Single Image Deraining Network with Rain Embedding Consistency and Layered LSTM

WACV2022 Supplementary Materials

Tokyo Institute of Technology

Yizhou Li, Yusuke Monno, Masatoshi Okutomi

Experimental results on SPA-Data

- **Dataset: SPA-Data [8] (real-world)**

The quantitative comparison on SPA-Data dataset

(Red: the best result; Blue: the second best result).

Methods	SPANet [8]	RCDNet [6]	ECNet (ours)	ECNet+LL (ours)
PSNR	40.04	41.05	**43.62**	**44.32**
SSIM	0.984	0.985	**0.990**	**0.991**

Note: PSNR/SSIM are calculated on Y channel

- Training pairs: 638492
- Testing pairs: 1000

Qualitative comparison on SPA-Data

Input Groundtruth SPANet RCDNet ECNet (ours) ECNet+LL (ours)

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Qualitative comparison on SPA-Data

Input | Groundtruth | SPANet | RCDNet | ECNet (ours) | ECNet+LL (ours)

Qualitative comparison on SPA-Data

Experimental results on Rain100H

- **Dataset: Rain100H [7]**

The quantitative comparison on Rain100H dataset

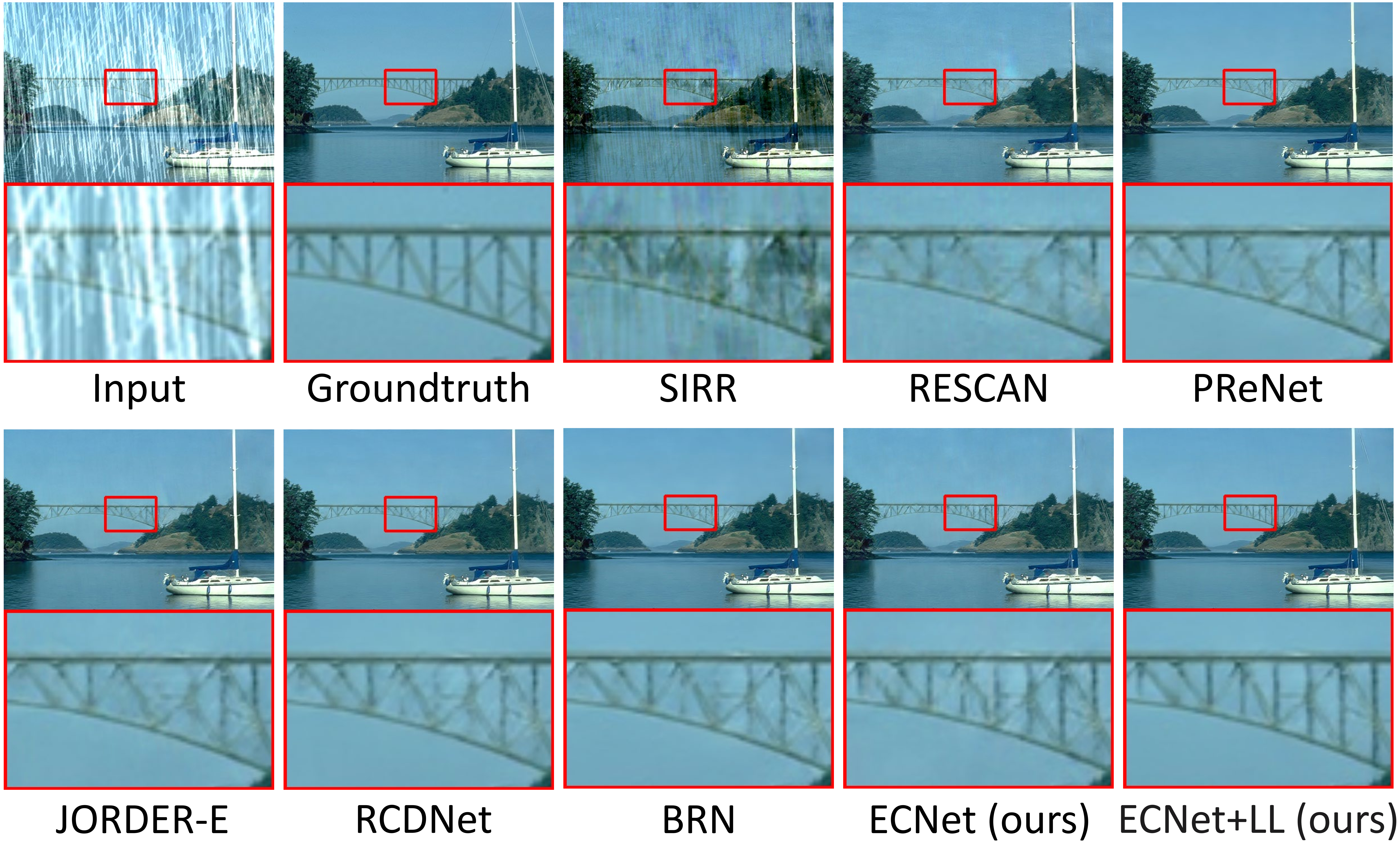
(Red: the best result; Blue: the second best result).

