

CLAIMS

1. A method for liveness detection, performed by an electronic device, comprising:
 - performing reconstruction processing based on an image to be detected comprising a target object to obtain a reconstructed image;
 - obtaining a reconstruction error based on the reconstructed image; and
 - concatenating the image to be detected and the reconstruction error in a direction of channels to obtain a fused image, and obtaining a classification result of the target object based on the fused image, wherein the classification result is living or non-living.
2. The method according to claim 1, wherein performing reconstruction processing based on the image to be detected comprising the target object to obtain the reconstructed image comprises:
 - performing reconstruction processing via an auto-encoder based on the image to be detected comprising the target object to obtain the reconstructed image.
3. The method according to claim 1 or 2, wherein performing reconstruction processing based on the image to be detected comprising the target object to obtain the reconstructed image comprises:
 - inputting the image to be detected to the auto-encoder for reconstruction processing to obtain the reconstructed image.
4. The method according to claim 3, wherein inputting the image to be detected to the auto-encoder for reconstruction processing to obtain the reconstructed image comprises:
 - performing encoding processing on the image to be detected by using the auto-encoder to obtain first feature data; and
 - performing decoding processing on the first feature data by using the auto-encoder to obtain the reconstructed image.
5. The method according to claim 3 or 4, wherein obtaining the reconstruction error based on the reconstructed image comprises:
 - obtaining the reconstruction error based on a difference between the reconstructed image and the image to be detected.
6. The method according to claim 1 or 2, wherein performing reconstruction processing based on the image to be detected comprising the target object to obtain the reconstructed image comprises:
 - performing feature extraction on the image to be detected comprising the target object to

obtain second feature data; and

inputting the second feature data to the auto-encoder for reconstruction processing to obtain the reconstructed image.

7. The method according to claim 6, wherein inputting the second feature data to the auto-encoder for reconstruction processing to obtain the reconstructed image comprises:

performing encoding processing on the second feature data by using the auto-encoder to obtain third feature data; and

performing decoding processing on the third feature data by using the auto-encoder to obtain the reconstructed image.

8. The method according to claim 6 or 7, wherein obtaining the reconstruction error based on the reconstructed image comprises:

obtaining the reconstruction error based on a difference between the second feature data and the reconstructed image; and

wherein concatenating the image to be detected and the reconstruction error in the direction of channels to obtain the fused image, and obtaining the classification result of the target object based on the fused image comprises:

concatenating the second feature data and the reconstruction error in the direction of channels to obtain second concatenation information; and

obtaining the classification result of the target object based on the second concatenation information.

9. The method according to any one of claims 1 to 8, wherein the method for liveness detection is implemented via a discriminative network; and

the method further comprises:

training a generative adversarial network via a training set to obtain the discriminative

network, wherein the generative adversarial network comprises a generative network and the discriminative network.

10. The method according to claim 9, wherein training the generative adversarial network via the training set comprises:

performing discrimination processing on an input image of the discriminative network via the discriminative network to obtain a classification prediction result of the input image, wherein the input image comprises a sample image in the training set or a generative image obtained via the generative network based on the sample image, annotation information of the sample image indicates that the sample image is a living real image or a non-living real image, and annotation information of the generative image indicates that the generative image is a generated image; and

adjusting a network parameter of the generative adversarial network based on the classification prediction result of the input image and the annotation information of the input image.

11. An apparatus for liveness detection, comprising:

a reconstructing module, configured to perform reconstruction processing based on an image to be detected comprising a target object to obtain a reconstructed image;

a first obtaining module, configured to obtain a reconstruction error based on the reconstructed image; and

a second obtaining module, configured to concatenat the image to be detected and the reconstruction error in a direction of channels to obtain a fused image, and obtain a classification result of the target object based on the fused image, wherein the classification result is living or non-living.

12. The apparatus according to claim 11, wherein the reconstructing module comprises an auto-encoder, and the auto-encoder is obtained by training based on a sample image comprising a living target object.

13. The apparatus according to claim 11 or 12, wherein the reconstructing module is configured to perform reconstruction processing via the auto-encoder based on the image to be detected comprising the target object to obtain the reconstructed image.

14. The apparatus according to claim 13, wherein the auto-encoder comprises:

a first encoding unit, configured to perform encoding processing on the image to be

detected to obtain first feature data; and

a first decoding unit, configured to perform decoding processing on the first feature data to obtain the reconstructed image.

15. The apparatus according to claim 13 or 14, wherein the first obtaining module is configured to obtain the reconstruction error based on a difference between the reconstructed image and the image to be detected

16. The apparatus according to claim 11 or 12, wherein the reconstructing module comprises:

a feature extracting unit, configured to perform feature extraction on the image to be detected comprising the target object to obtain second feature data; and

an auto-encoder, configured to perform reconstruction processing on the second feature data to obtain the reconstructed image.

17. The apparatus according to claim 16, wherein the auto-encoder comprises:

a first encoding unit, configured to perform encoding processing on the second feature data to obtain third feature data; and

a first decoding unit, configured to perform decoding processing on the third feature data to obtain the reconstructed image.

18. An electronic device, comprising:

a memory, configured to store computer programs; and

a processor, configured to execute the computer programs stored in the memory, wherein when the computer programs are executed, the method for liveness detection according to any one of claims 1 to 10 is implemented.

19. A computer readable storage medium having computer programs stored thereon, wherein when the computer programs are executed via a processor, the method for liveness detection according to any one of claims 1 to 10 is implemented.

20. A computer program product, wherein the computer program product comprises program instructions, and when the program instructions are executed via a processor, the processor executes the method according to any one of claims 1 to 10.