

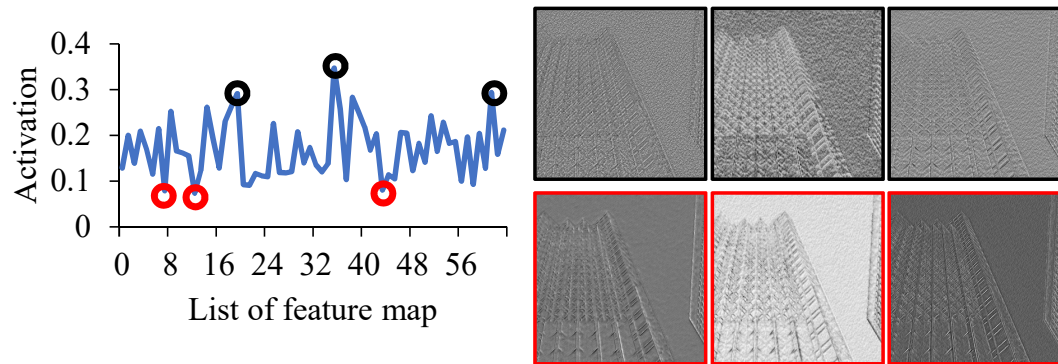
Locally Adaptive Channel Attention-based Network for Denoising Images

– Additional Analysis –

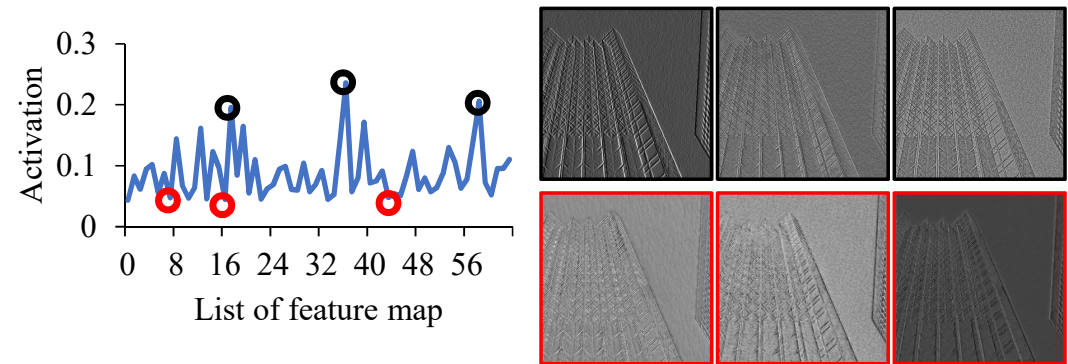
Channel Attention Weights and Corresponding Feature Channels

Initially (especially from the 1st to the 4th residual blocks) channel attention emphasizes features correlated with noise. Then, as the denoising proceeds, it gradually shifts its attention to structural components, which are correlated with a denoised result.