Methods	SIRR [1]	RESCAN [2]	PReNet [3]	JORDER-E [4]	RCDNet [5]	BRN [6]	ECNet (ours)	ECNet+LL (ours)
PSNR	22.03	28.82	30.31	30.22	31.26	**31.32**	29.80	**31.43**
SSIM	0.714	0.867	0.910	0.898	0.912	**0.924**	0.903	**0.921**

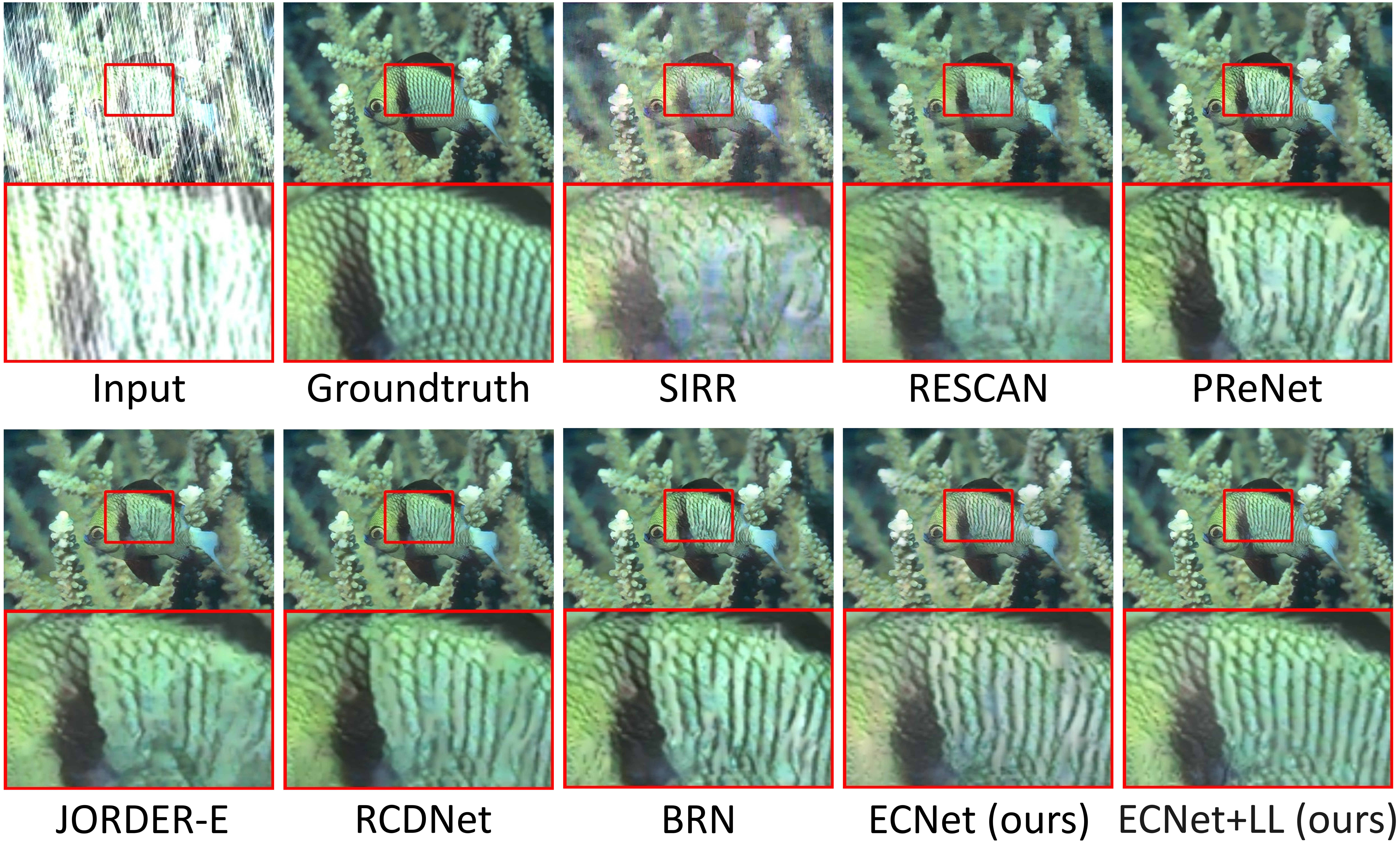
Note: PSNR/SSIM are calculated on Y channel

