

# NTIRE 2023 Image Super-Resolution ( $\times 4$ ) Challenge Factsheet

## NAF-Reload: Multilayer Residuals for Image Super Resolution

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### 1. Team details

- Team name: chaobaer
- Team leader name: Jun Cao
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- Rest of the team members: Cheng Li
- Affiliation: Personal
- User names and entries on the NTIRE 2023 CodaLab competitions (development/validation and testing phases): chaobaer
- Best scoring entries of the team during development/validation phase: 30.23
- Link to the codes/executables of the solution(s): team14-chaobaer
- Test results download command: Test dataset results

### 2. Methods

The chaobaer team developed an improved version of NAFNet to super-resolve the single image. The network architecture of the proposed method is shown in Fig. 1. NAFBlock has been proven to be efficient and easy to train in image super-resolution, so it is used as the basic stem. Most current DL-based super resolution methods aim to learn the residual between LR and HR images. Since the residuals are mainly concentrated in edge regions, we introduce boundary maps generated by Sobel as prior information, and combine the features of a larger receptive field as the input embedding. In addition, skip connections are used for residual in residual learning.

During the training phase, only the DVI2K used as the training dataset. The generated LR images were cropped into patches of size 128x128 and data augmented with random flipping. CosineAnnealingLR is used to decay the learning rate. We used L1 loss to train for 200 epochs and then switched to L2 loss for fine-tuning. The learning rate for fine-tuning is 5e-5.

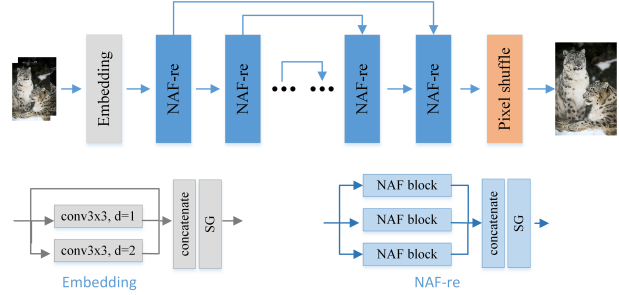


Figure 1. The proposed method.

### 3. Other details

Since the edge image generated by the Sobel operator is used, the input of the proposed method is 6 channels, which is different from the RGB 3 channels in the submission template. Therefore, in addition to modifying the modules in the submission guideline, we also modified `utilsimage.py` in our code and a small part in `testdemo.py`.

The final submitted model is the latest version of the training, the test results may be slightly different from the results of codaLab, and the performance on the test set should be better.

### References