WHAT IS CLAIMED IS:

1. An image processing method, comprising:

performing a progressive removal processing of raindrops with different granularities on an image with raindrops, to obtain an image subjected to the removal processing of raindrops, wherein the progressive removal processing of raindrops with different granularities comprises at least: a first granularity processing and a second granularity processing; and

performing fusion processing on the image subjected to the removal processing of raindrops and a to-be-processed image obtained according to the first granularity processing, to obtain a raindrop-removed target image.

2. The method of claim 1, wherein performing the progressive removal processing of raindrops with different granularities on the image with raindrops to obtain the image subjected to the removal processing of raindrops comprises:

performing the first granularity processing on the image with raindrops to obtain the to-be-processed image, wherein the to-be-processed image includes raindrop feature information; and

performing the second granularity processing on the to-be-processed image, and performing, according to the raindrop feature information, raindrop similarity comparison on the pixel points in the to-be-processed image, to obtain the image subjected to the removal processing of raindrops, wherein the image subjected to the removal processing of raindrops contains information of raindrop-free regions that is retained after the removal of raindrops.

3. The method of claim 2, wherein performing the first granularity processing on the image with raindrops to obtain the to-be-processed image comprises:

performing residual dense processing and down-sampling processing on the image with raindrops to obtain raindrop local feature information;

performing region noise reduction processing and up-sampling processing on the raindrop local feature information to obtain raindrop global feature information; and

performing residual subtraction between a raindrop result obtained according to the raindrop local feature information and the raindrop global feature information and the image with raindrops, to obtain the to-be-processed image.

4. The method of claim 3, wherein the raindrop result comprises a processing result obtained by performing residual fusion according to the raindrop local feature information and the raindrop global feature information.

5. The method of claim 3 or 4, wherein performing the residual dense processing and down-sampling processing on the image with raindrops to obtain the raindrop local feature information comprises:

inputting the image with raindrops into an i-th layer residual dense block to obtain a first intermediate processing result;

inputting the first intermediate processing result into an i-th layer down-sampling block to obtain a local feature map; and

inputting the local feature map processed by an (i+1)th layer residual dense block into an (i+1)th layer down-sampling block, and obtaining the raindrop local feature information through the down-sampling processing performed by the (i+1)th layer down-sampling block,

wherein i is a positive integer equal to or greater than 1 and less than a preset value.

6. The method of any one of claims 3 to 5, wherein performing the region noise reduction processing and up-sampling processing on the raindrop local feature information to obtain the raindrop global feature information comprises:

inputting the raindrop local feature information into an j-th layer region sensitive block to obtain a second intermediate processing result;

inputting the second intermediate processing result into an j-th layer up-sampling block to obtain a global enhancement feature map; and

inputting the global enhancement feature map processed by a (j+1)th layer region sensitive block into a (j+1)th layer up-sampling block, and obtaining the raindrop global feature information through the up-sampling processing performed by the (j+1)th layer up-sampling block,

wherein j is a positive integer equal to or greater than 1 and less than a preset value.

7. The method of claim 5, wherein obtaining the raindrop local feature information through the down-sampling processing performed by the (i+1)th layer down-sampling block comprises: performing a convolution operation using a local convolution kernel in the (i+1)th layer down-sampling block to obtain the raindrop local feature information.

8. The method of any one of claims 2 to 7, wherein performing the second granularity processing on the to-be-processed image and performing, according to the raindrop feature information, the raindrop similarity comparison on the pixel points in the to-be-processed image to obtain the image subjected to the removal processing of raindrops comprises:

inputting the to-be-processed image into a context semantic block to obtain context semantic information containing deep semantic features and shallow spatial features;

performing classification according to the context semantic information to identify a rain region in the to-be-processed image, wherein the rain region contains raindrops and other non-raindrop information;

performing, according to the raindrop feature information, the raindrop similarity comparison on the pixel points in the rain region, and positioning, according to a result of the comparison, raindrop regions where the raindrops are located and the

raindrop-free regions; and

removing the raindrops in the raindrop regions and retaining the information of the raindrop-free regions to obtain the image subjected to the removal processing of raindrops.

9. The method of claim 8, wherein the inputting the to-be-processed image into the context semantic block to obtain the context semantic information containing deep semantic features and shallow spatial features comprises:

inputting the to-be-processed image into a convolution block for convolution processing, to obtain a high-dimensional feature vector for generating the deep semantic features;

inputting the high-dimensional feature vector into the context semantic block for multi-layer residual dense processing, to obtain the deep semantic features; and

performing fusion processing on the deep semantic features obtained by the residual dense processing at each layer and the shallow spatial features, to obtain the context semantic information.

10. The method of any one of claims 1 to 9, wherein performing the fusion processing on the image subjected to the removal processing of raindrops and the to-be-processed image obtained according to the first granularity processing, to obtain the raindrop-removed target image comprises:

inputting the to-be-processed image into a convolution block for convolution processing, to obtain an output result; and

performing fusion processing on the image subjected to the removal processing of raindrops and the output result to obtain the raindrop-removed target image.

