CLAIMS

What is claimed is:

1. ~~An enhanced training~~ A computer-implemented method ~~for an image recognition model~~, comprising:

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

obtaining, for each of the seed ~~sample, several~~samples, at least one extended ~~samples obtained~~sample based on an extension operation for the seed sample, wherein the extension operation ~~for a single seed sample~~ comprises: ~~separately merging, on at least one image channel, pixels of a single seed image corresponding to the single~~

constructing a mask image with a pixel arrangement the same as the seed ~~sample with disturbance values arranged in predetermined distribution with~~ image;

determining a reference pixel ~~as a center, to obtain a single disturbance image~~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 ~~a single~~an extended sample based on the ~~single~~ disturbance image and the annotation result ~~corresponding to~~for the ~~single~~ seed ~~sample~~image, wherein the reference pixel is determined based on a predetermined rule; and

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

2. The computer-implemented method of claim 1, wherein ~~the~~ separately merging, on the at least one image channel, the pixels of ~~a single~~the seed image ~~corresponding to~~of the ~~single~~ seed sample with

the disturbance values ~~arranged in predetermined distribution with a reference pixel as a center,~~ to obtain ~~a single~~the disturbance image comprises:

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

determining, in the mask image, a reference point corresponding to ~~a~~the predetermined reference disturbance value and ~~corresponding to~~ the reference pixel based on ~~a~~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 ~~sequentially~~ increase from the predetermined reference disturbance value towards the surrounding pixels based on the predetermined distribution with the reference point as ~~a~~the center~~, to obtain a first noise image~~; and

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

3. The computer-implemented method of claim ~~1 or~~ 2, ~~wherein the predetermined distribution is linear distribution or normal distribution.~~further comprising:

~~4. The method of claim 2, wherein a result of~~ superposing the first noise image onto the first image channel of the ~~single~~ seed image ~~comprises a result obtained by performing~~ ;

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.

~~5~~4. The computer-implemented method of claim 2, wherein the first disturbance image ~~further~~ comprises~~:~~

a result of superposing the first noise image onto a second image channel of the ~~single~~ seed image~~;~~, or

a result of superposing ~~another~~a second noise image onto the second image channel of the ~~single~~ seed image.

~~6~~5. The computer-implemented method of claim 1, wherein the ~~single~~ 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.

~~7~~6. The computer-implemented method of claim 1, wherein ~~the~~ separately merging, on the at least one image channel, the pixels of ~~a single~~the seed image ~~corresponding to~~of the ~~single~~ seed sample with the disturbance values ~~arranged in predetermined distribution based on a distance from the reference pixel with a reference pixel as a center,~~ to obtain ~~a single~~the disturbance image comprises:

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

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

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

~~8~~7. The computer-implemented method of claim 1, wherein ~~the~~ performing the enhanced training in the image recognition model ~~based on~~using the at least one extended sample as input comprises:

adding ~~each~~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 ~~each~~ 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, ~~enhanced training on an~~wherein the image recognition model is obtained through a training ~~by~~ using the first sample set.

~~9. An image processing method, comprising:~~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 ~~a to-be-processed~~the seed image;

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

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

~~forming~~obtaining a first disturbance image ~~for the to-be-processed image~~ based on a result of merging the first noise image with a first image channel of the ~~to-be-processed~~seed image.

10. ~~The method~~The non-transitory, computer-readable medium of claim 9, wherein the ~~predetermined distribution is linear distribution or normal distribution.~~operations further comprise:

~~11. The method of claim 9, wherein a result of~~ superposing the first noise image onto the first image channel of the ~~to-be-processed~~seed image ~~comprises~~;

determining a ~~result obtained by performing~~ 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.

~~12~~11. The ~~method~~non-transitory, computer-readable medium of claim 9, wherein the first disturbance image ~~further~~ comprises~~:~~

a result of superposing ~~a~~the first noise image onto a second image channel of the ~~to-be-processed~~seed image~~;~~, or

a result of superposing ~~another~~a second noise image onto the second image channel of the ~~to-be-processed~~seed image.

