

CLAIMS

1. An image processing method, comprising:

generating a feature map of a to-be-processed image by performing feature extraction on the image;

determining a feature weight corresponding to each of a plurality of feature points comprised in the feature map; and

obtaining a feature-enhanced feature map by separately transmitting feature information of each feature point to associated other feature points comprised in the feature map based on the corresponding feature weight.

2. The method according to claim 1, further comprising: performing scene analysis processing or object segmentation processing on the image based on the feature-enhanced feature map; and/or

performing robot navigation control or vehicle intelligent driving control based on a result of the scene analysis processing or a result of the object segmentation processing.

3. The method according to claim 1 or 2, wherein

the feature weight of the feature point comprised in the feature map comprises an inward reception weight and an outward transmission weight;

the inward reception weight indicates a weight used by a feature point to receive the feature information of another feature point comprised in the feature map, and

the outward transmission weight indicates a weight used by a feature point to send the feature information to another feature point comprised in the feature map.

4. The method according to claim 3, wherein determining the feature weight corresponding to each of the plurality of the feature points comprised in the feature map comprises:

obtaining a first weight vector with respect to inward reception weights of each of the plurality of the feature points by performing first branch processing on the feature map; and

obtaining a second weight vector with respect to outward transmission weights of each of the plurality of feature points by performing second branch processing on the feature map.

5. The method according to claim 4, wherein obtaining the first weight vector with respect

to the inward reception weights of each of the plurality of the feature points by performing the first branch processing on the feature map comprises:

- obtaining a first intermediate weight vector by processing the feature map through a neural network; and

- obtaining the first weight vector by removing invalid information in the first intermediate weight vector, wherein the invalid information indicates information in the first intermediate weight vector that has no impact on feature transmission or has an impact degree, for the feature transmission, less than a specified condition.

6. The method according to claim 5,

wherein obtaining the first intermediate weight vector by processing the feature map through the neural network comprises:

- for each feature point in the feature map,

- using the feature point as a first input point;

- using a surrounding location of the first input point as a first output point corresponding to the first input point, wherein the surrounding location comprises the plurality of the feature points in the feature map and a plurality of adjacent locations of the first input point in a spatial position; and

- obtaining a first transmission ratio vector between the first input point and the first output point corresponding to the first input point; and

- obtaining the first intermediate weight vector based on the first transmission ratio vector of each feature point; and/or

- wherein obtaining the first intermediate weight vector by processing the feature map through the neural network comprises:

- before obtaining the first intermediate weight vector by processing the feature map through the neural network, obtaining a first intermediate feature map by performing dimension reduction processing on the feature map through a convolutional layer; and

- obtaining the first intermediate weight vector by processing the dimension-reduced first intermediate feature map through the neural network.

7. The method according to claim 6, wherein obtaining the first weight vector by removing the invalid information in the first intermediate weight vector comprises:

identifying, from the first intermediate weight vector, a first transmission ratio vector whose information comprised in the first output point is null;

obtaining the inward reception weights of the feature map by removing, from the first intermediate weight vector, the first transmission ratio vector whose information comprised in the first output point is null, to obtain the inward reception weights of the feature map; and

determining the first weight vector based on the inward reception weights.

8. The method according to claim 7, wherein determining the first weight vector based on the inward reception weights comprises:

obtaining the first weight vector by arranging the inward reception weights based on the locations of the corresponding first output points.

9. The method according to any one of claims 4 to 8,

wherein obtaining the second weight vector with respect to the outward transmission weights of each of the plurality of the feature points by performing the second branch processing on the feature map comprises:

obtaining a second intermediate weight vector by processing the feature map through a neural network; and

obtaining the second weight vector by removing invalid information in the second intermediate weight vector, wherein the invalid information indicates information in the second intermediate weight vector that has no impact on feature transmission or has an impact degree, for the feature transmission, less than a specified condition; and/or

wherein obtaining the feature-enhanced feature map by separately transmitting feature information of each feature point to the associated other feature points comprised in the feature map based on the corresponding feature weight comprises:

obtaining a first feature vector based on the first weight vector and the feature map;

obtaining a second feature vector based on the second weight vector and the feature map; and

obtaining the feature-enhanced feature map based on the first feature vector, the second

feature vector, and the feature map.

