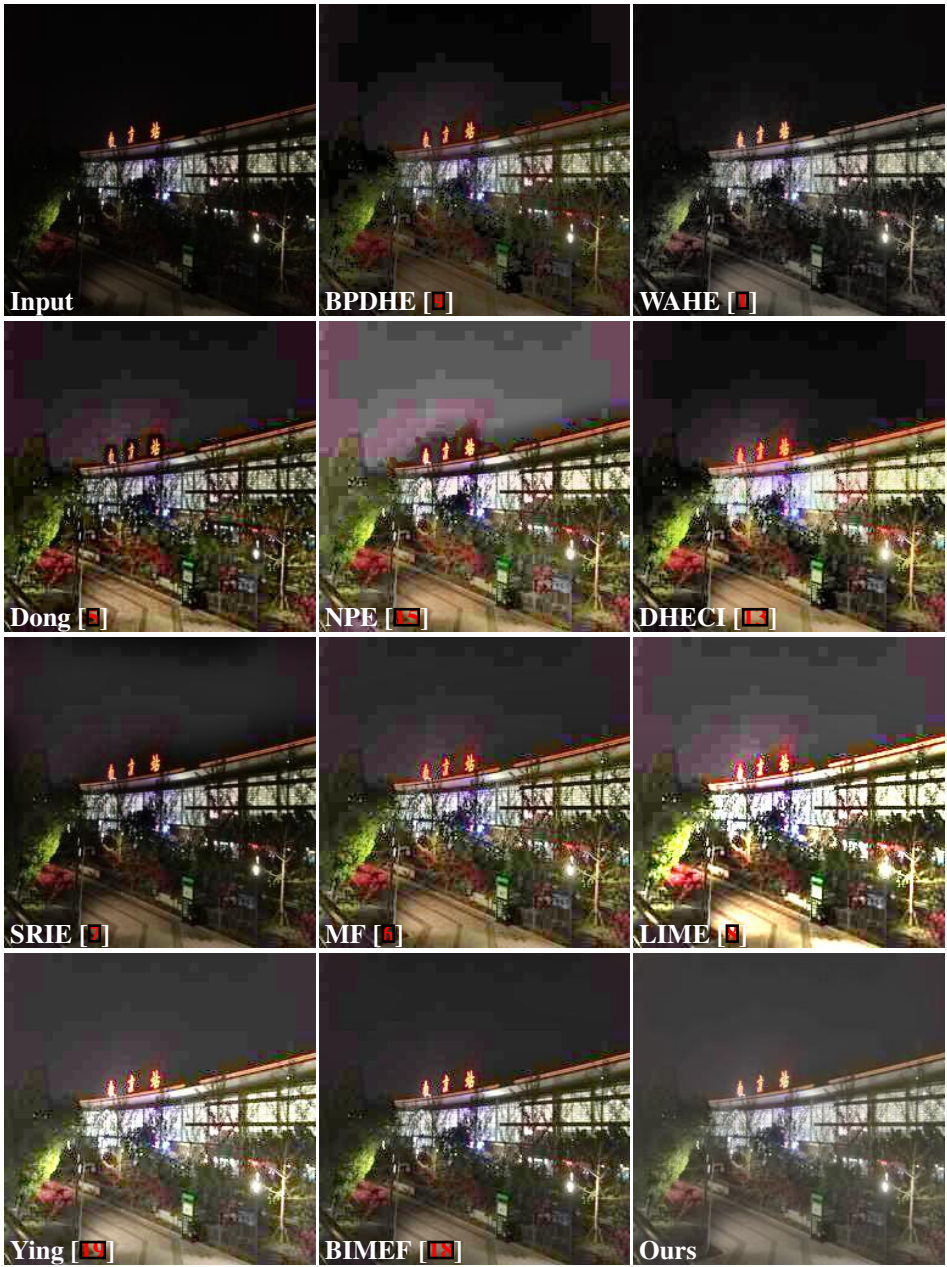


Figure 26: Comparison on natural low-light image enhancement.