- Training pairs: 1800
- Testing pairs: 100

Qualitative comparison on Rain100H



Qualitative comparison on Rain100H



Experimental results on Rain100L

- **Dataset: Rain100L [7]**

The quantitative comparison on Rain100L dataset

(Red: the best result; Blue: the second best result).

Methods	SIRR [1]	RESCAN [2]	PReNet [3]	JORDER-E [4]	RCDNet [5]	BRN [6]	ECNet (ours)	ECNet+LL (ours)
PSNR	32.31	38.09	37.21	39.36	**39.76**	38.16	38.21	**39.66**
SSIM	0.926	0.980	0.978	0.985	**0.986**	0.982	0.981	**0.986**

Note: PSNR/SSIM are calculated on Y channel

- Training pairs: 200
- Testing pairs: 100

Qualitative comparison on Rain100L

Input Groundtruth SIRR RESCAN PReNet

JORDER-E RCDNet BRN ECNet (ours) ECNet+LL (ours)

Qualitative comparison on Rain100L

Experimental results on Rain200H

- **Dataset: Rain200H [7]**

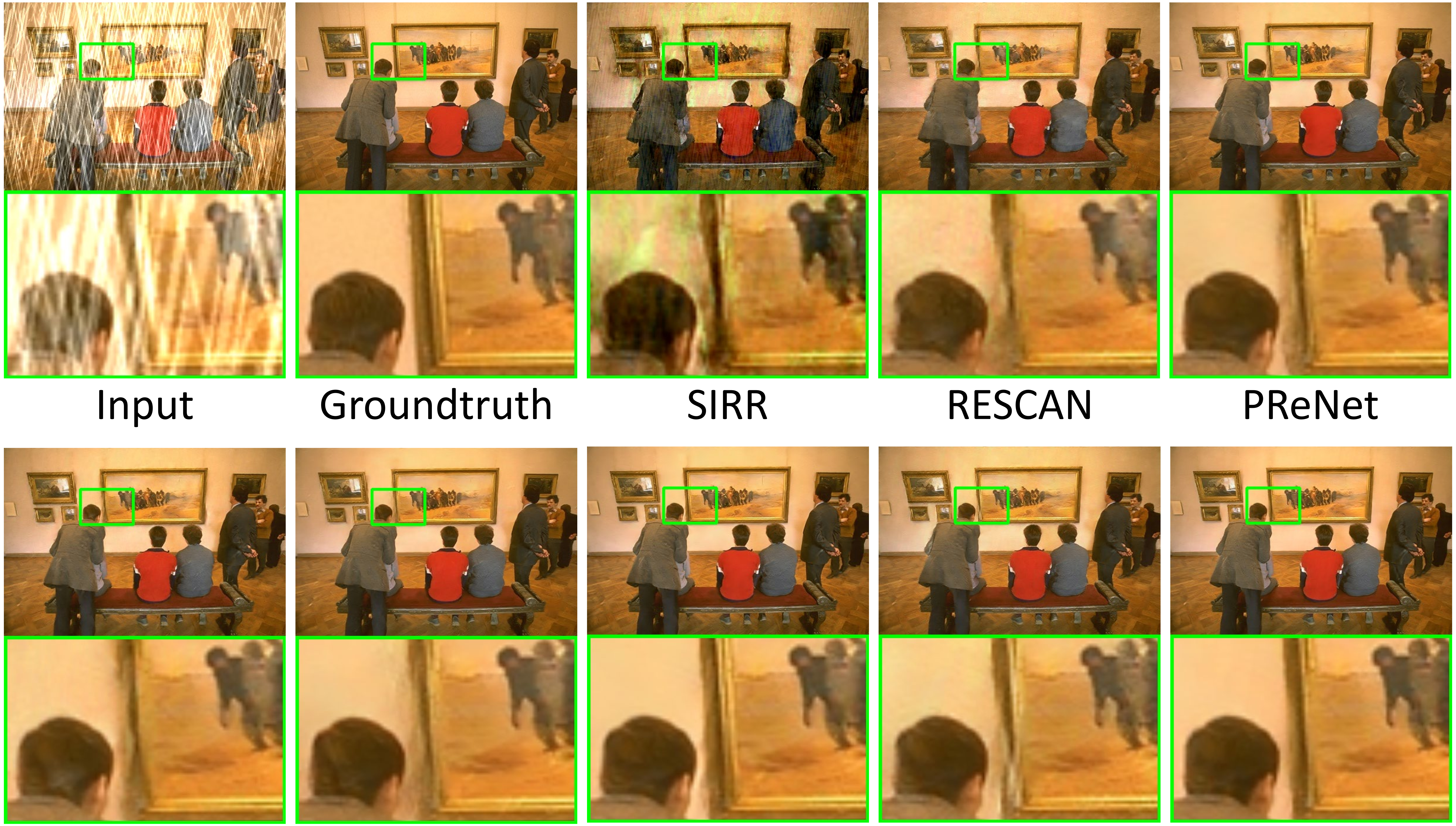
The quantitative comparison on Rain200H dataset
(Red: the best result; Blue: the second best result).