10. The method according to claim 9, wherein obtaining the second intermediate vector by processing the feature map through the neural network comprises:

for each feature point in the feature map,

using the feature point as a second output point;

using a surrounding location of the second output point as a second input point corresponding to the second output point, wherein the surrounding location comprises the plurality of the feature points in the feature map and a plurality of adjacent locations of the second output point in a spatial position; and

obtaining a second transmission ratio vector between the second output point and the second input point corresponding to the second output point; and

obtaining the second intermediate weight vector based on the second transmission ratio vector of each feature point.

11. The method according to claim 10, wherein obtaining the second weight vector by removing the invalid information in the second intermediate weight vector comprises:

identifying, from the second intermediate weight vector, a second transmission ratio vector whose information comprised in the second output point is null;

obtaining the outward transmission weights of the feature map by removing, from the second intermediate weight vector, the second transmission ratio vector whose information comprised in the second output point is null; and

determining the second weight vector based on the outward transmission weights.

12. The method according to claim 11, wherein determining the second weight vector based on the outward transmission weights comprises:

obtaining the second weight vector by arranging the outward transmission weights based on the locations of the corresponding second input points.

13. The method according to any one of claims 9 to 12, wherein before obtaining the second intermediate weight vector by processing the feature map through the neural network, the method further comprises:

obtaining a second intermediate feature map by performing dimension reduction

processing on the feature map through a convolutional layer; and

obtaining the second intermediate weight vector by processing the feature map through the neural network comprises:

obtaining the second intermediate weight vector by processing the dimension-reduced second intermediate feature map through the neural network.

14. The method according to claim 13,

wherein obtaining the first feature vector based on the first weight vector and the feature map comprises:

obtaining the first feature vector by performing matrix multiplication processing on the first weight vector and the feature map; or

obtaining the first feature vector by performing matrix multiplication processing on the first weight vector and a first intermediate feature map obtained by performing dimension reduction processing on the feature map;

wherein obtaining the second feature vector based on the second weight vector and the feature map comprises:

obtaining the second feature vector by performing matrix multiplication processing on the second weight vector and the feature map; or

obtaining the second feature vector by performing matrix multiplication processing on the second weight vector and a second intermediate feature map obtained by performing dimension reduction processing on the feature map; and/or

wherein obtaining the feature-enhanced feature map based on the first feature vector, the second feature vector, and the feature map comprises:

obtaining a spliced feature vector by splicing the first feature vector and the second feature vector in a channel dimension; and

obtaining the feature-enhanced feature map by splicing the spliced feature vector and the feature map in the channel dimension.

15. The method according to claim 14, wherein before obtaining the feature-enhanced feature map by splicing the spliced feature vector and the feature map in the channel dimension, the method further comprises:

obtaining a processed spliced feature vector by performing feature projection processing on the spliced feature vector; and

wherein obtaining the feature-enhanced feature map by splicing the spliced feature vector and the feature map in the channel dimension comprises:

obtaining the feature-enhanced feature map by splicing the processed spliced feature vector and the feature map in the channel dimension.

16. The method according to any one of claims 2 to 15, wherein the method is implemented by using a feature extraction network and a feature enhancement network; and

before generating the feature map of the to-be-processed image by performing feature extraction on the image, the method further comprises:

training the feature enhancement network by using a sample image, or

training the feature extraction network and the feature enhancement network by using the sample image, wherein the sample image has an annotation processing result which comprises an annotated scene analysis result or an annotated object segmentation result.

17. The method according to claim 16,

wherein training the feature enhancement network by using the sample image comprises:

obtaining a prediction processing result by inputting the sample image into the feature extraction network and the feature enhancement network; and

training the feature enhancement network based on the prediction processing result and the annotation processing result; and/or

wherein training the feature extraction network and the feature enhancement network by using the sample image comprises:

obtaining a prediction processing result by inputting the sample image into the feature extraction network and the feature enhancement network;

obtaining a first loss based on the prediction processing result and the annotation processing result; and

training the feature extraction network and the feature enhancement network based on the first loss.

18. The method according to claim 17, further comprising:

determining an intermediate prediction processing result based on a feature map output by an intermediate layer in the feature extraction network;

obtaining a second loss based on the intermediate prediction processing result and the annotation processing result; and

adjusting parameters of the feature extraction network based on the second loss.

19. An electronic device, comprising:

a memory, configured to store executable instructions; and

a processor, configured to communicate with the memory to execute the executable instructions to complete operations of the image processing method according to any one of claims 1 to 18.

20. A computer storage medium, configured to store computer readable instructions, wherein when the instructions are executed, operations of the image processing method according to any one of claims 1 to 18 are performed.