11. An image processing apparatus, comprising:

a raindrop processing unit configured to perform a progressive removal processing of raindrops with different granularities on an image with raindrops, to

obtain an image subjected to the removal processing of raindrops, wherein the progressive removal processing of raindrops with different granularities comprises at least: a first granularity processing and a second granularity processing; and

a fusion unit configured to perform fusion processing on the image subjected to the removal processing of raindrops and a to-be-processed image obtained according to the first granularity processing, to obtain a raindrop-removed target image.

12. The apparatus of claim 11, wherein the raindrop processing unit is configured to:

perform the first granularity processing on the image with raindrops to obtain the to-be-processed image, wherein the to-be-processed image includes raindrop feature information; and

perform the second granularity processing on the to-be-processed image, and perform, according to the raindrop feature information, raindrop similarity comparison on the pixel points in the to-be-processed image, to obtain the image subjected to the removal processing of raindrops, wherein the image subjected to the removal processing of raindrops contains information of raindrop-free regions that is retained after the removal of raindrops.

13. The apparatus of claim 12, wherein the raindrop processing unit is configured to:

perform residual dense processing and down-sampling processing on the image with raindrops to obtain raindrop local feature information;

perform region noise reduction processing and up-sampling processing on the raindrop local feature information to obtain raindrop global feature information; and

perform residual subtraction between a raindrop result obtained according to the raindrop local feature information and the raindrop global feature information and the image with raindrops, to obtain the to-be-processed image.

14. The apparatus of claim 13, wherein the raindrop result comprises a processing result obtained by performing residual fusion according to the raindrop local feature information and the raindrop global feature information.

15. The apparatus of claim 13 or 14, wherein the raindrop processing unit is configured to:

input the image with raindrops into an i-th layer residual dense block to obtain a first intermediate processing result;

input the first intermediate processing result into an i-th layer down-sampling block to obtain a local feature map; and

input the local feature map processed by an (i+1)th layer residual dense block into an (i+1)th layer down-sampling block, and obtain the raindrop local feature information through the down-sampling processing performed by the (i+1)th layer down-sampling block,

wherein i is a positive integer equal to or greater than 1 and less than a preset value.

16. The apparatus of any one of claims 13 to 15, wherein the raindrop processing unit is configured to:

input the raindrop local feature information into an j-th layer region sensitive block to obtain a second intermediate processing result;

input the second intermediate processing result into an j-th layer up-sampling block to obtain a global enhancement feature map; and

input the global enhancement feature map processed by a (j+1)th layer region sensitive block into a (j+1)th layer up-sampling block, and obtain the raindrop global feature information through the up-sampling processing performed by the (j+1)th layer up-sampling block,

wherein j is a positive integer equal to or greater than 1 and less than a preset value.

17. The apparatus of claim 15, wherein the raindrop processing unit is configured to perform a convolution operation using a local convolution kernel in the (i+1)th layer down-sampling block to obtain the raindrop local feature information.

~~18. The apparatus of any one of claims 12 to 17, wherein the raindrop processing unit is configured to:~~

~~input the to-be-processed image into a context semantic block to obtain context semantic information containing deep semantic features and shallow spatial features;~~

~~perform classification according to the context semantic information to identify a rain region in the to-be-processed image, wherein the rain region contains raindrops and other non-raindrop information;~~

~~perform, according to the raindrop feature information, raindrop similarity comparison on the pixel points in the rain region, and position, according to a result of the comparison, raindrop regions where the raindrops are located and the raindrop-free regions; and~~

~~remove the raindrops in the raindrop regions and retain the information of the raindrop-free regions to obtain the image subjected to the removal processing of raindrops.~~

~~19. The apparatus of claim 18, wherein the raindrop processing unit is configured to:~~

~~input the to-be-processed image into a convolution block for convolution processing, to obtain a high-dimensional feature vector for generating the deep semantic features;~~

~~input the high-dimensional feature vector into the context semantic block for multi-layer residual dense processing, to obtain the deep semantic features; and~~

~~perform fusion processing on the deep semantic features obtained by the residual dense processing at each layer and the shallow spatial features, to obtain the context~~

~~semantic information.~~

~~20. The apparatus of any one of claims 11 to 19, wherein the fusion unit is configured to:~~

~~input the to-be-processed image into a convolution block for convolution processing, to obtain an output result; and~~

~~perform fusion processing on the image subjected to the removal processing of raindrops and the output result to obtain the raindrop-removed target image.~~

~~21~~18. An electronic device, comprising:

a processor;

a memory for storing instructions executable by the processor,

wherein the processor is configured to perform the method of any one of claims 1 to 10.

~~22~~19. A computer readable storage medium having stored thereon computer program instructions that, when executed by a processor, cause the method of any one of claims 1 to 10 to be implemented.

~~23~~20. A computer program comprising computer readable codes that, when run in an electronic device, cause a processor in the electronic device to perform the method of any one of claims 1 to 10.