

CLAIMS

1. A method of creating a face model, comprising:

obtaining, by performing key point detection on a current face image, at least one key point feature of the current face image;

5 obtaining a target bone parameter set matching the current face image from a reference model database according to the at least one key point feature; and

creating a virtual three-dimensional face model corresponding to the current face image according to the target bone parameter set and a standard three-dimensional face model;

10 wherein the reference model database comprises the correspondence between a reference key point combination representing an image style of each partial face region and a reference bone parameter set, reference key point feature data of each face image sample, and a reference bone parameter set of each reference face model; the reference bone parameter set is configured to render a reference face model of a face image
15 sample, and the reference face model is a virtual three-dimensional face model created for each face image sample.

2. The method according to claim 1, wherein

the method further comprises: determining a reference model database according to a preset number of face image samples and the standard three-dimensional face
20 model, wherein the reference model database comprises at least one reference key point feature determined from the preset number of face image samples and at least one reference bone parameter set, each of the at least one reference key point feature corresponds to one of the at least one reference bone parameter set.

3. The method according to claim 2, wherein determining the reference model
25 database according to the preset number of face image samples and the standard three-

dimensional face model comprises:

obtaining a face image sample set comprising the preset number of face image samples, wherein the face image sample set comprises a plurality of image styles representing at least one partial face region;

- 5 creating, for each of the face image samples, a reference face model corresponding to the face image sample according to the standard three-dimensional face model, wherein the reference face model comprises the at least one reference bone parameter set corresponding to the face image sample; and

 determining the reference model database according to the reference face model
10 corresponding to each of the face image samples.

4. The method according to claim 3, wherein creating the reference face model corresponding to the face image sample according to the standard three-dimensional face model comprises:

 obtaining, by performing normalization processing on the face image sample, a
15 preprocessed face image conforming to a head pose and an image size of a standard face image, wherein the standard face image is a two-dimensional face image corresponding to the standard three-dimensional face model;

 obtaining, by performing key point detection on the preprocessed face image, a
reference key point set of the face image sample, wherein the reference key point set
20 comprises reference key point combinations representing all the partial face regions in the face image sample; and

 adjusting a corresponding bone parameter set in the standard three-dimensional face model based on each of the reference key point combinations, so as to create the reference face model corresponding to the face image sample.

- 25 5. The method according to any one of claims 1 to 4, wherein obtaining, by

performing key point detection on the current face image, at least one key point feature of the current face image comprises:

obtaining, by performing key point detection on the current face image, position coordinates of a present number of key points; and

5 determining, according to the position coordinates of the present number of key points, a key point feature representing at least one partial face region in the current face image.

6. The method according to claim 5, wherein determining, according to the position coordinates of the present number of key points, the key point feature
10 representing at least one partial face region in the current face image comprises:

determining, based on the position coordinates of the present number of key points, a key point coordinate combination representing a first partial face region in the current image as the key point feature representing the first partial face region, wherein the first partial face region is one of the at least one partial face region; and/or

15 fitting, according to the key point coordinate combination representing the first partial face region, a feature curve representing the first partial face region as the key point feature representing the first partial face region.

7. The method according to any one of claims 2 to 6, wherein obtaining the target bone parameter set matching the current face image from the reference model database
20 according to the at least one key point feature comprises:

determining, for each partial face region in the current face image, a reference key point feature in the reference model database matching a key point feature of the partial face region as a target reference key point feature of the partial face region; and

determining the target bone parameter set of the current face image according to
25 the reference bone parameter set corresponding to the target reference key point feature

of each the partial face region in the current face image.

8. The method according to claim 7, wherein determining the reference key point feature in the reference model database matching the key point feature of the partial face region as the target reference key point feature of the partial face region comprises:

5 determining a similarity between the key point feature of the partial face region and a corresponding reference key point feature in the reference model database; and

 determining the reference key point feature with a highest similarity as the target reference key point feature of the partial face region.

9. The method according to claim 8, wherein determining the similarity between
10 the key point feature of the partial face region and the corresponding reference key point feature in the reference model database comprises:

 fitting a feature curve representing the partial face region according to the key point coordinate combination of the partial face region; and

 determining the similarity between the key point feature of the partial face region
15 and the corresponding reference key point feature in the reference model database according to a distance between the feature curve and a corresponding reference feature curve in the reference model database.

10. The method according to claim 8 or 9, wherein when the partial face region comprises at least two sub-regions, determining the similarity between the key point
20 feature of the partial face region and the corresponding reference key point feature of one face image sample in the reference model database comprises:

 determining, for each of the sub-regions in the partial face region, the similarity between the key point feature of the sub-region and the reference key point feature of a corresponding sub-region of the face image sample in the reference model database, so
25 as to obtain a partial similarity corresponding to the sub-region; and

determining, according to the partial similarity corresponding to each of the sub-regions, an overall similarity between the partial face region and a corresponding partial face region in the face image sample as the similarity between the key point feature of the partial face region and the corresponding reference key point feature of the face image sample in the reference model database.

