CLAIMS

1. A liveness detection method, comprising:

periodically displaying a plurality of preset images, comprising displaying, in each period, the preset images of the plurality of preset images in a specific order;

continuously capturing face images of a user looking at the periodically displayed preset images, the continuously captured face images of the user forming a plurality of face images;

for each of the plurality of face images, determining an eye image of the user based on the face image; and performing liveness detection on the user based on the plurality of preset images and a plurality of to-be-verified images included in the plurality of eye images of the plurality of face images, wherein each to-be-verified image of the plurality of to-be-verified images is formed by reflection of a corresponding displayed preset image of the plurality of preset images in an eye of the user, wherein the performing liveness detection on the user based on the plurality of preset images and the plurality of to-be-verified images comprises:

extracting the plurality of to-be-verified images from the plurality of eye images,

comparing the plurality of to-be-verified images with the plurality of preset images,

determining, through comparison of the plurality of to-be-verified images with the plurality of preset images, a quantity of designated preset images among the plurality of preset images, wherein the designated preset images are the preset images of the plurality of preset images which match at least a to-be-verified image in the plurality of to-be-verified images,

determining a ratio of the quantity of designated preset images to the total quantity of preset images in the plurality of preset images,

if it is determined that the ratio reaches a set ratio, determining that the plurality of face images are face images of a living body, and

if it is determined that the ratio does not reach the set ratio, determining that the plurality of face images are face images of a non-living body.

2. The method according to claim 1, wherein the determining, for each of the plurality of face images, an eye image of the user based on the face image comprises:

determining whether the face image meets a preset condition; and

if it is determined that the face image meets the preset condition, extracting the eye image of the user from the face image.

3. The method according to claim 1, wherein the plurality of preset images comprises

different preset images having different characters each characterized by respective characteristic information, wherein the different preset images comprise a first preset image having a first character and the plurality of to-be-verified images comprise a second to-be-verified image from a second face image captured during display of the first preset image, the second to-be-verified image comprising a second character;

wherein comparing the plurality of to-be-verified images with the plurality of preset images comprises:

comparing the second to-be-verified image with the first preset image by comparing characteristic information of the first character in the first preset image and characteristic information of the second character in the second to-be-verified image, comprising comparing the size of the first character in the first preset image with the size of the second character in the second to-be-verified image, comparing the color of the first character in the first preset image with the color of the second character in the second to-be-verified image, or comparing the location of the first character in the first preset image with the location of the second character in the second to-be-verified image.

4. The method according to claim 1, wherein the plurality of preset images comprises different preset images having different patterns each characterized by respective characteristic information, wherein the different preset images comprise a first preset image having a first pattern and the plurality of to-be-verified images comprise a second to-be-verified image from a second face image captured during display of the first preset image, the second to-be-verified image comprising a second pattern; and

wherein comparing the plurality of to-be-verified images with the plurality of preset images comprises:

comparing the second to-be-verified image with the first preset image by comparing characteristic information of the first pattern in the first preset image and characteristic information of the second pattern in the second to-be-verified image, comprising comparing the shape of the first pattern in the first preset image with the shape of the second pattern in the second to-be-verified image, comparing the size of the first pattern in the first preset image with the size of the second pattern in the second to-be-verified image, comparing the color of the first pattern in the first preset image with the color of the second pattern in the second to-be-verified image, or comparing the location of the first pattern in the first preset image with the location of the second pattern in the second to-be-verified image.

5. A liveness detection apparatus comprising a display module and a preset image acquisition apparatus and configured to carry out the method of any one of claims 1 to 4.

6. A liveness detection device, comprising one or more memories and processors, wherein the one or more memories storing a program configured to cause the one or more processors to execute the following steps:

periodically displaying a plurality of preset images, comprising displaying, in each period, the preset images of the plurality of preset images in a specific order;

continuously capturing face images of a user looking at the periodically displayed preset images, the continuously captured face images of the user a plurality of face images;

for each of the plurality of face images, determining an eye image of the user based on the face image; and

performing liveness detection on the user based on the plurality of preset images and a plurality of to-be-verified images included in the plurality of eye images of the plurality of face images, wherein each to-be-verified image of the plurality of to-be-verified images is formed by reflection of a corresponding displayed preset image of the plurality of preset images in an eye of the user, wherein the performing liveness detection on the user based on the plurality of preset images and the plurality of to-be-verified images comprises:

extracting the plurality of to-be-verified images from the plurality of eye images,

comparing the plurality of to-be-verified images with the plurality of preset images,

determining, through comparison of the plurality of to-be-verified images with the plurality of preset images, a quantity of designated preset images among the plurality of preset images, wherein the designated preset images are the preset images of the plurality of preset images which match at least a to-be-verified image in the plurality of to-be-verified images,

determining a ratio of the quantity of designated preset images to the total quantity of preset images in the plurality of preset images,

if it is determined that the ratio reaches a set ratio, determining that the plurality of face images are face images of a living body, and

if it is determined that the ratio does not reach the set ratio, determining that the plurality of face images are face images of a non-living body

.

7. A computer program product comprising instructions, which, when executed by a liveness detection device according to claim 5, cause the liveness detection device to perform the method according to any one of claims 1 to 4.