CLAIMS

What is claimed is:

1. A computer-implemented method, comprising:

randomly selecting a predetermined quantity of samples from a first sample set as seed samples, wherein a seed sample of the seed samples corresponds to a seed image and an annotation result for the seed image;

obtaining, for each of the seed samples, at least one extended sample based on an extension operation for the seed sample, wherein the extension operation comprises:

constructing a mask image with a pixel arrangement the same as the seed image;

determining a reference pixel in the mask image based on a predetermined reference disturbance value, wherein the reference pixel corresponds to an interference source;

generating, in the mask image with the reference pixel as a center, disturbance values sequentially decrease or increase by distance from the predetermined reference disturbance value of the reference pixel towards surrounding pixels based on a predetermined distribution, wherein the predetermined distribution is related to a distance from each of the pixels to the reference pixel;

separately merging, on at least one image channel, pixels of the seed image of the seed sample with the disturbance values to obtain a disturbance image; and

constructing an extended sample based on the disturbance image and the annotation result for the seed image, wherein the reference pixel is determined based on a predetermined rule; and

performing an enhanced training in an image recognition model using the at least one extended sample as input.

2. The computer-implemented method of claim 1, wherein separately merging, on the at least one image channel, the pixels of the seed image of the seed sample with the disturbance values to obtain the disturbance image comprises:

determining, in the mask image, a reference point corresponding to the predetermined reference disturbance value and the reference pixel based on the predetermined rule;

generating second disturbance values in the mask image to obtain a first noise image, wherein the second disturbance values sequentially decrease or increase from the predetermined reference

disturbance value towards the surrounding pixels based on the predetermined distribution with the reference point as the center; and

obtaining a first disturbance image based on a result of merging the first noise image with a first image channel of the seed image.

3. The computer-implemented method of claim 2, further comprising:

superposing the first noise image onto the first image channel of the seed image;

determining a weighted average on third disturbance values in the first noise image and image values on the first image channel using a one-to-one pixel mapping relationship; and

obtaining a superposition result of the first image channel of the seed image.

4. The computer-implemented method of claim 2, wherein the first disturbance image comprises a result of superposing the first noise image onto a second image channel of the seed image, or a result of superposing a second noise image onto the second image channel of the seed image.

5. The computer-implemented method of claim 1, wherein the seed image comprises a first pixel, and wherein a distance between the first pixel and the reference pixel is a Euclidean distance between the first pixel and the reference pixel by using rows and columns that the first pixel and the reference pixel are located as coordinates.

6. The computer-implemented method of claim 1, wherein separately merging, on the at least one image channel, the pixels of the seed image of the seed sample with the disturbance values to obtain the disturbance image comprises:

constructing an auxiliary matrix with a pixel arrangement the same as the seed image;

determining, based on the predetermined rule, a reference element that is in the auxiliary matrix and corresponds to the predetermined reference disturbance value, wherein the reference element is a matrix element corresponding to the reference pixel;

generating fourth disturbance values in the auxiliary matrix to obtain a first noise matrix, wherein the fourth disturbance values sequentially decrease or increase from the predetermined reference disturbance value towards surrounding elements based on the predetermined distribution with the reference element as the center; and

obtaining a first disturbance image based on a result of superposing the first noise matrix onto a first image channel of the seed image.

7. The computer-implemented method of claim 1, wherein performing the enhanced training in the image recognition model using the at least one extended sample as input comprises:

adding the at least one extended sample to the first sample set, and training the image recognition model by using the first sample set; or

adding the at least one extended sample to a second sample set, and performing the enhanced training in the image recognition model by using the second sample set, wherein the image recognition model is obtained through a training using the first sample set.

8. A non-transitory, computer-readable medium storing one or more instructions executable by a computer system to perform operations comprising:

randomly selecting a predetermined quantity of samples from a first sample set as seed samples, wherein a seed sample of the seed samples corresponds to a seed image and an annotation result for the seed image;

obtaining, for each of the seed samples, at least one extended sample based on an extension operation for the seed sample, wherein the extension operation comprises:

constructing a mask image with a pixel arrangement the same as the seed image;

determining a reference pixel in the mask image based on a predetermined reference disturbance value, wherein the reference pixel corresponds to an interference source;

generating, in the mask image with the reference pixel as a center, disturbance values sequentially decrease or increase by distance from the predetermined reference disturbance value of the reference pixel towards surrounding pixels based on a predetermined distribution, wherein the predetermined distribution is related to a distance from each of the pixels to the reference pixel;

separately merging, on at least one image channel, pixels of the seed image of the seed sample with the disturbance values to obtain a disturbance image; and

constructing an extended sample based on the disturbance image and the annotation result for the seed image, wherein the reference pixel is determined based on a predetermined rule; and

performing an enhanced training in an image recognition model using the at least one extended sample as input.

9. The non-transitory, computer-readable medium of claim 8, wherein separately merging, on the at least one image channel, the pixels of the seed image of the seed sample with the disturbance values to obtain the disturbance image comprises:

determining, in the mask image, a reference point corresponding to the predetermined reference disturbance value and the reference pixel based on the predetermined rule;

generating second disturbance values in the mask image to obtain a first noise image, wherein the second disturbance values sequentially decrease or increase from the predetermined reference disturbance value towards the surrounding pixels based on the predetermined distribution with the reference point as the center; and

obtaining a first disturbance image based on a result of merging the first noise image with a first image channel of the seed image.