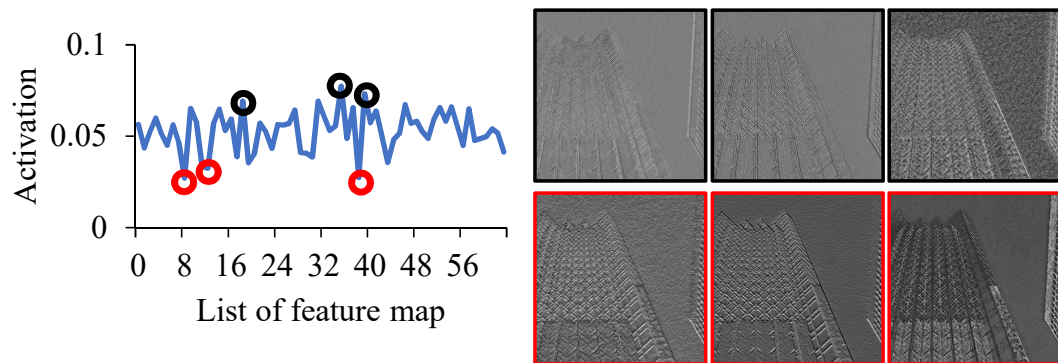
- Residual block 1 -



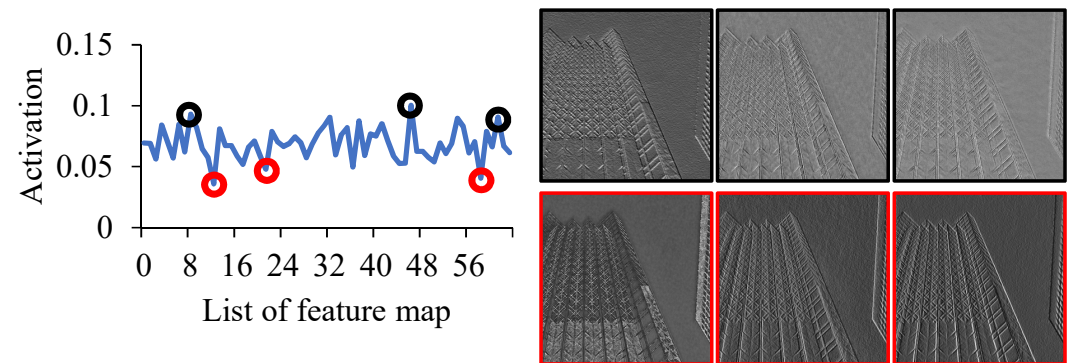
- Residual block 2 -



- Residual block 3 -



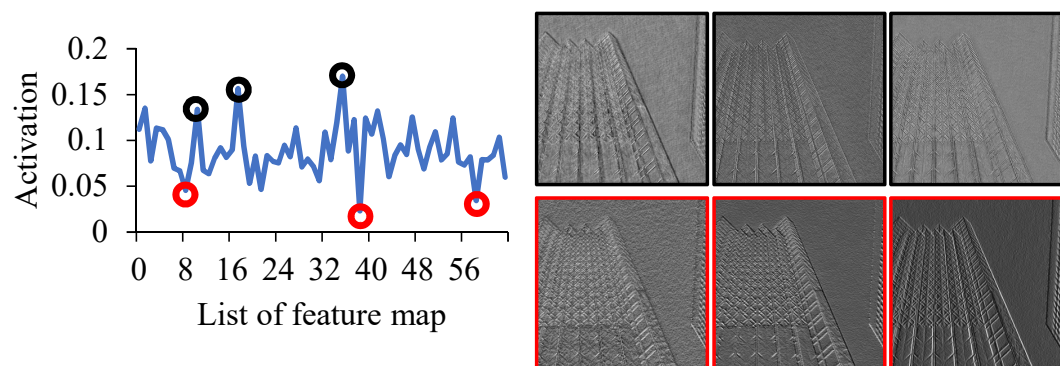
- Residual block 4 -



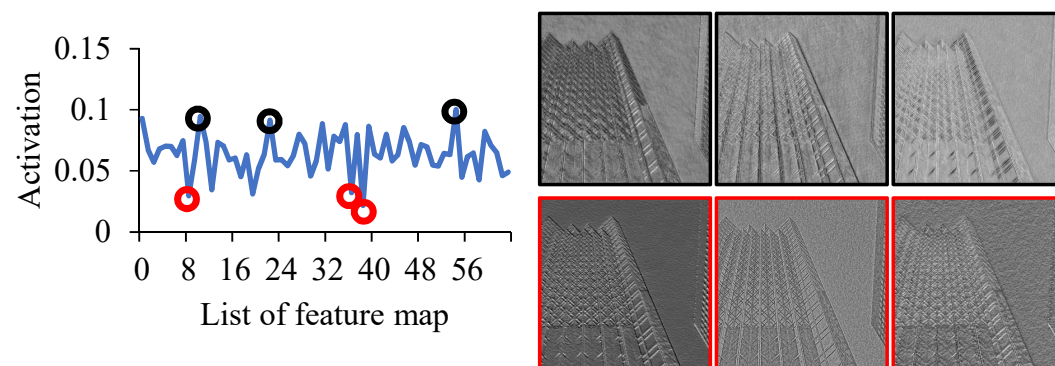
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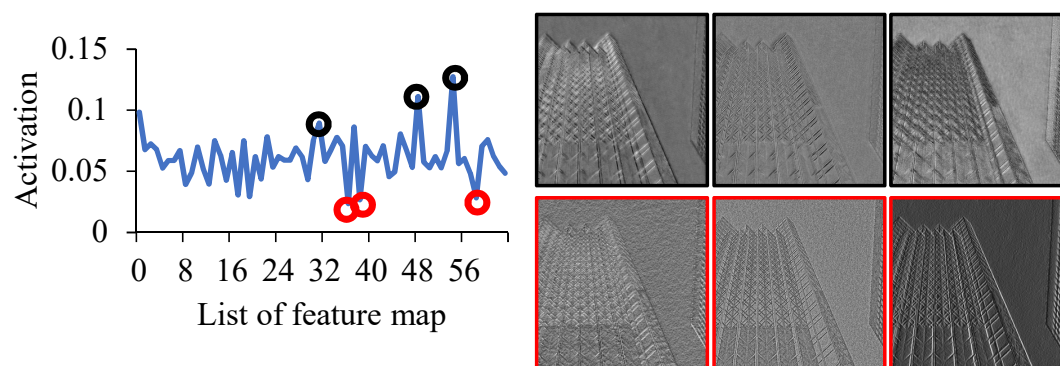
- Residual block 5 -



