CLAIMS

1. A face image processing method, comprising:

performing face detection on an image to be processed, and obtaining at least one face region image comprised in the image to be processed and face attribute information in the at least one face region image; and

for the at least one face region image, processing, at least according to the face attribute information in the face region image, an image corresponding to a first region in the face region image and/or an image corresponding to a second region in the face region image, wherein the first region is a skin region, and the second region comprises at least a non-skin region.

2. The method according to claim 1, wherein

the method further comprises: obtaining face key-point information in the at least one face region image;

the for the at least one face region image, processing , at least according to the face attribute information in the face region image, an image corresponding to a first region in the face region image and/or an image corresponding to a second region in the face region image comprises: for the at least one face region image, processing, according to the face attribute information and the face key-point information in the face region image, the image corresponding to the first region in the face region image and/or the image corresponding to the second region in the face region image.

3. The method according to either claim 1 or 2, wherein before the processing,

according to the face attribute information in the face region image, an image corresponding to a first region in the face region image and/or an image corresponding to a second region in the face region image at least, the method further comprises:

determining, according to user input information, the image corresponding to the first region in the face region image and/or the image corresponding to the second region in the face region image.

4. The method according to any one of claims 1 to 3, wherein the face attribute information comprises at least one of the following:

gender information, race information, age information, facial movement information, facial attachment information, or facial angle information,

wherein the facial movement information comprises at least one of the following: eye close information or mouth open information; and/or,

the facial attachment information comprises at least one of the following: information on whether a beard is present, information on whether a mask is worn, or information on whether glasses are worn; and/or,

the facial angle information comprises at least one of the following: facial horizontal angle information, facial rotation angle information, or facial pitch angle information;

wherein the processing an image corresponding to a first region in the face region image and/or an image corresponding to a second region in the face region image comprises at least one of facial whitening, facial ruddy, face-lifting, eye enlargement, eye enhancement, eye size correction, facial skin grinding, tooth whitening, or facial enhancement.

5. The method according to any one of claims 1 to 4, wherein the processing, at least according to the face attribute information in the face region image, an image corresponding to a first region in the face region image and/or an image corresponding to a second region in the face region image comprises:

determining a facial processing parameter corresponding to the face attribute information in the face region image; and

processing, at least according to the facial processing parameter, the image corresponding to the first region in the face region image and/or the image corresponding to the second region in the face region image.

6. The method according to claim 5, wherein the determining a facial processing parameter corresponding to the face attribute information in the face region image comprises:

if the face attribute information comprises the gender information, determining a facial processing parameter corresponding to the gender information, wherein a beauty processing intensity in facial processing parameters corresponding to male is lower than a beauty processing intensity in facial processing parameters corresponding to female; and/or

responsive to the face attribute information comprising the race information, determining a facial processing parameter of a tone corresponding to a skin color race of the face region image indicated by the race information in the face attribute information, wherein different skin color races correspond to facial processing parameters of different

tones; and/or

responsive to the face attribute information comprising the facial movement information, determining a processing parameter of a facial specific part corresponding to the facial movement information; and/or

responsive to the face attribute information comprising the face attachment information, determining the face processing parameter according to the face attachment information, wherein the determined facial processing parameter fails to comprise a processing parameter of the facial specific part occluded by the facial attachment in the facial region image; and/or

responsive to the face attribute information comprising the facial angle information, determining a facial processing parameter corresponding to a face angle of the face region image indicated by the facial angle information, wherein different face angles correspond to different facial processing parameters.

7. The method according to claim 6, wherein the beauty processing intensity comprises at least one of the following: whitening intensity, ruddy intensity, skin grinding intensity, or face-lift proportion.

8. The method according to claim 6, wherein the determining a processing parameter of a facial specific part corresponding to the facial movement information comprises: if the facial movement information comprises the mouth open information, determining a whitening processing parameter of teeth.

9. The method according to claim 6, wherein if the facial attachment information indicates the presence of worn glasses in the face region image, the processing parameter of the facial specific part occluded by the facial attachment comprises at least one of the following: an eye enlargement processing parameter, an eye enhancement processing parameter, or an eye size correction parameter.

10. The method according to any one of claims 2 to 9, wherein the processing, according to the face attribute information and the face key-point information in the face region image, an image corresponding to a first region in the face region image and/or an image corresponding to a second region in the face region image comprises:

obtaining a preset standard face template, wherein the standard face template comprises standard face key-point information;

performing, according to the face key-point information in the face region image and the standard face key-point information, matching deformation on the standard face template to obtain a deformed standard face template; and

processing, at least according to the face attribute information in the face region image and the deformed standard face template, the image corresponding to the first region and/or the image corresponding to the second region;

wherein the obtaining a preset standard face template comprises:

determining a standard face template required for current image processing from at least two different standard face templates comprised in a preset standard face template set.