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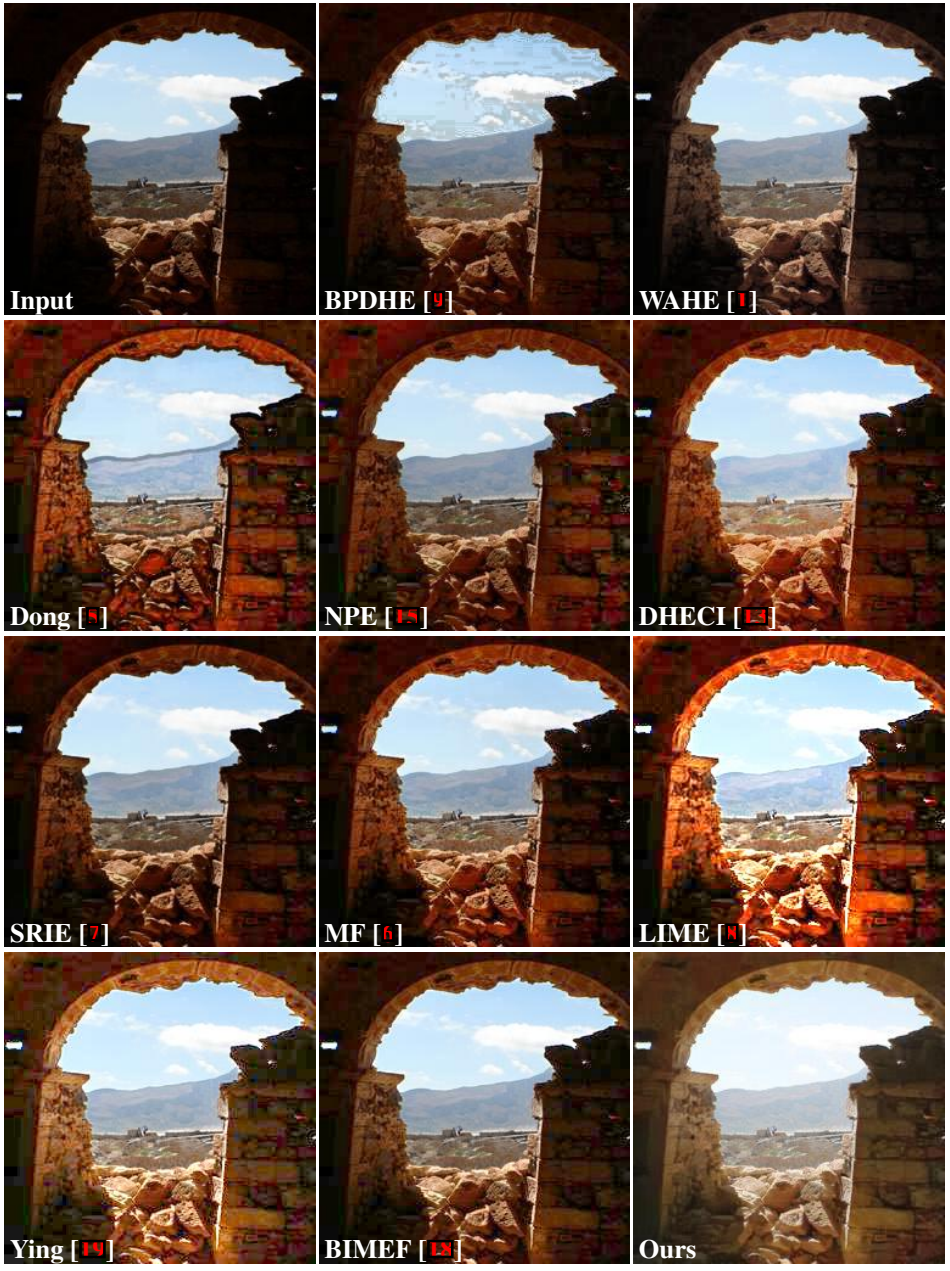


Figure 27: Comparison on natural low-light image enhancement.