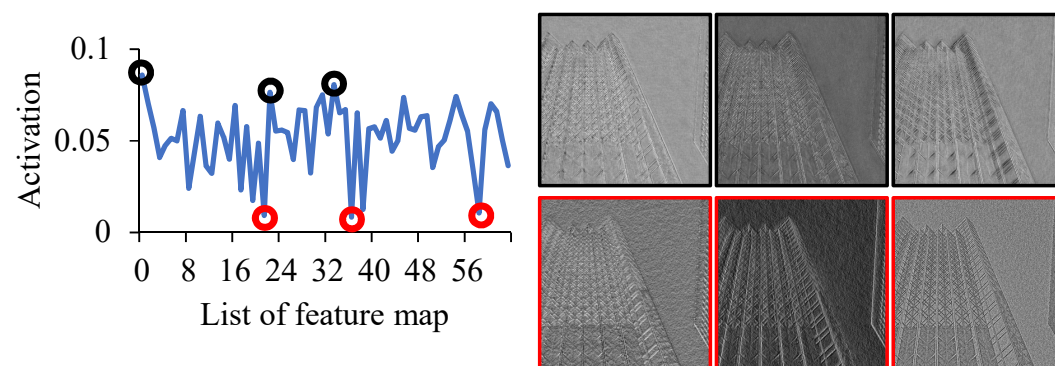
- Residual block 6 -



- Residual block 7 -



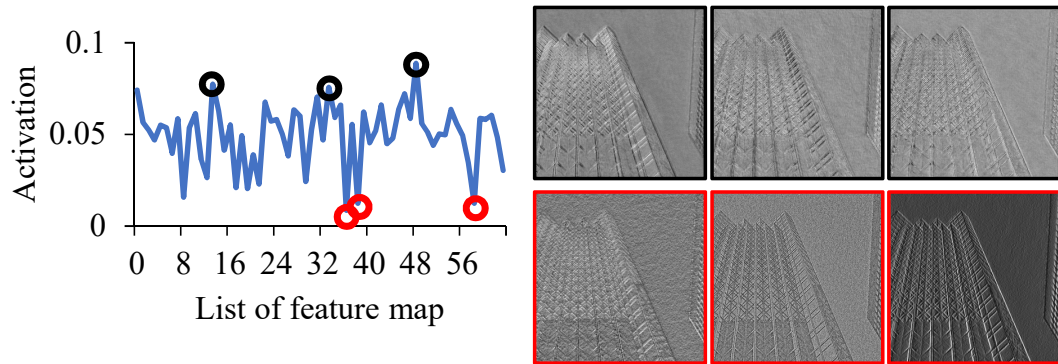
- Residual block 8 -



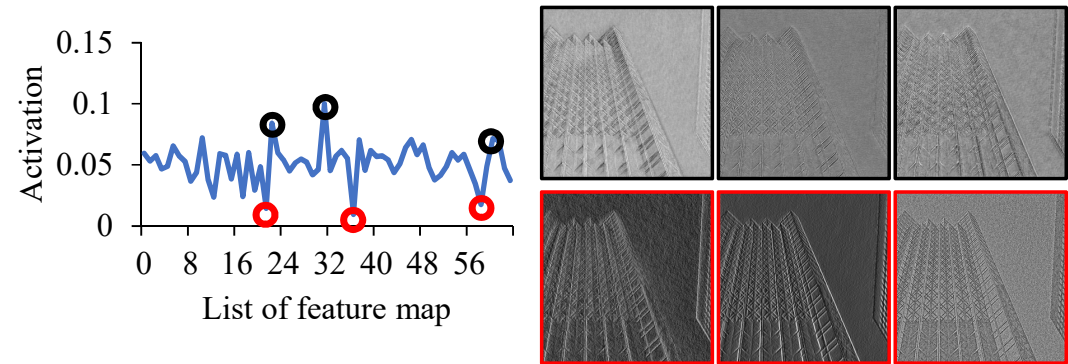
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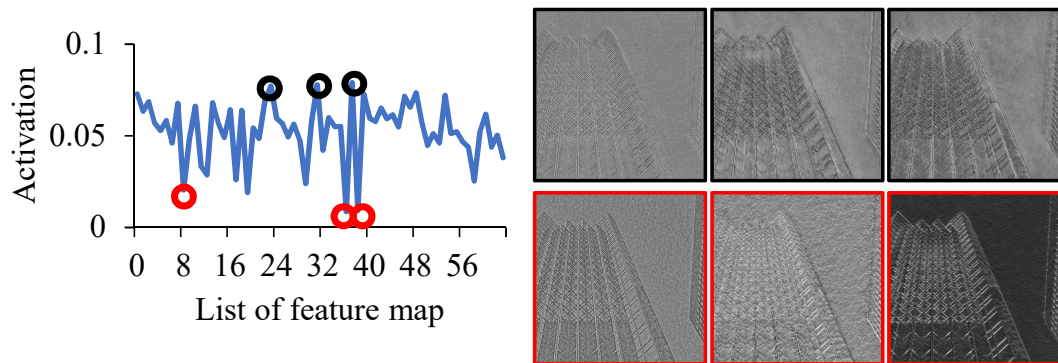
- Residual block 9 -



