

CLAIMS

1. A method for liveness detection, comprising:

processing a to-be-processed image to obtain probabilities of multiple pixel points of the to-be-processed image to be corresponding to spoofing;

determining a predicted face region in the to-be-processed image; and

obtaining, based on the probabilities of the multiple pixel points of the to-be-processed image to be corresponding to spoofing and the predicted face region, a liveness detection result of the to-be-processed image,

wherein processing the to-be-processed image to obtain the probabilities of the multiple pixel points of the to-be-processed image to be corresponding to spoofing comprises:

using a neural network to process the to-be-processed image to output the probability of each pixel point of the to-be-processed image to be corresponding to spoofing,

wherein the neural network is obtained by being trained based on sample data having pixel-level labels.

2. The method for liveness detection according to claim 1, wherein obtaining, based on the probabilities of the multiple pixel points of the to-be-processed image to be corresponding to spoofing and the predicted face region, the liveness detection result of the to-be-processed image comprises:

determining, based on position information of the multiple pixel points and the predicted face region, at least two pixel points comprised in the predicted face region from among the multiple pixel points; and

determining, based on the probability of each of the at least two pixel points corresponding to spoofing, the liveness detection result of the to-be-processed image.

3. The method for liveness detection according to claim 2, wherein determining, based on the probability of each of the at least two pixel points corresponding to spoofing, the liveness detection result of the to-be-processed image comprises:

determining, based on the probability of each of the at least two pixel points corresponding to spoofing, at least one spoofing pixel point in the at least two pixel points; and

determining, based on a proportion of the at least one spoofing pixel point in the at least two

pixel points, the liveness detection result of the to-be-processed image.

4. The method for liveness detection according to claim 3, wherein determining, based on the proportion of the at least one spoofing pixel point in the at least two pixel points, the liveness detection result of the to-be-processed image comprises:

in response to the proportion being greater than or equal to a first threshold, determining that the liveness detection result of the to-be-processed image is spoofing; and/or

in response to the proportion being less than the first threshold, determining that the liveness detection result of the to-be-processed image is non-spoofing.

5. The method for liveness detection according to claim 2, wherein determining, based on the probability of each of the at least two pixel points corresponding to spoofing, the liveness detection result of the to-be-processed image comprises:

performing averaging processing on the probabilities of the at least two pixel points corresponding to spoofing to obtain an average probability; and

determining, based on the average probability, the liveness detection result of the to-be-processed image.

6. The method for liveness detection according to claim 1, wherein obtaining, based on the probabilities of the multiple pixel points of the to-be-processed image to be corresponding to spoofing and the predicted face region, the liveness detection result of the to-be-processed image comprises:

determining, based on the probabilities of the multiple pixel points of the to-be-processed image to be corresponding to spoofing, a spoofing region of the to-be-processed image; and

determining, based on positions of the spoofing region and the predicted face region, the liveness detection result of the to-be-processed image.

7. The method for liveness detection according to claim 6, wherein determining, based on the positions of the spoofing region and the predicted face region, the liveness detection result of the to-be-processed image comprises:

determining, based on the positions of the spoofing region and the predicted face region, an

overlapping region between the spoofing region and the predicted face region; and

determining, based on a proportion of the overlapping region in the predicted face region, the liveness detection result of the to-be-processed image.

8. The method for liveness detection according to claim 7, further comprising:

displaying at least one spoofing pixel point determined based on the probabilities of the multiple pixel points corresponding to spoofing; and/or

outputting information of the at least one spoofing pixel point determined based on the probabilities of the multiple pixel points corresponding to spoofing for displaying.

9. The method for liveness detection according to any one of claims 1 to 8, wherein determining the predicted face region in the to-be-processed image comprises:

performing face key point detection on the to-be-processed image to obtain key point prediction information; and

determining, based on the key point prediction information, the predicted face region in the to-be-processed image.

10. The method for liveness detection according to claim 9, wherein before performing face key point detection on the to-be-processed image to obtain key point prediction information, the method further comprises:

performing face detection on the to-be-processed image to obtain a face bounding region in the to-be-processed image,

wherein performing face key point detection on the to-be-processed image to obtain the key point prediction information comprises:

performing face key point detection on the image in the face bounding region to obtain the key point prediction information.

11. The method for liveness detection according to any one of claims 1 to 8, wherein determining the predicted face region in the to-be-processed image comprises:

performing face detection on the to-be-processed image to obtain the predicted face region in the to-be-processed image.

12. The method for liveness detection according to any one of claims 1 to 11, wherein before processing the to-be-processed image, the method further comprises:

obtaining the to-be-processed image that is acquired by a monocular camera.

13. An apparatus for liveness detection, comprising: a pixel prediction module, a face detection module, and an analysis module, wherein

the pixel prediction module is configured to process a to-be-processed image to obtain probabilities of multiple pixel points of the to-be-processed image to be corresponding to spoofing;

the face detection module is configured to determine a predicted face region in the to-be-processed image; and

the analysis module is configured to obtain, based on the probabilities of the multiple pixel points of the to-be-processed image to be corresponding to spoofing and the predicted face region, a liveness detection result of the to-be-processed image,

wherein the pixel prediction module is configured to use a neural network to process the to-be-processed image to output the probability of each pixel point of the to-be-processed image to be corresponding to spoofing,

wherein the neural network is obtained by being trained based on sample data having pixel-level labels.

14. An electronic device, comprising a processor and a memory, wherein the memory is configured to store a computer program, the computer program is configured to be executed by the processor, and the processor is configured to perform a method for liveness detection, the method comprising:

processing a to-be-processed image to obtain probabilities of multiple pixel points of the to-be-processed image to be corresponding to spoofing;

determining a predicted face region in the to-be-processed image; and

obtaining, based on the probabilities of the multiple pixel points of the to-be-processed image to be corresponding to spoofing and the predicted face region, a liveness detection result of the to-be-processed image,

wherein processing the to-be-processed image to obtain the probabilities of the multiple pixel points of the to-be-processed image to be corresponding to spoofing comprises:

using a neural network to process the to-be-processed image to output the probability of each pixel point of the to-be-processed image to be corresponding to spoofing,

wherein the neural network is obtained by being trained based on sample data having pixel-level labels.

15. A computer-readable storage medium, wherein the computer-readable storage medium is configured to store a computer program, and the computer program enables a computer to perform the method according to any one of claims 1 to 12.

16. A computer program product, wherein the computer program product comprises a computer program, the computer program is configured to be executed by a processor, and the processor is configured to perform the method according to any one of claims 1 to 12.