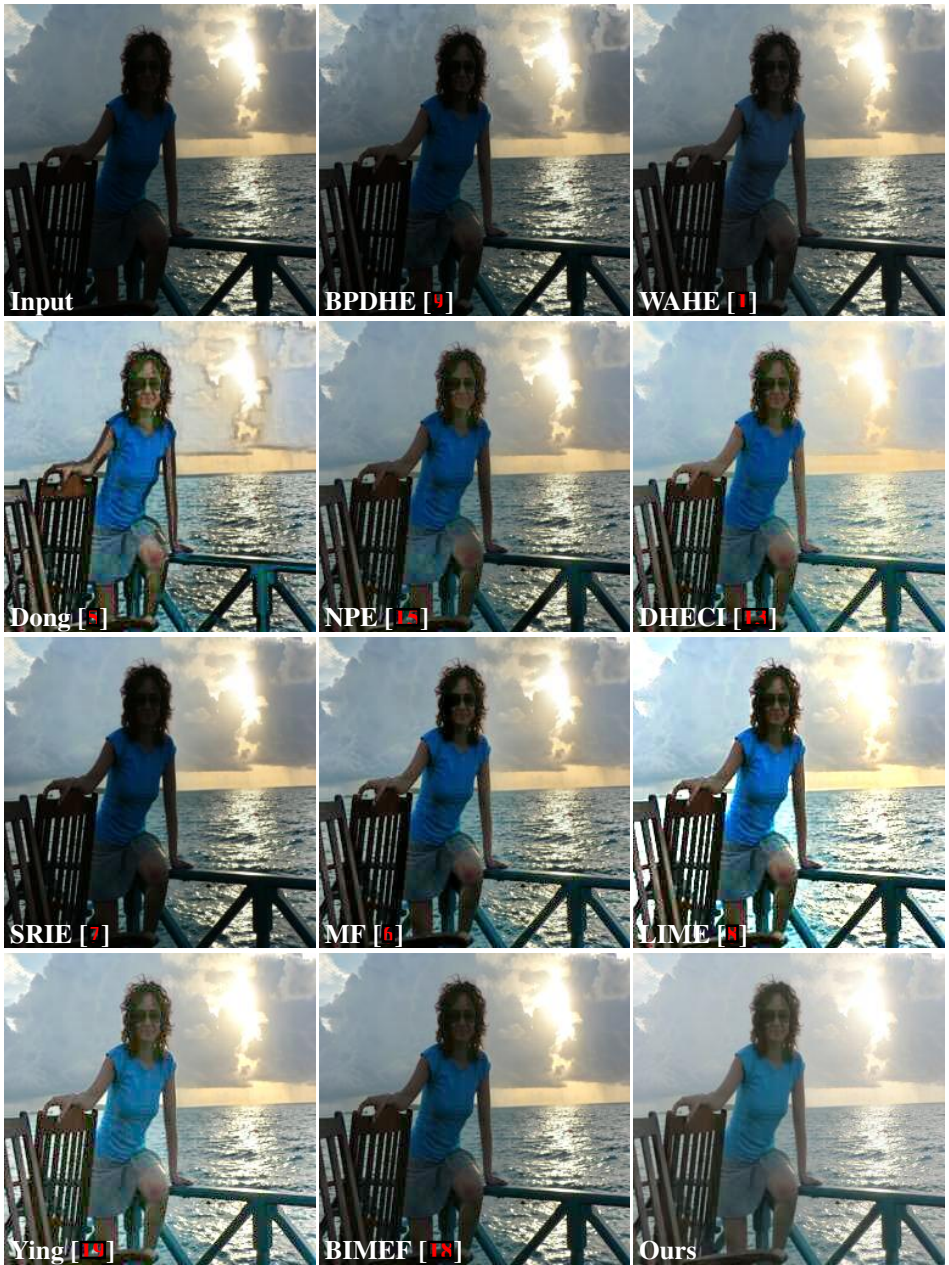


Figure 28: Comparison on natural low-light image enhancement.

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Figure 29: Comparison on natural low-light image enhancement.