~~13~~12. The ~~method~~non-transitory, computer-readable medium of claim ~~9~~8, wherein ~~a~~ 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 ~~maximum value or minimum value exists~~rule, a reference element that is in the ~~disturbance values~~ auxiliary matrix and corresponds to ~~a pixel with a maximum distance~~ 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 ~~reference pixel.~~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. ~~An image sample extension method~~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:

~~obtaining~~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 ~~to be extended~~set as seed samples, wherein ~~the first~~a seed sample of the seed samples corresponds to a ~~first~~seed image and ~~a first~~an annotation result for the ~~first~~seed image;

~~separately merging, on~~obtaining, for each of the seed samples, at least one ~~image channel, pixels of the first~~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 ~~with disturbance values arranged in predetermined distribution with~~;

determining a reference pixel ~~as a center, to obtain a first disturbance image~~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 ~~pixel~~of the pixels to the reference pixel; ~~and~~

~~combining the first disturbance image with the first annotation result to obtain a first extended sample.~~

~~15. The method of claim 14, wherein the~~ separately merging, on at least one image channel, pixels of the ~~first~~seed image of the seed sample with the disturbance values ~~arranged in predetermined distribution with a reference pixel as a center,~~ to obtain a ~~first~~ disturbance image ~~comprises:~~; and

constructing ~~a mask~~an extended sample based on the disturbance image ~~with pixel arrangement the same as~~ and the ~~first~~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 ~~a predetermined reference disturbance value based on a predetermined rule, wherein the reference point is a pixel corresponding to the reference pixel;~~

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

forming the first disturbance image for the first image based on a result of merging the first noise image with a first image channel of the first image.

16. The method of claim 14, wherein athe predetermined maximum value or minimum value exists in the disturbance values and corresponds to a pixel with a maximum distance from the reference pixel.

17. The method of claim 14, wherein the generating, in the mask image, disturbance values sequentially decrease or sequentially increase fromdisturbance value and the reference disturbance value towards surrounding pixels pixel based on the predetermined distribution with the reference point as a center,rule;

generating second disturbance values in the mask image to obtain a first noise image further comprises:

generating, in, wherein the mask image, thesecond disturbance values sequentially decrease or sequentially increase from the predetermined reference disturbance value towards the surrounding pixels based on the predetermined distribution with the reference point as athe center; and

performing the following correction processing on each disturbance value: for a single pixel, modifying a corresponding disturbance value to a median value of disturbance values separately corresponding to pixels in a predetermined neighborhood of the pixel; and

using a mask image correspondingly having each corrected disturbance value as the first noise image.

18. An enhanced training apparatus for an image recognition model, comprising:

a selection unit, configured to randomly select a predetermined quantity or predetermined proportion of samples from a first sample set as seed samples, wherein each seed sample corresponds to each seed image and an annotation result for the corresponding seed image;

an obtaining unit, configured to obtain, for each seed sample, several extended samples obtained based on an extension operation, wherein the extension operation for a single seed sample comprises: separately merging, on at least one image channel, pixels of a single seed image corresponding to the single seed sample with disturbance values arranged in predetermined distribution with a reference pixel as a center,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 ~~single disturbance image, wherein the predetermined distribution is related to a distance from each pixel to the reference pixel; and constructing a single extended sample based on the single disturbance image and the annotation result corresponding to the single seed sample, wherein the reference pixel is determined based on a predetermined rule; and~~

~~a training unit, configured to perform enhanced training in the image recognition model based on the extended sample.~~

~~19. An image processing apparatus, comprising:~~

~~an image construction unit, configured to construct a mask image with pixel arrangement the same as a to-be-processed image;~~

~~a reference determining unit, configured to determine, in the mask image, a reference pixel corresponding to a predetermined reference disturbance value based on a predetermined rule;~~

~~a disturbance value generation unit, configured to generate, in the mask image,~~first noise matrix, wherein the fourth disturbance values sequentially decrease or ~~sequentially~~ increase from the predetermined reference disturbance value towards surrounding ~~pixels~~elements based on the predetermined distribution with the reference ~~pixel~~element as ~~a~~the center~~, to obtain a noise image~~; and

~~an image merging unit, configured to form a~~ obtaining a first disturbance image ~~for the to-be-processed image~~ based on a result of ~~merging~~superposing the first noise ~~image with~~matrix onto a first image channel of the ~~to-be-processed~~seed image.

~~20. An image sample extension apparatus, comprising:~~

~~a sample acquisition unit, configured to obtain a first sample to be extended, wherein the first sample corresponds to a first image and a first annotation result for the first image;~~

~~an image disturbance unit, configured to separately merge, on at least one image channel, pixels of the first image with disturbance values arranged in predetermined distribution with a reference pixel as a center, to obtain a first disturbance image, wherein the predetermined distribution is related to a distance from each pixel to the reference pixel; and~~

~~an image extension unit, configured to combine the first disturbance image with the first annotation result to obtain a first extended sample.~~

~~21. A computer readable storage medium, wherein the computer readable storage medium stores a computer program, and when the computer program is executed in a computer, the computer is enabled to execute the method according to any one of claims 1 to 17.~~

~~22. A computing device, comprising a memory and a processor, wherein the memory stores executable code, and when executing the executable code, the processor implements the method according to any one of claims 1 to 17.~~