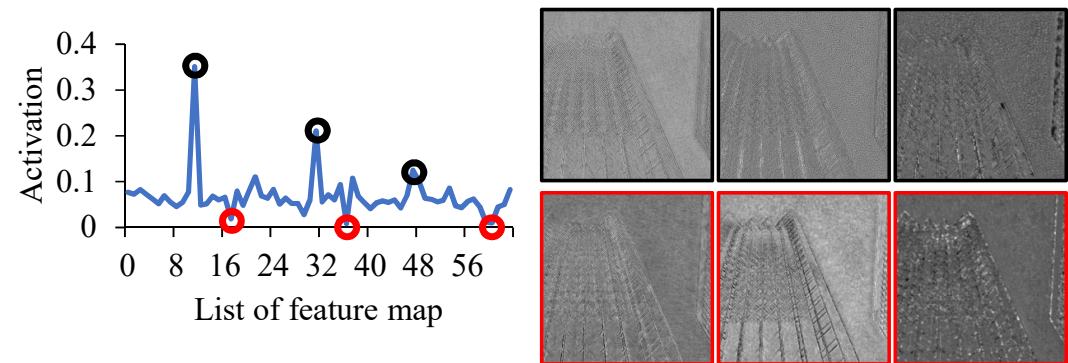
- Residual block 10 -



- Residual block 11 -



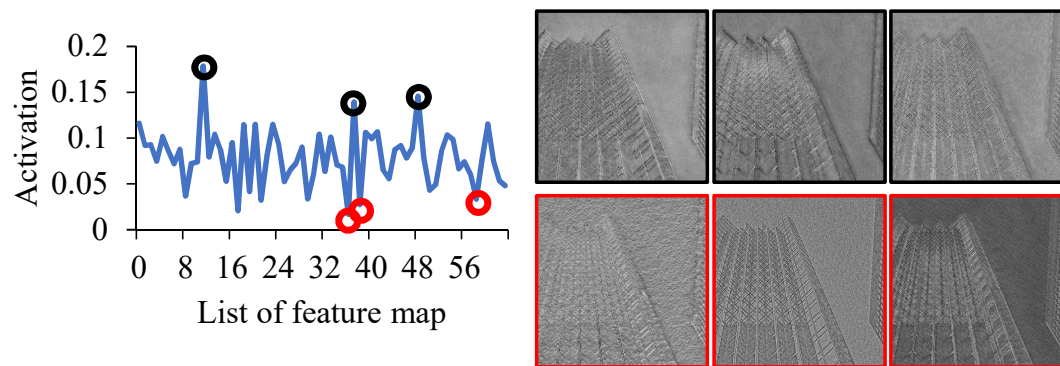
- Residual block 12 -



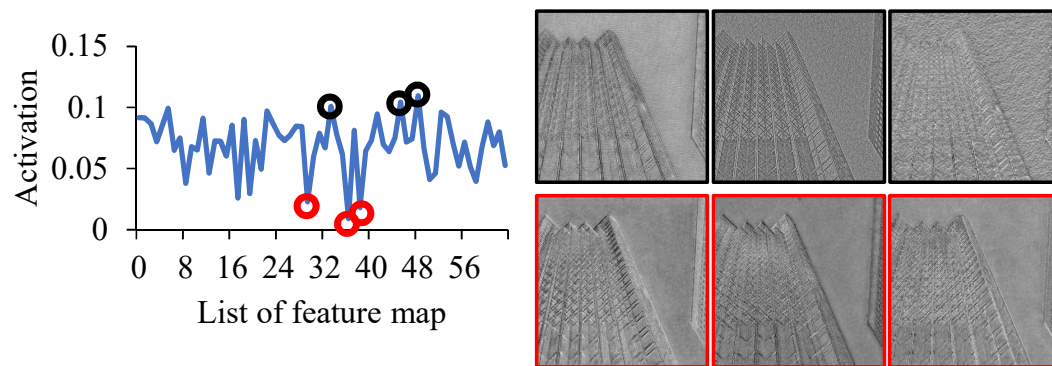
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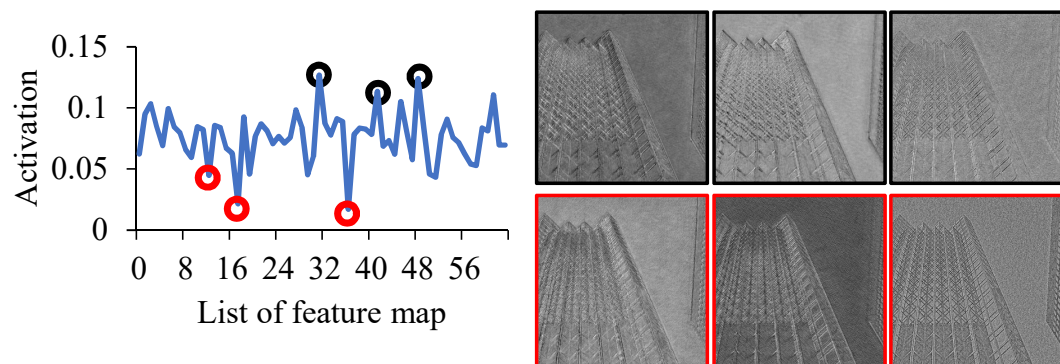
- Residual block 13 -