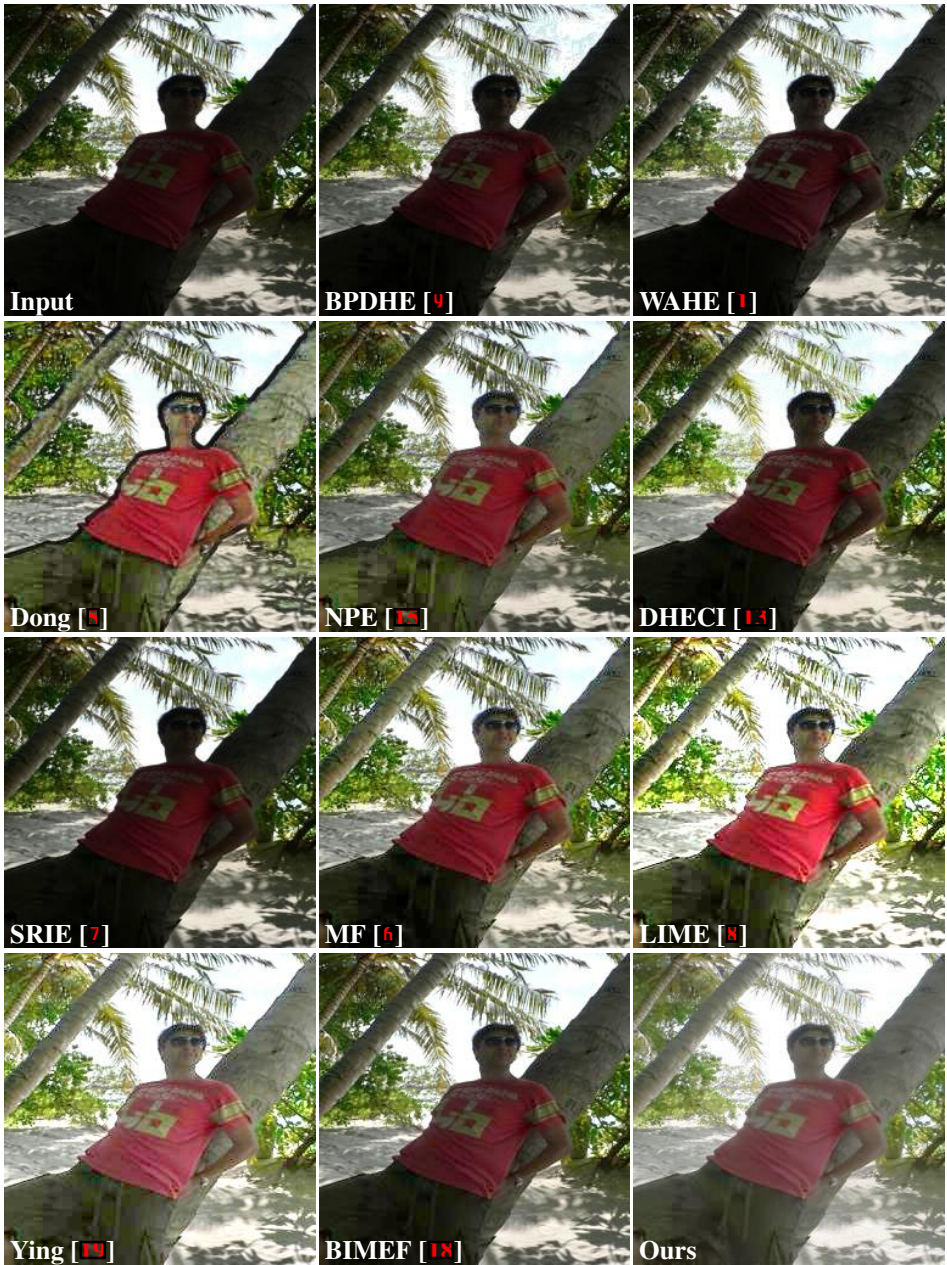


Figure 30: Comparison on natural low-light image enhancement.

