

WHAT IS CLAIMED IS:

1. A method for image processing, comprising:

acquiring image data comprising a target object, the target object comprising at least one sub-object; and

acquiring target image data by processing the image data based on a fully convolutional neural network, the target image data comprising at least a center point of each sub-object in the target object.

2. The method of claim 1, wherein acquiring the target image data by processing the image data based on the fully convolutional neural network comprises:

acquiring the target image data by processing the image data based on a first fully convolutional neural network, the target image data comprising the center point of the each sub-object in the target object.

3. The method of claim 1, wherein acquiring the target image data by processing the image data based on the fully convolutional neural network comprises:

acquiring first image data by processing the image data based on a first fully convolutional neural network, the first image data comprising the center point of the each sub-object in the target object; and

acquiring second image data by processing the image data and the first image data based on a second fully convolutional neural network, the second image data being for indicating a category of the each sub-object in the target object.

4. The method of claim 2 or 3, wherein processing the image data based on the first fully convolutional neural network comprises:

acquiring first displacement data corresponding to a pixel in the image data by processing the image data based on the first fully convolutional neural network, the first

displacement data representing a displacement between the pixel and a center point of a first sub-object closest to the pixel;

determining an initial location of the center point of the first sub-object closest to the pixel based on the first displacement data and location data of the pixel, the first sub-object being any sub-object in the at least one sub-object; and

acquiring initial locations of the center point of the first sub-object corresponding to at least some pixels in the image data; determining a count of occurrences of each of the initial locations; and determining the center point of the first sub-object based on an initial location with a maximal count.

5. The method of claim 4, further comprising: before determining the initial location of the center point of the first sub-object closest to the pixel based on the first displacement data and the location data of the pixel,

acquiring at least one first pixel by filtering at least one pixel in the image data based on a first displacement distance corresponding to the at least one pixel, a distance between the at least one first pixel and a center point of a first sub-object closest to the at least one pixel meeting a specified condition,

wherein determining the initial location of the center point of the first sub-object closest to the pixel based on the first displacement data and the location data of the pixel comprises:

determining the initial location of the center point of the first sub-object based on first displacement data corresponding to the at least one first pixel and location data of the at least one first pixel.

6. The method of claim 3, wherein acquiring the second image data by processing the image data and the first image data based on the second fully convolutional neural network comprises:

acquiring the target image data by merging the image data and the first image data;

acquiring a probability of a category of a sub-object to which a pixel in the target image data belongs by processing the target image data based on the second fully

convolutional neural network; determining a category of the sub-object corresponding to a maximal probability as the category of the sub-object to which the pixel belongs; and

acquiring the second image data based on the category of the sub-object to which the pixel in the target image data belongs.

7. The method of claim 6, wherein acquiring the probability of the category of the sub-object to which the pixel in the target image data belongs and determining the category of the sub-object corresponding to the maximal probability as the category of the sub-object to which the pixel belongs comprises:

acquiring a probability of a category of a sub-object to which a pixel belongs, the pixel corresponding to a center point of a second sub-object in the target image data, the second sub-object being any sub-object in the at least one sub-object; and

determining, as the category of the second sub-object, a category of a second sub-object corresponding to a maximal probability.

8. The method of claim 3, wherein acquiring the second image data by processing the image data and the first image data based on the second fully convolutional neural network comprises:

acquiring third image data by performing down-sampling on the image data; and

acquiring the second image data by processing the third image data and the first image data based on the second fully convolutional neural network.

9. The method of any one of claims 2 to 5, wherein the first fully convolutional neural network is trained by:

acquiring first sample image data comprising the target object, and first label data corresponding to the first sample image data, the first label data being for indicating the center point of the each sub-object in the target object in the first sample image data; and

training the first fully convolutional neural network according to the first sample image data and the first label data corresponding to the first sample image data.

10. The method of claim 9, wherein training the first fully convolutional neural network according to the first sample image data and the first label data corresponding to the first sample image data comprises:

acquiring initial image data by processing the first sample image data according to the first fully convolutional neural network, the initial image data comprising an initial center point of the each sub-object in the target object in the first sample image data; and

training the first fully convolutional neural network by determining a loss function based on the initial image data and the first label data and adjusting a parameter of the first fully convolutional neural network based on the loss function.

11. The method of claim 3, 6, or 7, wherein the second fully convolutional neural network is trained by:

acquiring first sample image data comprising the target object, second sample image data relating to the first sample image data, and second label data corresponding to the first sample image data, the second sample image data comprising the center point of the each sub-object in the target object in the first sample image data, the second label data being for indicating the category of the each sub-object in the target object in the first sample image data; and

training the second fully convolutional neural network based on the first sample image data, the second sample image data, and the second label data.

12. The method of claim 11, training the second fully convolutional neural network based on the first sample image data, the second sample image data, and the second label data comprises:

acquiring third sample image data by performing down-sampling on the first sample image data; and

training the second fully convolutional neural network based on the third sample image data, the second sample image data, and the second label data.

13. The method of any one of claims 1 to 12, wherein the target object comprises spine

bones, the spine bones comprising at least one vertebra.

14. A device for image processing, comprising an acquiring unit and an image processing unit,

wherein the acquiring unit is adapted to acquiring image data comprising a target object, the target object comprising at least one sub-object,

wherein the image processing unit is adapted to acquiring target image data by processing the image data based on a fully convolutional neural network, the target image data comprising at least a center point of each sub-object in the target object.

15. The device of claim 14, wherein the image processing unit is adapted to acquiring the target image data by processing the image data based on a first fully convolutional neural network, the target image data comprising the center point of the each sub-object in the target object.

16. The device of claim 14, wherein the image processing unit is adapted to:

acquiring first image data by processing the image data based on a first fully convolutional neural network, the first image data comprising the center point of the each sub-object in the target object; and

acquiring second image data by processing the image data and the first image data based on a second fully convolutional neural network, the second image data being for indicating a category of the each sub-object in the target object.

17. The device of any one of claims 14 to 16, wherein the target object comprises spine bones, the spine bones comprising at least one vertebra.

18. A computer-readable storage medium, having stored thereon a computer program which, when executed by a processor, implements steps of the method of any one of claims 1 to 13.

19. Electronic equipment, comprising memory, a processor, and a computer program stored on the memory and executable by the processor, wherein when executing the computer

program, the processor implements steps of the method of any one of claims 1 to 13.

20. A computer program, comprising a computer-readable code which, when executed in electronic equipment, allows a processor in the electronic equipment to implement the method of any one of claims 1 to 13.