Methods	SIRR [2]	RESCAN [3]	PReNet [4]	JORDER-E [5]	RCDNet [6]	BRN [7]	ECNet (ours)	ECNet+LL (ours)
PSNR	22.17	27.95	29.47	29.23	30.18	**30.27**	28.54	**30.22**
SSIM	0.726	0.862	0.907	0.894	0.909	**0.919**	0.893	**0.912**

Note: PSNR/SSIM are calculated on Y channel

- Training pairs: 1800 (Models trained on Rain100H are used)
- Testing pairs: 200

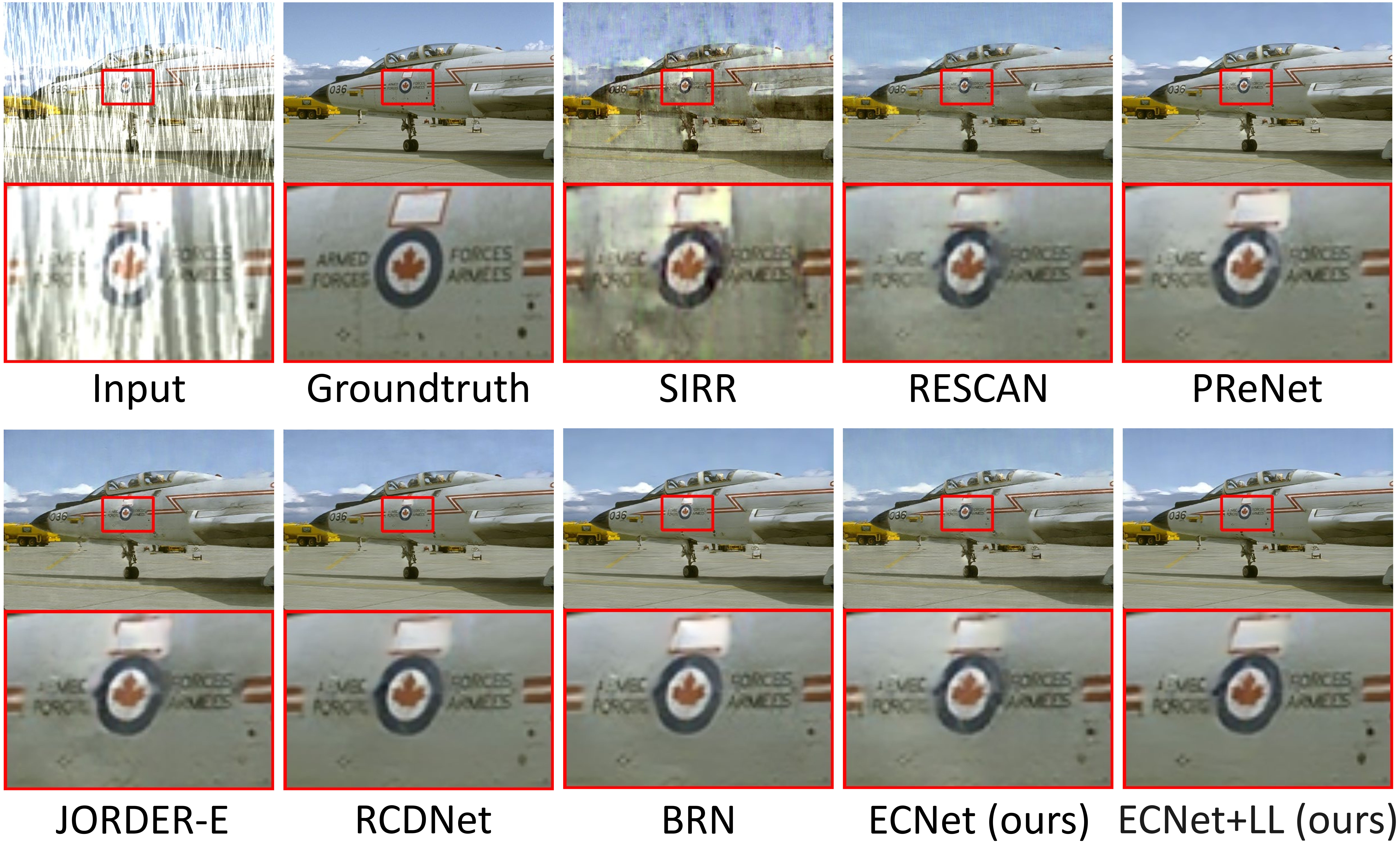
Qualitative comparison on Rain200H



Input | Groundtruth | SIRR | RESCAN | PReNet

JORDER-E | RCDNet | BRN | ECNet (ours) | ECNet+LL (ours)