11. An apparatus of creating a face model, comprising:

a key point detection module, configured to obtain, by performing key point detection on a current face image, at least one key point feature of the current face image;

10 a parameter matching module, configured to obtain a target bone parameter set matching the current face image from a reference model database according to the at least one key point feature; and

a model creation module, configured to create a virtual three-dimensional face model corresponding to the current face image according to the target bone parameter set and a standard three-dimensional face model;

15 wherein the reference model database comprises the correspondence between a reference key point combination representing an image style of each partial face region and a reference bone parameter set, reference key point feature data of each face image sample, and a reference bone parameter set of each reference face model; the reference bone parameter set is configured to render a reference face model of a face image sample, and the reference face model is a virtual three-dimensional face model created for each face image sample.

12. The apparatus according to claim 11, wherein

the apparatus further comprises: a database creation module, configured to determine a reference model database according to a preset number of face image

samples and the standard three-dimensional face model, wherein the reference model database comprises at least one reference key point feature determined from the preset number of face image samples and at least one reference bone parameter set, each of the at least one reference key point feature corresponds to one of the at least one reference bone parameter set.

13. The apparatus according to claim 12, wherein the database creation module comprises:

a sample obtaining sub-module, configured to obtain a face image sample set comprising the preset number of face image samples, wherein the face image sample set comprises a plurality of image styles representing at least one partial face region;

a reference model creation sub-module, configured to create, for each of the face image samples, a reference face model corresponding to the face image sample according to the standard three-dimensional face model, wherein the reference face model comprises the at least one reference bone parameter set corresponding to the face image sample; and

a database determination sub-module, configured to determine the reference model database according to the reference face model corresponding to each of the face image samples.

14. The apparatus according to claim 13, wherein the reference model creation sub-module comprises:

an image preprocessing unit, configured to obtain, by performing normalization processing on one of the face image samples, a preprocessed face image conforming to a head pose and an image size of a standard face image, wherein the standard face image is a two-dimensional face image corresponding to the standard three-dimensional face model;

a key point detection unit, configured to obtain, by performing key point detection on the preprocessed face image, a reference key point set of the face image sample, wherein the reference key point set comprises reference key point combinations representing all the partial face regions in the face image sample; and

5 a reference model creation unit, configured to adjust a corresponding bone parameter set in the standard three-dimensional face model based on each of the reference key point combinations, so as to create the reference face model corresponding to the face image sample.

15 15. The apparatus according to any one of claims 11 to 14, wherein the key point detection module comprises:

a key point localization sub-module, configured to obtain, by performing key point detection on the current face image, position coordinates of a present number of key points; and

15 a key point feature determination sub-module, configured to determine, according to the position coordinates of the present number of key points, a key point feature representing at least one partial face region in the current face image.

16. The apparatus according to claim 15, wherein the key point feature determination sub-module comprises:

20 a coordinate combination determination unit, configured to determine, based on the position coordinates of the present number of key points, a key point coordinate combination representing a first partial face region in the current image as the key point feature representing the first partial face region, wherein the first partial face region is one of the at least one partial face region; and/or

25 a feature curve determination unit, configured to fit, according to the key point coordinate combination representing the first partial face region, a feature curve

representing the first partial face region as the key point feature representing the first partial face region.

17. The apparatus according to any one of claims 12 to 16, wherein the parameter matching module comprises:

5 a feature matching sub-module, configured to determine, for each partial face region in the current face image, a reference key point feature in the reference model database matching a key point feature of the partial face region as a target reference key point feature of the partial face region; and

 a bone parameter determination sub-module, configured to determine the target
10 bone parameter set of the current face image according to the reference bone parameter set corresponding to the target reference key point feature of each the partial face region in the current face image.

18. The apparatus according to claim 17, wherein the feature matching sub-module comprises:

15 a similarity determination unit, configured to determine a similarity between the key point feature of the partial face region and a corresponding reference key point feature in the reference model database; and

 a target feature determination unit, configured to determine the reference key point
20 feature with a highest similarity as the target reference key point feature of the partial face region.

19. A computer-readable storage medium storing a computer program, wherein the computer program is executed by a processor to cause the processor to implement a method according to any one of claims 1 to 10.

20. An electronic device, comprising:

25 a memory;

a processor; and

a computer program stored on the memory and executable by the processor,
wherein the program is executed by the processor to cause the processor to implement
a method according to any one of claims 1 to 10.