11. The method according to claim 10, wherein the standard face template further comprises a first preset region for indicating a skin region in a standard face, and/or a second preset region for indicating a non-skin region in the standard face;

the processing, at least according to the face attribute information in the face region image and the deformed standard face template, the image corresponding to the first region and/or the image corresponding to the second region comprises:

determining, at least according to the first preset region in the deformed standard face template and/or the second preset region in the deformed standard face template, the first region in the face region image and/or the second region in the face region image; and

processing, according to the face attribute information in the face region image and the determined first region in the face region image and/or the determined second region in the face region image, the image corresponding to the first region and/or the image corresponding to the second region.

12. The method according to claim 11, wherein the determining, at least according to the first preset region in the deformed standard face template and/or the second preset region in the deformed standard face template, the first region in the face region image and/or the second region in the face region image comprises:

determining a region in the face region image corresponding to the first preset region in the deformed standard face template as a first initial region;

screening pixels for indicating non-skin in an image corresponding to the first initial region;

determining a region with the pixels for indicating non-skin screened in the first initial

region as the first region; and

determining a region in the face region image corresponding to the second preset region in the deformed standard face template and a portion screened from the first initial region as the second region.

13. The method according to any one of claims 2 to 9, wherein the processing, according to the face attribute information and the face key-point information in the face region image, an image corresponding to a first region and/or an image corresponding to a second region in the face region image comprises:

obtaining a preset standard face template, wherein the standard face template comprises standard face key-point information;

performing, according to the face key-point information in the face region image and the standard face template, deformation on the face region image to obtain a deformed face region image; and

processing, according to the face attribute information, the original face region image, and the deformed face region image, the image corresponding to the first region and/or the image corresponding to the second region;

wherein the obtaining a preset standard face template comprises:

determining a standard face template required for current image processing from at least two different standard face templates comprised in a preset standard face template set.

14. The method according to claim 4, wherein the processing an image corresponding to a first region in the face region image and/or an image corresponding to a second region

in the face region image comprises:

performing at least one of facial whitening, facial ruddy, or facial skin grinding on the image corresponding to the first region in the face region image and/or the image corresponding to the second region in the face region image; and

performing smooth processing on the processed face region image.

15. The method according to any one of claims 1 to 14, wherein the performing face detection on an image to be processed comprises: performing face detection on the image to be processed by means of a pre-trained neural network;

wherein training the neural network comprises:

obtaining, by performing at least information preserving scrambling processing on an original sample image comprising face key-point annotation information, a scrambled sample image and image information processed by the information preserving scrambling processing;

detecting the original sample image and the scrambled sample image based on the neural network;

obtaining first prediction information for a face key-point in the original sample image and second prediction information for a face key-point in the scrambled sample image;

determining a first difference between the first prediction information and the annotation information, a second difference between the first prediction information and the second prediction information, and a third difference between the second difference and the image information processed by the information preserving scrambling processing; and

adjusting, according to the first difference and the third difference, network parameters of

the neural network.

16. The method according to claim 15, wherein the performing at least information preserving scrambling processing on an original sample image comprising face key-point annotation information comprises:

performing information preserving scrambling processing and information non-preserving scrambling processing on the original sample image comprising the face key-point annotation information, wherein the information preserving scrambling processing comprises at least one of the following: affine transformation processing, translation processing, scaling processing, or rotation processing.

17. The method according to either claim 15 or 16, wherein the determining a first difference between the first prediction information and the annotation information comprises:

determining, by using a first loss function, the first difference between the first prediction information and the face key-point annotation information in the original sample image, wherein the first loss function is used for measuring the accuracy of a face key-point prediction result in the original sample image.

18. The method according to any one of claims 15 to 17, wherein the determining a second difference between the first prediction information and the second prediction information comprises: determining, by using a second loss function, the second difference between the first prediction information and the second prediction information, wherein the second loss function is used for measuring a difference between the face key-point prediction result in the original sample image and the face key-point prediction result in the

scrambled sample image.

19. An electronic device, comprising:

a processor; and

a memory for storing instructions executable by the processor;

wherein execution of the instructions by the processor causes the processor to perform operations corresponding to the face image processing method according to any one of claims 1 to 18.

20. A computer readable storage medium, configured to store computer-readable instructions, wherein execution of the instructions by the processor causes the processor to perform operations corresponding to the face image processing method according to any one of claim1 to 18.