

CLAIMS

1. A method for recognizing a remote sensing image, comprising:

performing resolution reduction processing on a remote sensing image to be recognized to obtain a remote sensing image with reduced resolution;

segmenting the remote sensing image with reduced resolution to obtain at least one remote sensing image block;

determining a remote sensing image block to be processed from the at least one remote sensing image block;

obtaining category probability information of pixels in the remote sensing image block to be processed through a neural network; and

determining a recognition result of the remote sensing image to be recognized according to the category probability information of the pixels in the remote sensing image block to be processed,

wherein performing resolution reduction processing on the remote sensing image to be recognized comprises:

performing resolution reduction processing on the remote sensing image to be recognized according to an unused reduction value in a reduction scale set.

2. The method of claim 1, wherein determining the recognition result of the remote sensing image to be recognized according to the category probability information of the pixels in the remote sensing image block to be processed comprises:

responsive to that the reduction scale set does not comprise any unused reduction value or determining that the at least one remote sensing image block does not comprise any remote sensing image block to be processed, determining the recognition result of the remote sensing image to be recognized according to the category probability information of the pixels in the

remote sensing image block to be processed.

3. The method of any one of claims 1 to 2, wherein the reduction scale set comprises at least two different reduction values, and a lower reduction value is used first compared with a higher reduction value.

4. The method of any one of claims 1-3, wherein determining the remote sensing image block to be processed from the at least one remote sensing image block comprises that:

under a condition that the resolution reduction processing is performed not for the first time,

a number of the at least one remote sensing image block to be processed is less than or equal to a number of remote sensing image blocks presently obtained by segmentation, and/or

an image resolution of the remote sensing image to be recognized obtained after the present resolution reduction processing is executed is higher than an image resolution obtained after previous resolution reduction processing is executed.

5. The method of claim 4, wherein under a condition that the resolution reduction processing is performed not for the first time, the remote sensing image block to be processed is determined from the at least one remote sensing image block according to present confidences of the pixels of the remote sensing image to be recognized.

6. The method of claim 5, wherein determining the remote sensing image block to be processed from the at least one remote sensing image block according to the present confidence of the pixel of the remote sensing image to be recognized comprises:

determining, according to present category probability information of at least one of a plurality of pixels in the remote sensing image to be recognized, a present confidence of the at

least one pixel;

statistically obtaining a number of pixels of which the present confidences reach a predetermined confidence in the at least one pixel in a region of the remote sensing image to be recognized that corresponds to each remote sensing image block; and

determining a remote sensing image block, of which the number of the pixels reaching the predetermined confidence does not meet a predetermined requirement, as the remote sensing image block to be processed.

7. The method of claim 6, wherein determining the remote sensing image block, of which the number of the pixels reaching the predetermined confidence does not meet the predetermined requirement, as the remote sensing image block to be processed comprises:

for a remote sensing image block, under a condition that a ratio of the number of pixels reaching the predetermined confidence to the number of at least one pixel in a region of the remote sensing image to be recognized, that corresponds to the remote sensing image block, is lower than a predetermined ratio, determining the remote sensing image block as the remote sensing image block to be processed.

8. The method of any one of claims 6 to 7, wherein a manner for obtaining the present category probability information of the at least one pixel of the remote sensing image to be recognized comprises:

under a condition that the resolution reduction processing is performed for the first time, mapping category probability information of at least one pixel in each remote sensing image block to be processed, that is output by the neural network, into the remote sensing image to be recognized, to obtain category probability information of the at least one pixel of the remote sensing image to be recognized, wherein

the category probability information of the at least one pixel of the remote sensing image to be recognized is determined as the present category probability information of the at least one pixel of the remote sensing image to be recognized.

9. The method of any one of claims 6 to 8, wherein a manner for obtaining the present category probability information of the at least one pixel of the remote sensing image to be recognized comprises:

under a condition that the resolution reduction processing is performed not for the first time, mapping the category probability information of the at least one pixel in each remote sensing image block to be processed, that is output by the neural network, into the remote sensing image to be recognized, to obtain the category probability information of the at least one pixel of the remote sensing image to be recognized; and

updating, according to the presently obtained category probability information of the at least one pixel of the remote sensing image to be recognized, the present category probability information of the corresponding pixel of the remote sensing image to be recognized.