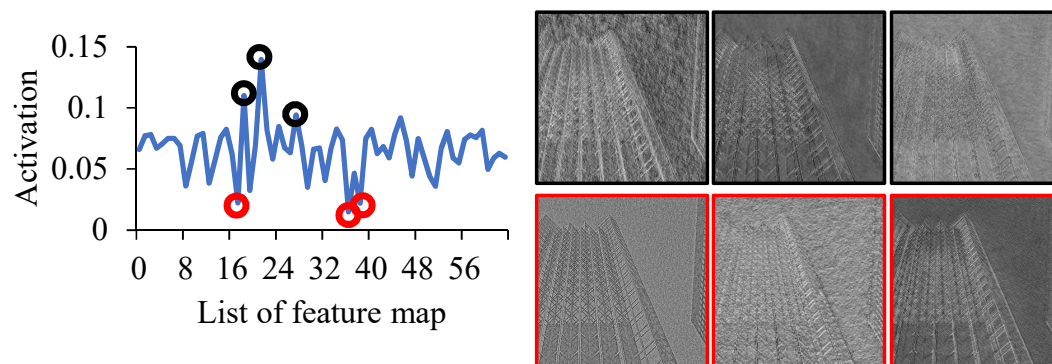
- Residual block 14 -



- Residual block 15 -



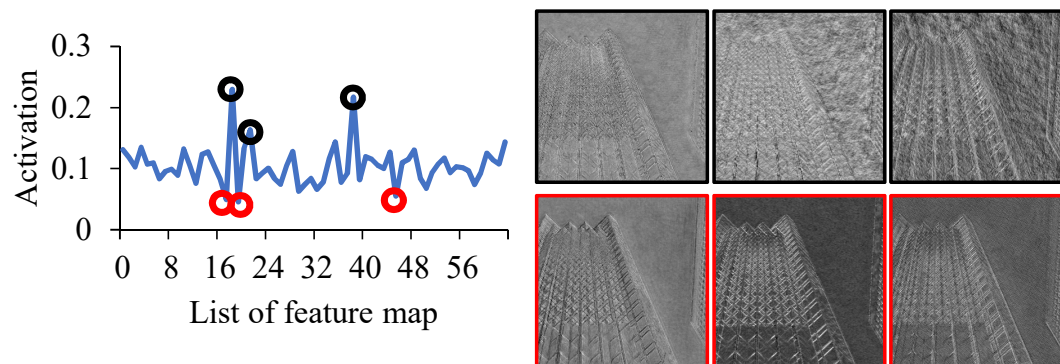
- Residual block 16 -



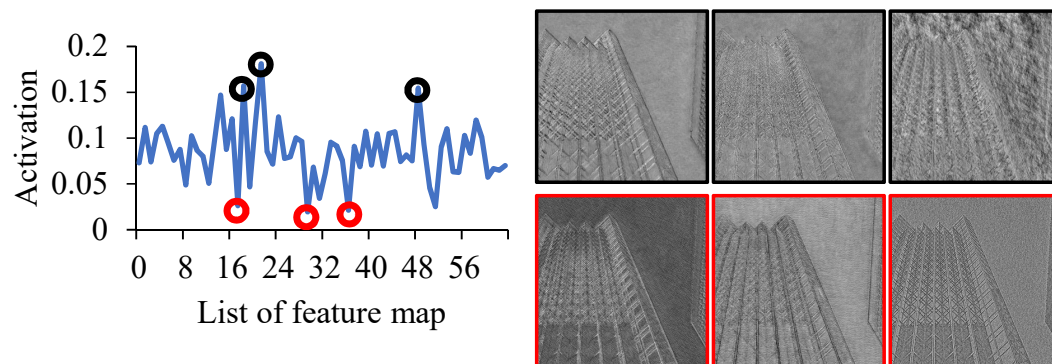
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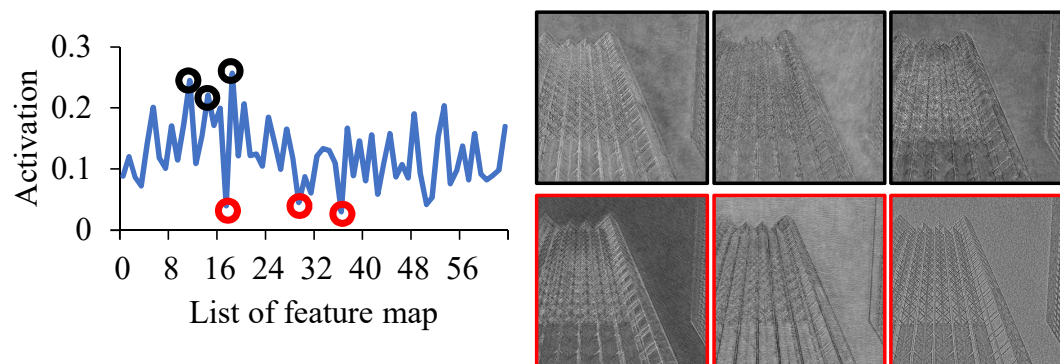
- Residual block 17 -



