

CLAIMS

1. A method for living object detection, comprising:

acquiring, by each of two cameras of a binocular photographing device, a respective image containing an object to be detected, to obtain a first image and a second image;

determining key point information in the first image and key point information in the second image;

determining, according to the key point information in the first image and the key point information in the second image, depth information corresponding to each of a plurality of key points on the object to be detected; and

determining, according to the depth information corresponding to each of the plurality of key points, a detection result indicating whether the object to be detected is a living object;

wherein determining, according to the depth information corresponding to each of the plurality of key points, the detection result indicating whether the object to be detected is a living object comprises:

inputting the depth information corresponding to each of the plurality of key points into a pre-trained support vector machine (SVM) classifier, to obtain a first output result that is output by the SVM classifier and indicates whether the plurality of key points belong to a same plane; and

in response to that the first output result indicates that the plurality of key points belong to the same plane, determining the detection result that the object to be detected is not a living object, otherwise determining the detection result that the object to be detected is a living object.

2. The method of claim 1, wherein before acquiring, by each of the two cameras of the binocular photographing device, the respective image containing the object to be detected, to obtain the first image and the second image, the method further comprises:

calibrating the binocular photographing device to obtain a calibration result, wherein

the calibration result comprises an internal parameter of each of the two cameras of the binocular photographing device and an external parameter between the two cameras of the binocular photographing device.

3. The method of claim 2, wherein after obtaining the first image and the second image, the method further comprises:

performing binocular correction on the first image and the second image according to the calibration result.

4. The method of claim 3, wherein determining the key point information in the first image and the key point information in the second image comprises:

inputting the first image and the second image into a pre-established key point detection model to obtain the key point information of the plurality of key points in the first image and the key point information of the plurality of key points in the second image respectively.

5. The method of claim 3 or 4, wherein determining, according to the key point information in the first image and the key point information in the second image, the depth information corresponding to each of the plurality of key points on the object to be detected comprises:

determining, according to the calibration result, an optical center distance value between the two cameras in the binocular photographing device and a focal length value corresponding to the binocular photographing device;

for each of the plurality of key points, determining a respective position difference value between a horizontal position in the first image and a horizontal position in the second image; and

for each of the plurality of key points, calculating a quotient of a product divided by the respective position difference value to obtain the depth information, wherein the product is obtained by multiplying the optical center distance value by the focal length value.

~~6. The method of any one of claims 1 to 5, wherein determining, according to the depth information corresponding to each of the plurality of key points, the detection result indicating whether the object to be detected is a living object comprises:~~

~~inputting the depth information corresponding to each of the plurality of key points into a pre-trained classifier, to obtain a first output result that is output by the classifier and indicates whether the plurality of key points belong to a same plane; and~~

~~in response to that the first output result indicates that the plurality of key points belong to the same plane, determining the detection result that the object to be detected is not a living object, otherwise determining the detection result that the object to be detected is a living object.~~

~~76. The method of claim 61, wherein after obtaining the first output result that is output by the vector machineSVM classifier and indicates whether the plurality of key points belong to the same plane, the method further comprises:~~

~~in response to that the first output result indicates that the plurality of key points do not belong to the same plane, inputting the first image and the second image into a pre-established living object detection model to obtain a second output result output by the living object detection model; and~~

~~determining, according to the second output result, the detection result indicating whether the object to be detected is a living object.~~

~~87. The method of any one of claims 1 to 76, wherein the object to be detected comprises a face, and the key point information comprises key point information of the face.~~

~~98. A device for living object detection, comprising:~~

~~an image acquisition module, configured to acquire, by each of two cameras of a binocular photographing device, a respective image containing an object to be detected, to obtain a first image and a second image;~~

~~a first determination module, configured to determine key point information in the first image and key point information in the second image;~~

a second determination module, configured to determine, according to the key point information in the first image and the key point information in the second image, depth information corresponding to each of a plurality of key points on the object to be detected; and

a third determination module, configured to determine, according to the depth information corresponding to each of the plurality of key points, a detection result indicating whether the object to be detected is a living object,

wherein the third determination module is further configured to inputting the depth information corresponding to each of the plurality of key points into a pre-trained support vector machine (SVM) classifier, to obtain a first output result that is output by the SVM classifier and indicates whether the plurality of key points belong to a same plane; and

in response to that the first output result indicates that the plurality of key points belong to the same plane, determining the detection result that the object to be detected is not a living object, otherwise determining the detection result that the object to be detected is a living object.

~~109~~. The device of claim ~~98~~, further comprising:

a calibration module, configured to calibrate the binocular photographing device to obtain a calibration result, wherein the calibration result comprises an internal parameter of each of the two cameras of the binocular photographing device and an external parameter between the two cameras of the binocular photographing device.

~~110~~. The device of claim ~~109~~, further comprising:

a correction module, configured to perform binocular correction on the first image and the second image according to the calibration result.

~~1211~~. The device of claim ~~110~~, wherein the first determination module comprises:

a first determination submodule, configured to input the first image and the second image into a pre-established key point detection model to obtain the key point information of the plurality of key points in the first image and the key point information of the plurality of

key points in the second image respectively.

~~13~~12. The device of claim 10 or 11~~or 12~~, wherein the second determination module comprises:

a second determination submodule, configured to determine, according to the calibration result, an optical center distance value between the two cameras in the binocular photographing device and a focal length value corresponding to the binocular photographing device;

a third determination submodule, configured to: for each of the plurality of key points, determine a respective position difference value between a horizontal position in the first image and a horizontal position in the second image; and

a fourth determination submodule, configured to: for each of the plurality of key points, calculate a quotient of a product divided by the respective position difference value to obtain the depth information, wherein the product is obtained by multiplying the optical center distance value by the focal length value.

~~14. The device of any one of claims 9 to 13, wherein the third determination module comprises:~~

~~a fifth determination submodule, configured to input the depth information corresponding to each of the plurality of key points into a pre-trained classifier, to obtain a first output result that is output by the classifier and indicates whether the plurality of key points belong to a same plane; and~~

~~a sixth determination submodule, configured to: in response to that the first output result indicates that the plurality of key points belong to the same plane, determining the detection result that the object to be detected is not a living object, otherwise determining the detection result that the object to be detected is a living object.~~

~~15~~13. The device of claim ~~14~~8, further comprising:

a fourth determination module, configured to: in response to that the first output result indicates that the plurality of key points do not belong to the same plane, inputting the first

image and the second image into a pre-established living object detection model to obtain a second output result output by the living object detection model; and

a fifth determination module, configured to determine, according to the second output result, the detection result indicating whether the object to be detected is a living object.

~~16~~14. The device of any one of claims ~~9 to 15~~8 to 13, wherein the object to be detected comprises a face, and the key point information comprises key point information of the face.

~~17~~15. A computer-readable storage medium having a computer program stored thereon, wherein the computer program, when being executed by a processor, implements the method for living object detection of any one of claims 1 to ~~8~~7.

~~18~~16. A device for living object detection, comprising:

a processor; and

a memory configured to store instructions executable for the processor;

wherein the processor is configured to call the executable instructions stored in the memory to implement the method for living object detection of any one of claims 1 to ~~8~~7.

~~19~~17. A computer program, comprising a computer readable code which, when running in an electronic device, causes a processor in the electronic device to perform the method of any one of claims 1 to ~~8~~7.