

CLAIMS

1. A data processing method, comprising:

converting, according to actual depth values of key points of a target in an image and reference depth values, first two-dimensional (2D) coordinates of the key points into second 2D coordinates, wherein the second 2D coordinates and the reference depth values form first three-dimensional (3D) features of the key points; and

obtaining, based on the first 3D features, a 3D posture of the target,

wherein before the converting, according to actual depth values of key points of a target in an image and reference depth values, first 2D coordinates of the key points into second 2D coordinates, the method further comprises:

obtaining the first 2D coordinates according to second 3D features of the key points and an optical center position corresponding to the image, the second 3D features comprising: third 2D coordinates obtained based on a 2D image and actual depth values obtained based on a depth image.

2. The method of claim 1, wherein

converting, according to the actual depth values of the key points of the target in the image and the reference depth values, the first 2D coordinates of the key points into the second 2D coordinates comprises:

obtaining the second 2D coordinates according to the first 2D coordinates and ratios of the actual depth values to the reference depth values.

3. The method of claim 2, wherein

obtaining the second 2D coordinates according to the first 2D coordinates and the ratios of the actual depth values to the reference depth values comprises:

determining the second 2D coordinates by using the following functional relationship:

$$X2 = (X1*d)/D,$$

$$Y2 = (Y1*d)/D,$$

where, X2 is a coordinate value of a second 2D coordinate in a first direction, and X1 is a coordinate value of a first 2D coordinate in the first direction;

Y2 is a coordinate value of the second 2D coordinate in a second direction, and Y1 is a coordinate value of the first 2D coordinate in the second direction, the second direction being perpendicular to the first direction; and

d is an actual depth value, and D is a reference depth value.

4. The method of claim 1, wherein

obtaining the first 2D coordinates according to the second 3D features of the key points and the optical center position corresponding to the image comprises:

moving the second 3D features of the key points, such that a 3D feature of a reference point in the key points is translated to the optical center position to obtain third 3D features of the key points; and

projecting the third 3D features to a 2D imaging plane to obtain the first 2D coordinates.

5. The method of claim 4, wherein

if the target is a body skeleton, the 3D feature of the reference point is determined based on second 3D features of two crotch key points in the key points.

6. The method of claim 4, wherein obtaining, based on the first 3D features, the 3D posture of the target comprises:

subtracting a depth value of the reference point from depth values corresponding to the second 2D coordinates of the key points to obtain fourth 2D coordinates and depth values corresponding to the fourth 2D coordinates;

performing normalization processing on the fourth 2D coordinates and the depth values corresponding to the fourth 2D coordinates to obtain normalized fourth 2D coordinates and depth values corresponding to the normalized fourth 2D coordinates; and

processing the normalized fourth 2D coordinates and the depth values corresponding to the normalized fourth 2D coordinates by using a deep learning module to obtain the 3D posture of the target.

7. The method of claim 6, wherein

performing the normalization processing on the fourth 2D coordinates and the depth values corresponding to the fourth 2D coordinate to obtain the normalized fourth 2D coordinates and the depth values corresponding to the normalized fourth 2D coordinates comprises:

obtaining, based on the fourth 2D coordinates and the depth values corresponding to the fourth 2D coordinates, a coordinate mean and a variance of

coordinates of the key points; and

obtaining the normalized fourth 2D coordinates according to the mean and the variance as well as the fourth 2D coordinates and the depth values corresponding to the fourth 2D coordinates.

8. The method of any one of claims 1 to 6, further comprising:

performing, based on the actual depth values, an iterative operation of projecting the 3D posture to a 2D plane to obtain fifth 2D coordinates having a minimum distance with the third 2D coordinates; and

obtaining a rotation parameter and a translation parameter of the target according to the fifth 2D coordinates and the first 3D features.

9. A data processing apparatus, comprising:

a first conversion module, configured to convert, according to actual depth values of key points of a target in an image and reference depth values, first two-dimensional (2D) coordinates of the key points into second 2D coordinates, wherein the second 2D coordinates and the reference depth values form first three-dimensional 3D features of the key points; and

a first obtaining module, configured to obtain, based on the first 3D features, a 3D posture of the target,

wherein the apparatus further comprises:

a second conversion module, configured to obtain the first 2D coordinates according to second 3D features of the key points and an optical center position corresponding to the image, the second 3D features comprising: third 2D coordinates

obtained based on a 2D image and actual depth values obtained based on a depth image.

10. The apparatus of claim 9, wherein

the first conversion module is configured to obtain the second 2D coordinates according to the first 2D coordinate and ratios of the actual depth values to the reference depth values.

11. The apparatus of claim 10, wherein

the first conversion module is configured to determine the second 2D coordinates by using the following functional relationship:

$$X2=(X1*d)/D,$$

$$Y2=(Y1*d)/D,$$

where, X2 is a coordinate value of a second 2D coordinate in a first direction, and X1 is a coordinate value of a first 2D coordinate in the first direction;

Y2 is a coordinate value of the second 2D coordinate in a second direction, and Y1 is a coordinate value of the first 2D coordinate in the second direction, the second direction being perpendicular to the first direction; and

d is an actual depth value, and D is a reference depth value.

12. The apparatus of claim 9, wherein

the second conversion module is configured to move the second 3D features of

the key points, such that a 3D feature of a reference point in the key points is translated to the optical center position to obtain third 3D features of the key points; and project the third 3D features to a 2D imaging plane to obtain an optical center position of the first 2D coordinates.

13. The apparatus of claim 12, wherein

if the target is a body skeleton, the 3D feature of the reference point is determined based on second 3D features of two crotch key points in the key points.

14. The apparatus of claim 12, wherein

the first obtaining module is configured to subtract a depth value of the reference point from depth values corresponding to the second 2D coordinates of the key points to obtain fourth 2D coordinates and depth values corresponding to the fourth 2D coordinates; perform normalization processing on the fourth 2D coordinates and the depth values corresponding to the fourth 2D coordinates to obtain normalized fourth 2D coordinates and depth values corresponding to the normalized fourth 2D coordinates; and process the normalized fourth 2D coordinates and the depth values corresponding to the normalized fourth 2D coordinates by using a deep learning module to obtain the 3D posture of the target.

15. The apparatus of claim 14, wherein

the first obtaining module is configured to obtain, based on the fourth 2D coordinates and the depth values corresponding to the fourth 2D coordinates, a mean and a variance of coordinates of the key points; and obtain the normalized fourth 2D coordinates according to the mean and the variance as well as the fourth 2D

coordinates and the depth values corresponding to the fourth 2D coordinates.

16. The apparatus of any one of claims 9 to 15, further comprising:

an iteration module, configured to perform, based on the actual depth values, an iterative operation of projecting the 3D posture to a 2D plane to obtain fifth 2D coordinates having a minimum distance with the third 2D coordinates; and

a second obtaining module, configured to obtain a rotation parameter and a translation parameter of the target according to the fifth 2D coordinates and the first 3D features.

17. A computer storage medium, having computer executable codes stored thereon, wherein the computer executable codes, when being executed, cause to implement the method of any one of claims 1 to 8.

18. An electronic device, comprising:

a memory, configured to store information; and

a processor, connected to the memory and configured to implement, by executing computer executable instructions stored on the memory, the method of any one of claims 1 to 8.