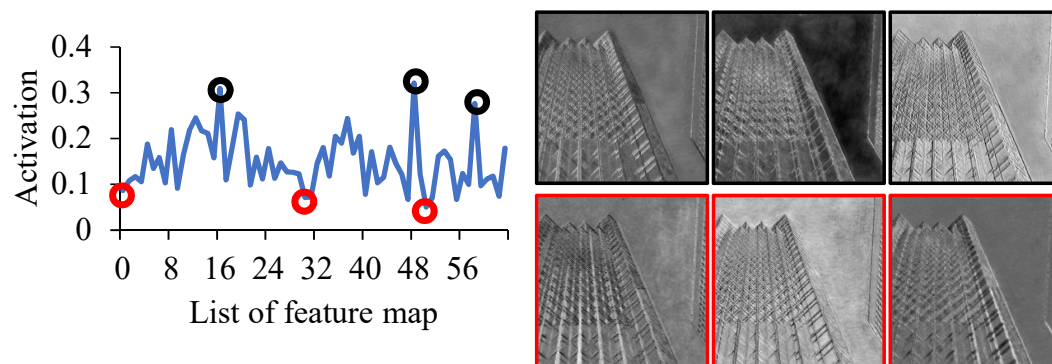
- Residual block 18 -



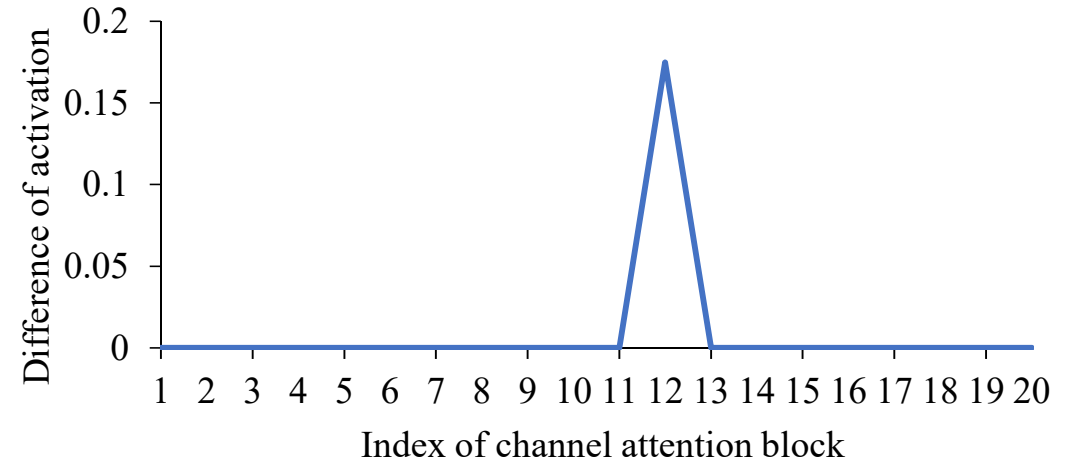
- Residual block 19 -



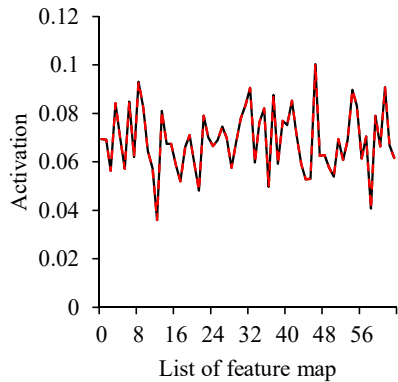
- Residual block 20 -



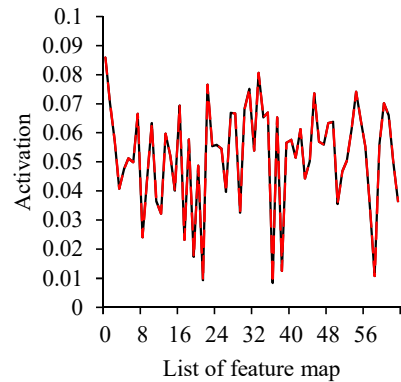
Content-Adaptivity Analysis



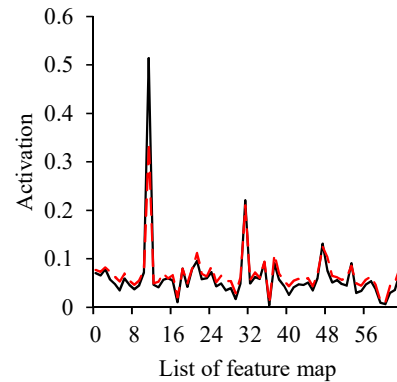
- Residual block 4 -



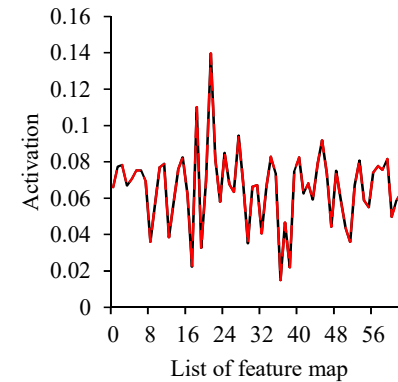
- Residual block 8 -



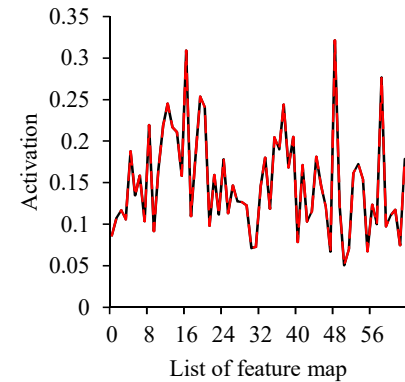
- **Residual block 12** -



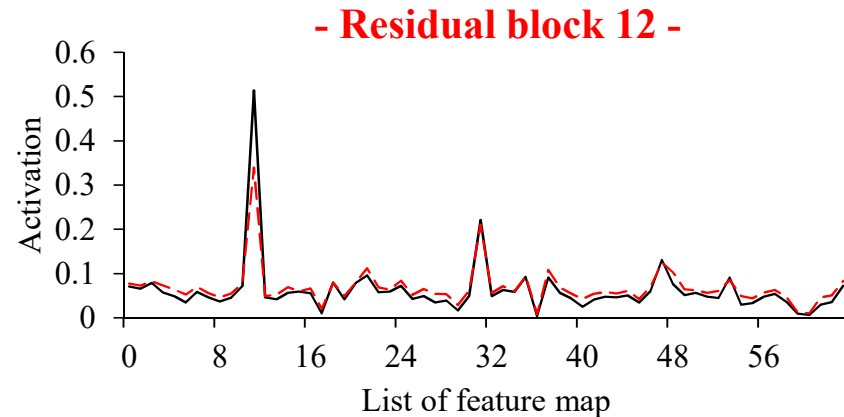
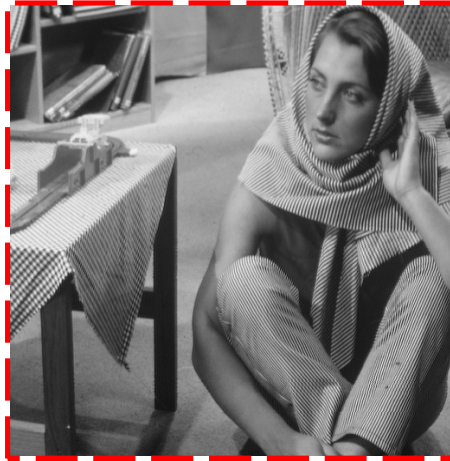
- Residual block 16 -



- Residual block 20 -



Content-Adaptivity Analysis

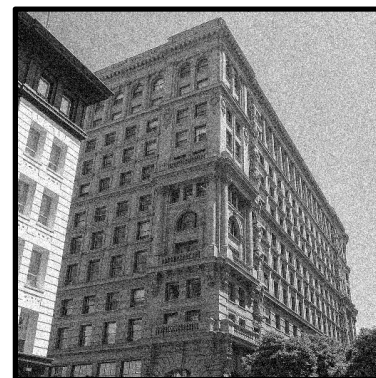


- All the blocks except the 12th block have the same channel attention weights for two images with different contents.
- This shows that most channel attention weights are determined to simply emphasize informative channels regardless of image contents similarly to classical transform-based (or frequency-based) approaches. At the same time, some of them are adaptively determined to image contents.