10. The non-transitory, computer-readable medium of claim 9, wherein the operations further comprise:

superposing the first noise image onto the first image channel of the seed image;

determining a weighted average on third disturbance values in the first noise image and image values on the first image channel using a one-to-one pixel mapping relationship; and

obtaining a superposition result of the first image channel of the seed image.

11. The non-transitory, computer-readable medium of claim 9, wherein the first disturbance image comprises a result of superposing the first noise image onto a second image channel of the seed image, or a result of superposing a second noise image onto the second image channel of the seed image.

12. The non-transitory, computer-readable medium of claim 8, wherein the seed image comprises a first pixel, and wherein a distance between the first pixel and the reference pixel is a Euclidean distance between the first pixel and the reference pixel by using rows and columns that the first pixel and the reference pixel are located as coordinates.

13. The non-transitory, computer-readable medium of claim 8, wherein separately merging, on the at least one image channel, the pixels of the seed image of the seed sample with the disturbance values to obtain the disturbance image comprises:

constructing an auxiliary matrix with a pixel arrangement the same as the seed image;

determining, based on the predetermined rule, a reference element that is in the auxiliary matrix and corresponds to the predetermined reference disturbance value, wherein the reference element is a matrix element corresponding to the reference pixel;

generating fourth disturbance values in the auxiliary matrix to obtain a first noise matrix, wherein the fourth disturbance values sequentially decrease or increase from the predetermined reference disturbance value towards surrounding elements based on the predetermined distribution with the reference element as the center; and

obtaining a first disturbance image based on a result of superposing the first noise matrix onto a first image channel of the seed image.

14. The non-transitory, computer-readable medium of claim 8, wherein performing the enhanced training in the image recognition model using the at least one extended sample as input comprises:

adding the at least one extended sample to the first sample set, and training the image recognition model by using the first sample set; or

adding the at least one extended sample to a second sample set, and performing the enhanced training in the image recognition model by using the second sample set, wherein the image recognition model is obtained through a training using the first sample set.

15. A computer-implemented system, comprising:

one or more computers; and

one or more computer memory devices interoperably coupled with the one or more computers and having tangible, non-transitory, machine-readable media storing one or more instructions that, when executed by the one or more computers, perform operations comprising:

randomly selecting a predetermined quantity of samples from a first sample set as seed samples, wherein a seed sample of the seed samples corresponds to a seed image and an annotation result for the seed image;

obtaining, for each of the seed samples, at least one extended sample based on an extension operation for the seed sample, wherein the extension operation comprises:

constructing a mask image with a pixel arrangement the same as the seed image;

determining a reference pixel in the mask image based on a predetermined reference disturbance value, wherein the reference pixel corresponds an interference source;

generating, in the mask image with the reference pixel as a center, disturbance values sequentially decrease or increase by distance from the predetermined reference disturbance value of the reference pixel towards surrounding pixels based on a predetermined distribution, wherein the predetermined distribution is related to a distance from each of the pixels to the reference pixel;

separately merging, on at least one image channel, pixels of the seed image of the seed sample with the disturbance values to obtain a disturbance image; and

constructing an extended sample based on the disturbance image and the annotation result for the seed image, wherein the reference pixel is determined based on a predetermined rule; and

performing an enhanced training in an image recognition model using the at least one extended sample as input.

16. The computer-implemented system of claim 15, wherein separately merging, on the at least one image channel, the pixels of the seed image of the seed sample with the disturbance values to obtain the disturbance image comprises:

determining, in the mask image, a reference point corresponding to the predetermined reference disturbance value and the reference pixel based on the predetermined rule;

generating second disturbance values in the mask image to obtain a first noise image, wherein the second disturbance values sequentially decrease or increase from the predetermined reference disturbance value towards the surrounding pixels based on the predetermined distribution with the reference point as the center; and

obtaining a first disturbance image based on a result of merging the first noise image with a first image channel of the seed image.

17. The computer-implemented system of claim 16, wherein the operations further comprise:

superposing the first noise image onto the first image channel of the seed image;

determining a weighted average on third disturbance values in the first noise image and image values on the first image channel using a one-to-one pixel mapping relationship; and

obtaining a superposition result of the first image channel of the seed image.

18. The computer-implemented system of claim 16, wherein the first disturbance image comprises a result of superposing the first noise image onto a second image channel of the seed image, or a result of superposing a second noise image onto the second image channel of the seed image.

19. The computer-implemented system of claim 15, wherein the seed image comprises a first pixel, and wherein a distance between the first pixel and the reference pixel is a Euclidean distance between the first pixel and the reference pixel by using rows and columns that the first pixel and the reference pixel are located as coordinates.

20. The computer-implemented system of claim 15, wherein separately merging, on the at least one image channel, the pixels of the seed image of the seed sample with the disturbance values to obtain the disturbance image comprises:

constructing an auxiliary matrix with a pixel arrangement the same as the seed image;

determining, based on the predetermined rule, a reference element that is in the auxiliary matrix and corresponds to the predetermined reference disturbance value, wherein the reference element is a matrix element corresponding to the reference pixel;

generating fourth disturbance values in the auxiliary matrix to obtain a first noise matrix, wherein the fourth disturbance values sequentially decrease or increase from the predetermined reference disturbance value towards surrounding elements based on the predetermined distribution with the reference element as the center; and

obtaining a first disturbance image based on a result of superposing the first noise matrix onto a first image channel of the seed image.