Qualitative comparison on Rain200H



Experimental results on Rain200L

- **Dataset: Rain200L [7]**

The quantitative comparison on Rain200L dataset

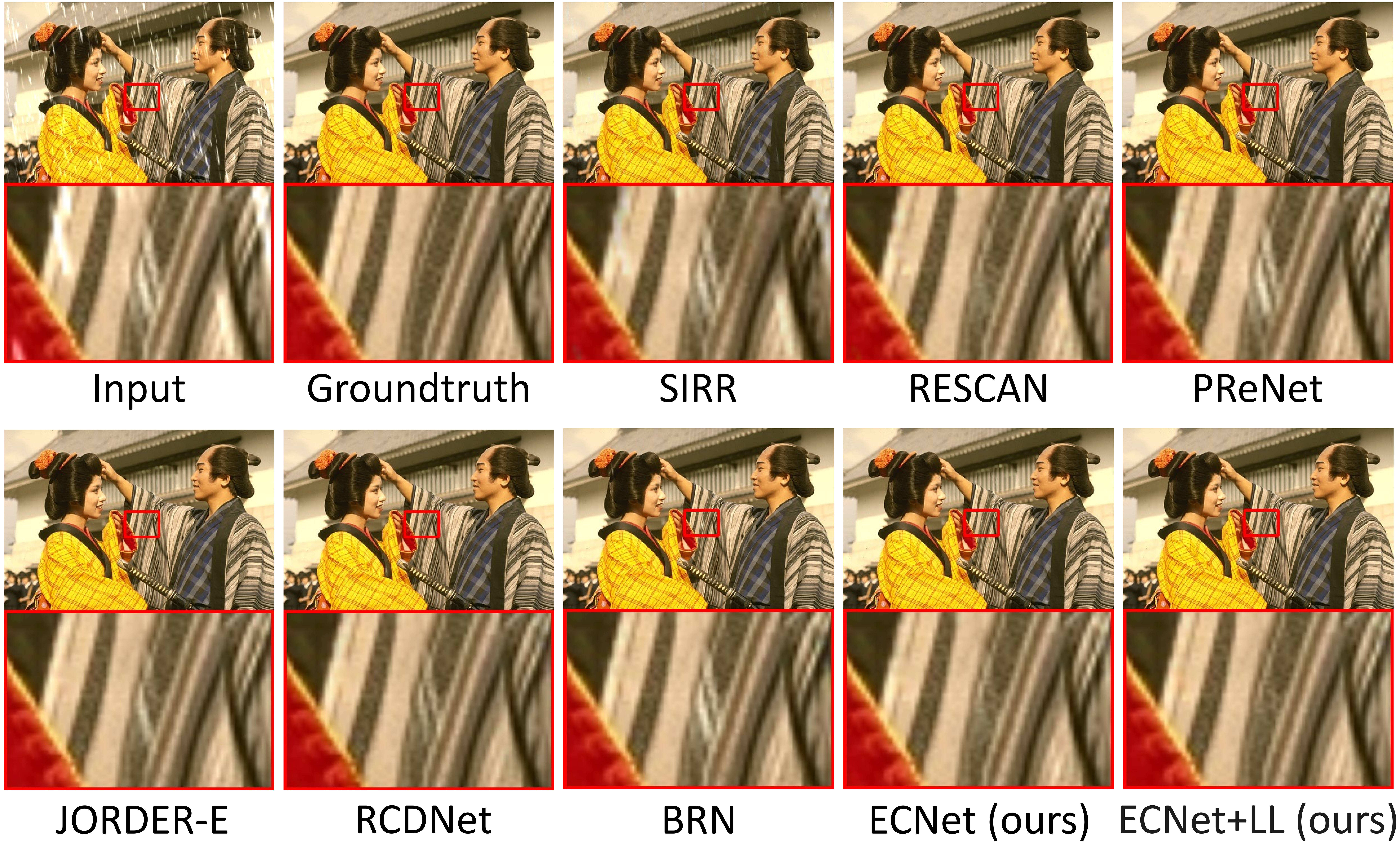
(Red: the best result; Blue: the second best result).

Methods	SIRR [2]	RESCAN [3]	PReNet [4]	JORDER-E [5]	RCDNet [6]	BRN [7]	ECNet (ours)	ECNet+LL (ours)
PSNR	32.21	38.43	37.93	39.13	**39.49**	38.86	38.37	**39.72**
SSIM	0.931	0.982	0.983	0.985	**0.986**	0.985	0.983	**0.987**