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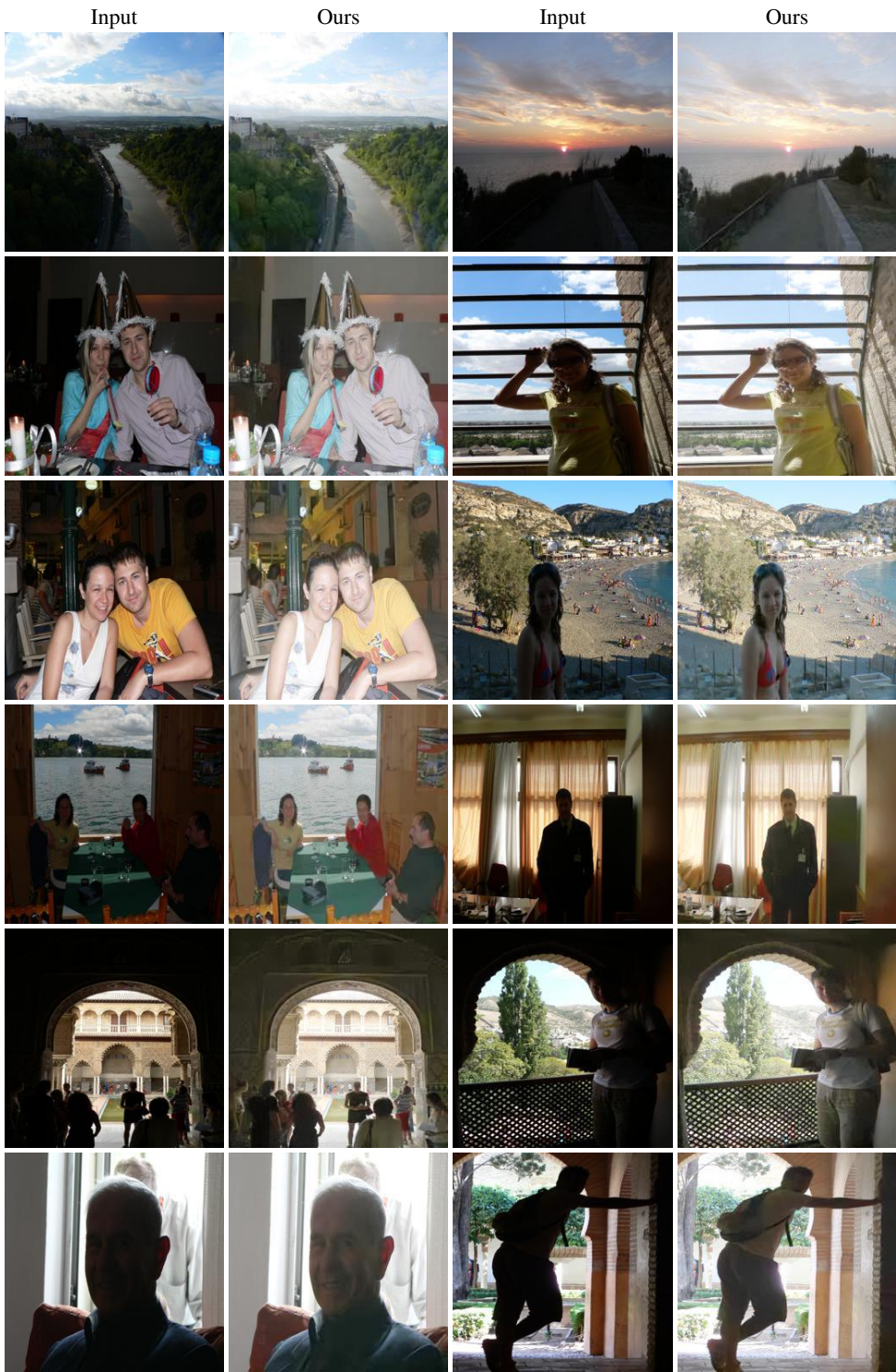


Figure 31: Additional results on natural low-light image enhancement.

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