Content-Adaptivity Analysis



Original images



Noisy images ($\sigma=25$)

- 0.47dB

- 0.88dB



(30.36dB)

Denoising results of CANDI



(26.68dB)



(29.88dB)

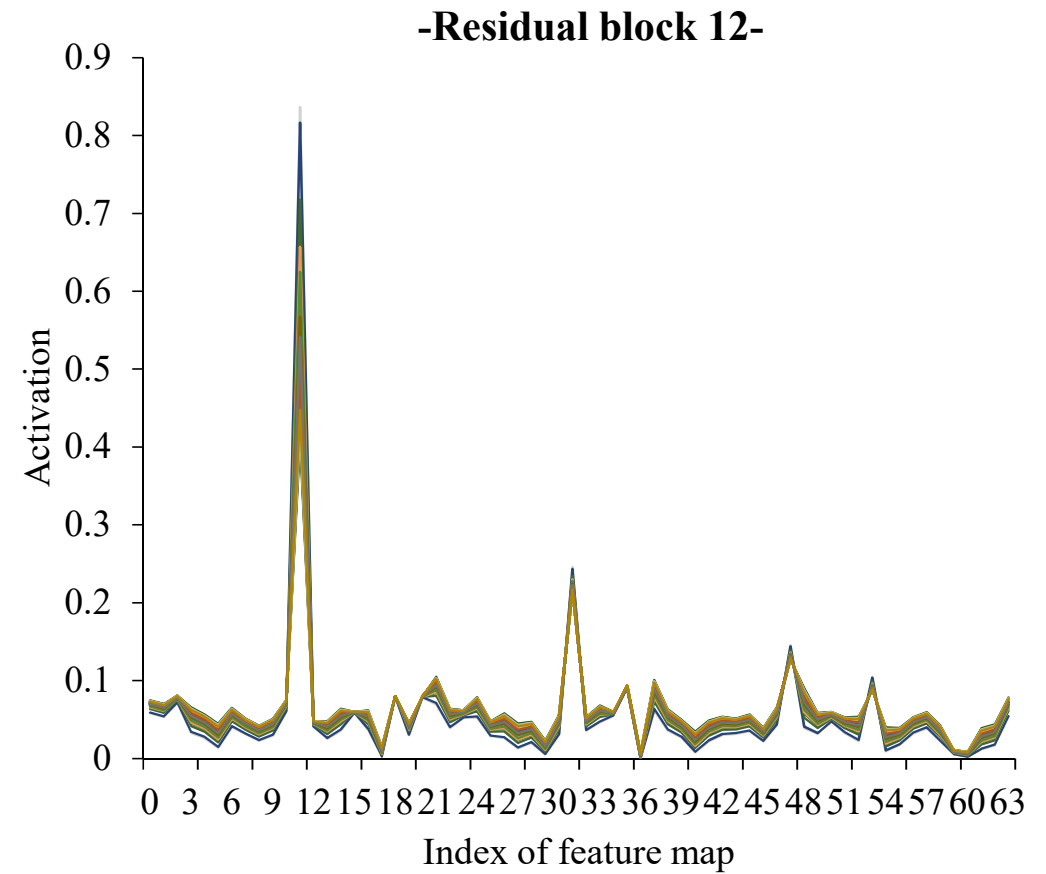
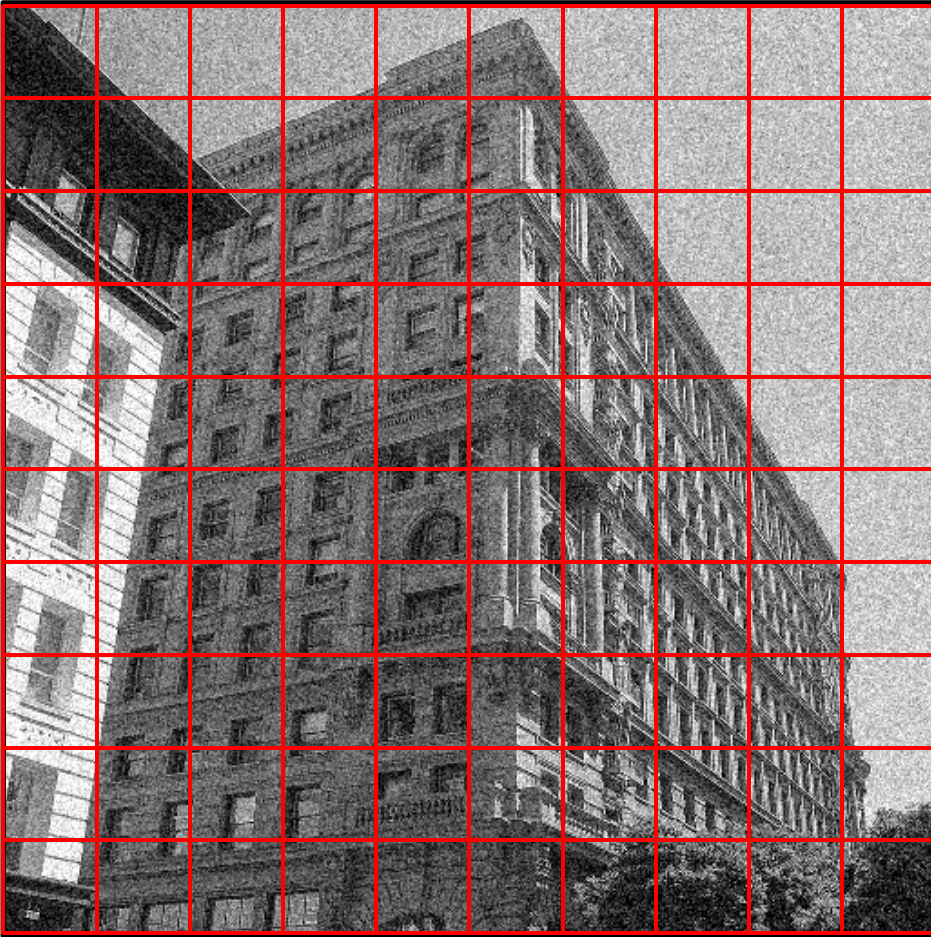
Denoising results of CANDI with the channel attention values of each other



(25.79dB)