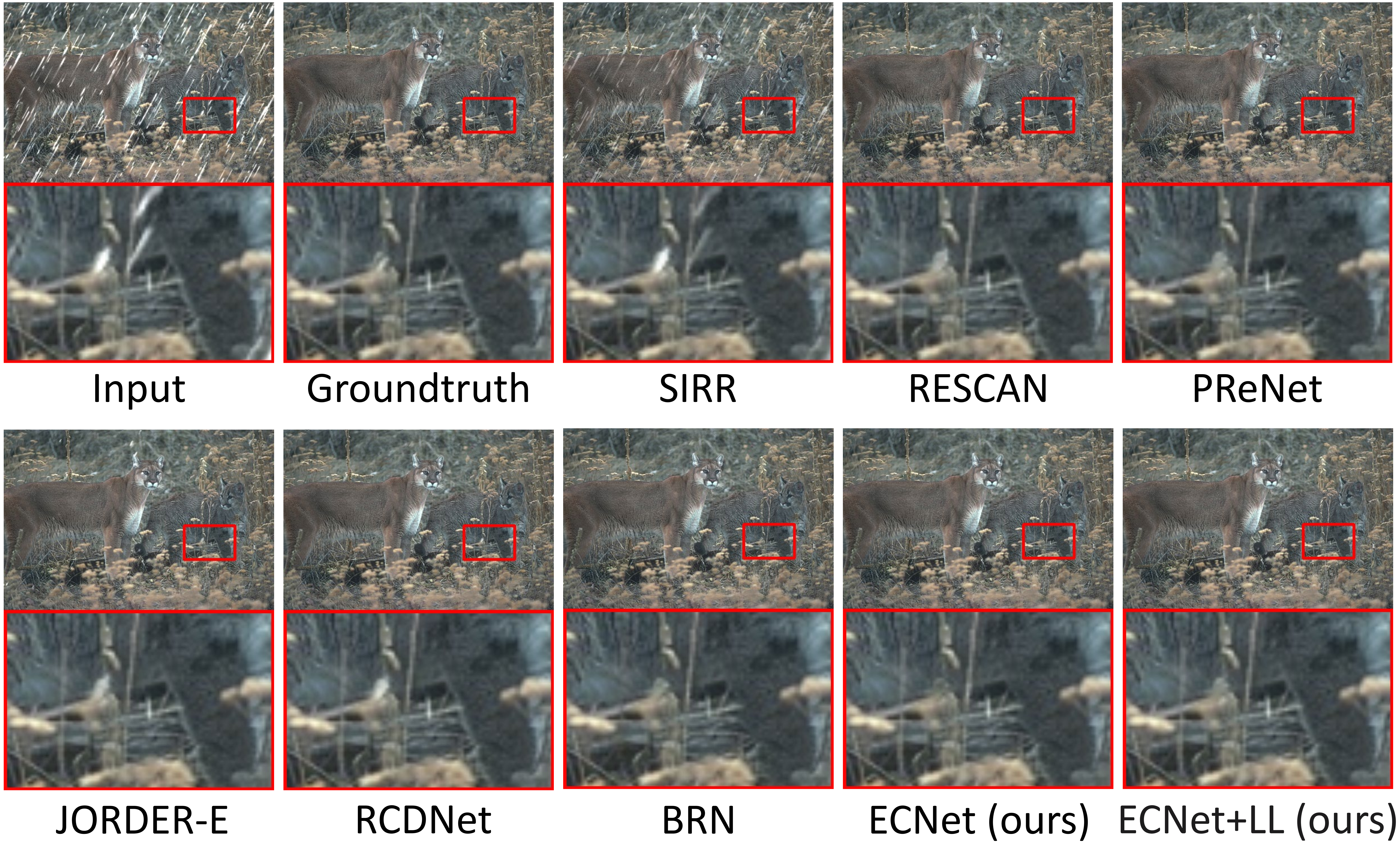
Note: PSNR/SSIM are calculated on Y channel

- Training pairs: 1800
- Testing pairs: 200

Qualitative comparison on Rain200L



Qualitative comparison on Rain200L



Experimental results on Rain800

- **Dataset: Rain800 [9]**

The quantitative comparison on Rain800 dataset

(Red: the best result; Blue: the second best result).

