|  |  |
| --- | --- |
| *IxLR* | input low-resolution image |
| *IyE* | estimated HR corresponding to *IxLR* |
| *IyHR* | true high-resolution image |
|  | reference image |
| ∂ | parameters of the image degradation function |
| *d ( )* | image degradation function |
| *g ( )* | super-resolution function |
| *δ* | parameters to the function *g* |
|  | downsampling operator |
|  | convolution operator |
|  | additive white Gaussian noise with a standard deviation of *σ* |
|  | blue kernel |
|  | regularization term |
|  | an ith pixel value of the image |
| , | contrast and luminance of the image |
| , . | comparison functions of luminance, contrast, and structure |
|  | covariance between and |
|  | high-level data representations in layer |
|  | image classification network |
|  | maximum pixel value |
|  | total number of pixels in an image |
| , , | constants for stability |
| ,, | control parameters for SSIM function |
|  | scale factor |
|  | loss function |
| , | the adversarial loss function of least square-based cross-entropy generator and discriminator |
| , | the adversarial loss function of least square-based generator and discriminator |
| , | L1 and L2 pixel loss |
|  | L1 Charbonnier loss |
|  | Gram matrix representation |
| , | texture loss, total variation loss |