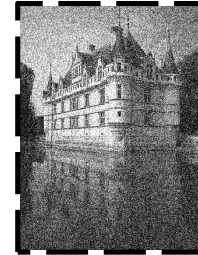
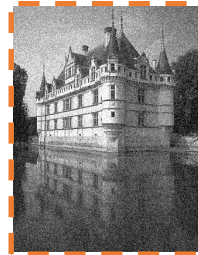
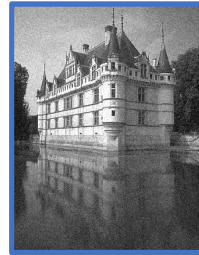
Content-Adaptivity Analysis

Channel attention values of local areas

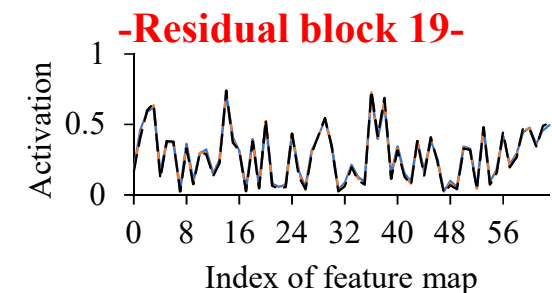
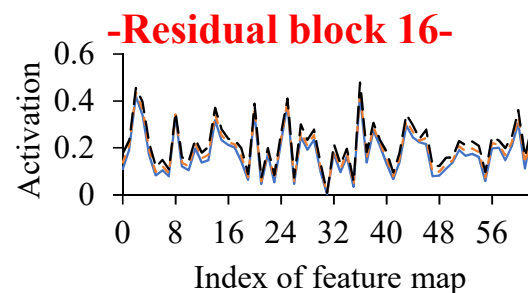
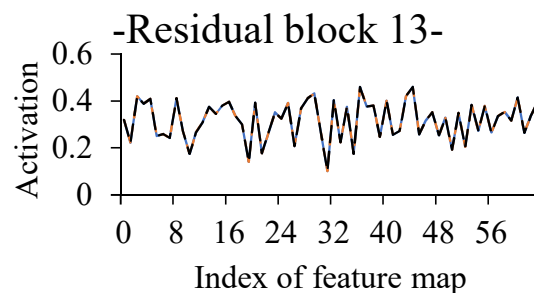
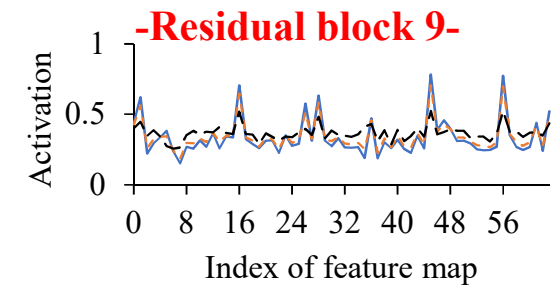
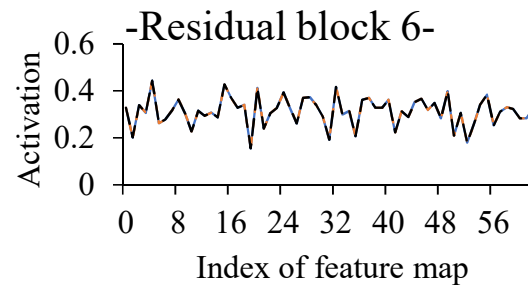
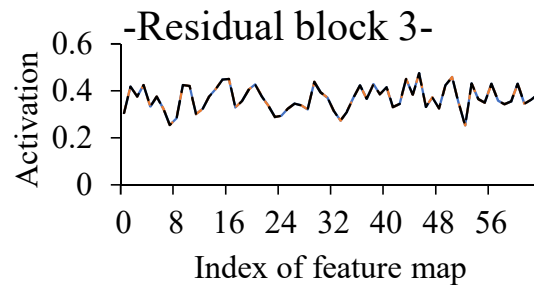


Noise-Adaptivity Analysis

Channel attention values of CANDI-B for different noise levels



Noise level (σ)



While most blocks have the same channel attention weights, the 9th, 16th, and 19th blocks have different channel attention weights for different noise levels, showing that channel attention is adaptive to noise.

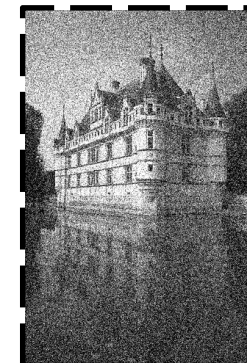
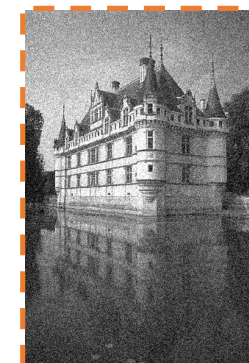
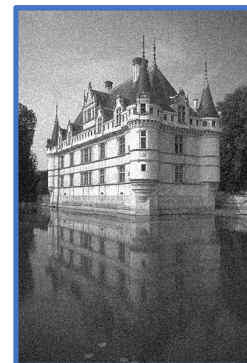
Noise-Adaptivity Analysis



Original images

Noise level (σ)

- 15
- - 25
- - - 50



Noisy images

- 6.04dB

- 4.44dB



(32.61dB)



(30.22dB)



(27.13dB)

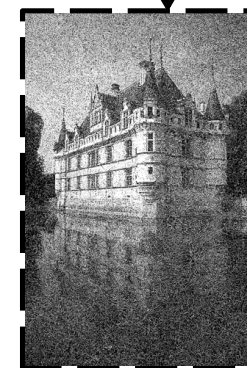
Denoising results of CANDI-B



(26.57dB)



(30.22dB)



(22.69dB)

Denoising results of CANDI-B with the channel attention values of a noise level 25