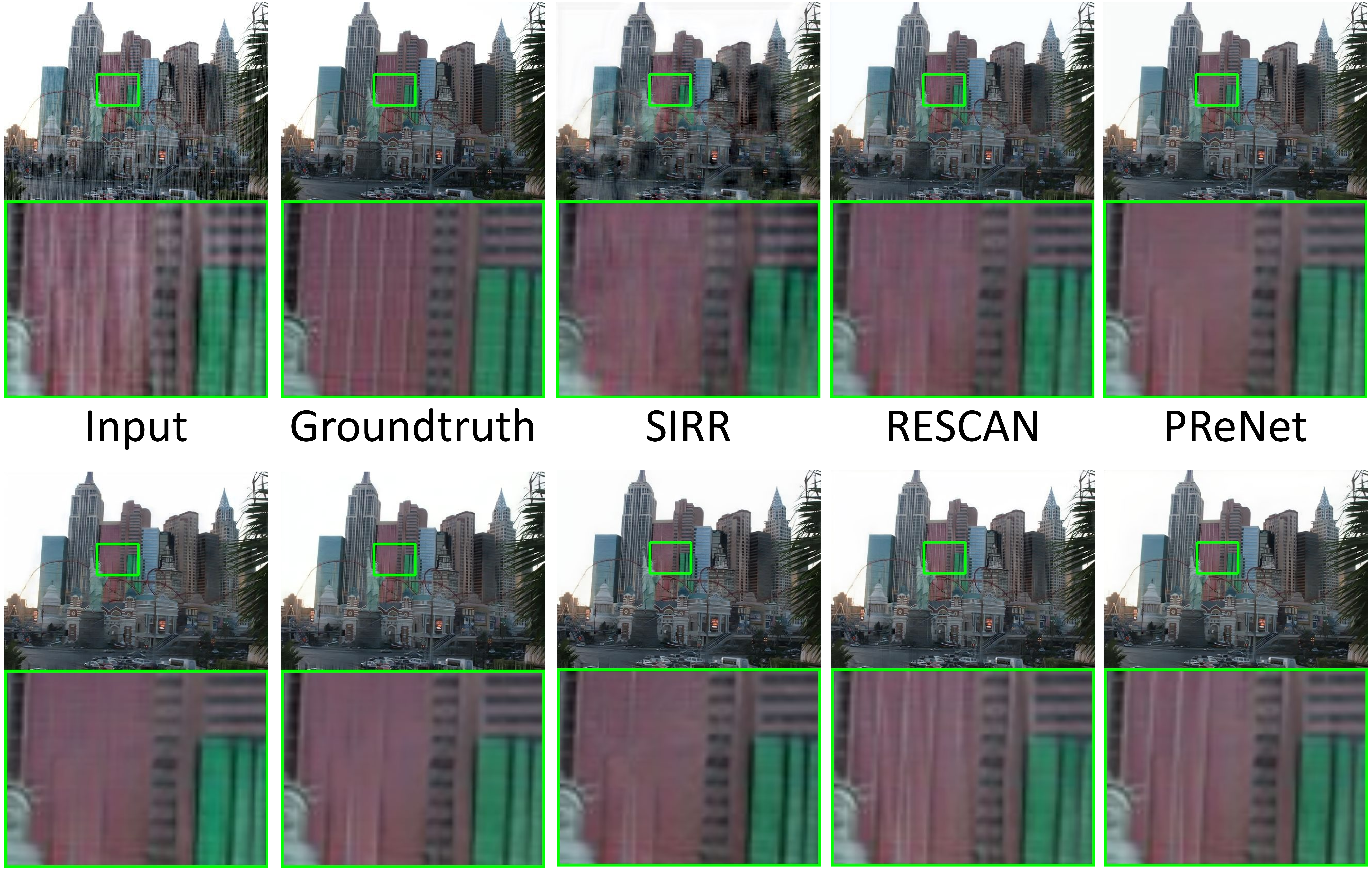
Methods	SIRR [2]	RESCAN [3]	PReNet [4]	JORDER-E [5]	RCDNet [6]	BRN [7]	ECNet (ours)	ECNet+LL (ours)
PSNR	22.73	28.36	26.82	27.92	28.66	28.31	**28.80**	**29.26**
SSIM	0.762	0.872	0.888	0.883	0.893	0.986	**0.901**	**0.905**

Note: PSNR/SSIM are calculated on Y channel

- Training pairs: 700
- Testing pairs: 100

Qualitative comparison on Rain800

Qualitative comparison on Rain800



Input Groundtruth SIRR RESCAN PReNet

JORDER-E RCDNet BRN ECNet (ours) ECNet+LL (ours)

References

[1] Wei Wei, Deyu Meng, Qian Zhao, Zongben Xu, and Ying Wu. Semi-supervised transfer learning for image rain removal. In Proc. of IEEE Conf. on Computer Vision and Pattern Recognition (CVPR), pages 3877–3886, 2019.

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[4] Wenhan Yang, Robby T Tan, Jiashi Feng, Zongming Guo, Shuicheng Yan, and Jiaying Liu. Joint rain detection and removal from a single image with contextualized deep networks. IEEE Trans. on Pattern Analysis and Machine Intelligence, 42(6):1377–1393, 2019.

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[8] Tianyu Wang, Xin Yang, Ke Xu, Shaozhe Chen, Qiang Zhang, and Rynson WH Lau. Spatial attentive single-image deraining with a high quality real rain dataset. In Proc. of IEEE Conf. on Computer Vision and Pattern Recognition (CVPR), pages 12270–12279, 2019.

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