10. The method of claim 9, wherein updating, according to the presently obtained category probability information of the at least one pixel of the remote sensing image to be recognized, the present category probability information of the corresponding pixel of the remote sensing image to be recognized comprises:

calculating an average value of the presently obtained category probability information of the at least one pixel of the remote sensing image to be recognized and the present category probability information of the corresponding pixel in the remote sensing image to be recognized; and

updating the present category probability information of the corresponding pixel in the remote sensing image to be recognized with the calculated average value.

11. The method of claim 10, wherein determining the recognition result of the remote sensing image to be recognized according to the category probability information of the pixels in the remote sensing image block to be processed comprises:

for a pixel in the remote sensing image to be recognized, determining a maximum probability of probabilities, of the pixel belonging to the categories, in the present category probability information of the pixel, and determining the maximum probability and the category corresponding to the maximum probability as a recognition result of the pixel.

12. The method of any one of claims 1-11, wherein a resolution of a remote sensing image sample for training the neural network comprises: a resolution of each remote sensing image obtained by performing the resolution reduction processing on the remote sensing image according to each reduction value in the reduction scale set.

13. An apparatus for recognizing a remote sensing image, comprising:

- a resolution reduction module, configured to perform resolution reduction processing on a remote sensing image to be recognized to obtain a remote sensing image with reduced resolution;

- a remote sensing image segmentation module, configured to segment the remote sensing image with reduced resolution to obtain at least one remote sensing image block;

- an image block selection module, configured to determine a remote sensing image block to be processed from the at least one remote sensing image block;

- a category processing module, configured to obtain category probability information of pixels in the remote sensing image block to be processed through a neural network; and

- a recognition result determination module, configured to determine a recognition result of the remote sensing image to be recognized according to the category probability information of the pixels in the remote sensing image block to be processed.

wherein the resolution reduction module is configured to:

- perform resolution reduction processing on the remote sensing image to be recognized according to an unused reduction value in a reduction scale set.

14. The apparatus of claim 13, wherein the recognition result determination module is configured to:

responsive to that the reduction scale set does not comprise any unused reduction value or determining that the at least one remote sensing image block does not comprise any remote sensing image block to be processed, determine the recognition result of the remote sensing image to be recognized according to the category probability information of the pixels in the remote sensing image block to be processed.

15. The apparatus of any one of claims 13 to 14, wherein the reduction scale set comprises at least two different reduction values, and a lower reduction value is used first compared with a higher reduction value.

16. The apparatus of any one of claims 13-15, wherein

under a condition that the resolution reduction processing is performed not for the first time, a number of remote sensing image blocks to be processed determined by the image block selection module is less than or equal to a number of the remote sensing image blocks presently obtained by segmentation by the remote sensing image segmentation module, and a resolution obtained after resolution reduction presently performed by the resolution reduction module is higher than a resolution obtained after previously performed resolution reduction.

17. The apparatus of claim 16, wherein the image block selection module is configured to: under a condition that the resolution reduction processing is performed not for the first time, determine a remote sensing image block to be processed from the at least one remote sensing image block according to present confidences of the pixels of the remote sensing image to be recognized.

18. The apparatus of claim 17, wherein the image block selection module comprises:

a first unit, configured to determine, according to present category probability information of at least one of a plurality of pixels in the remote sensing image to be recognized, a present confidence of the at least one pixel;

a second unit, configured to statistically obtain a number of pixels of which the present confidences reach a predetermined confidence in the at least one pixel in a region of the remote sensing image to be recognized that corresponds to each remote sensing image block; and

a third unit, configured to determine a remote sensing image block, of which the number of the pixels reaching the predetermined confidence does not meet a predetermined requirement, as the remote sensing image block to be processed.

19. The apparatus of claim 18, wherein the third unit is configured to: for a remote sensing image block, under a condition that a ratio of the number of pixels reaching the predetermined confidence to the number of at least one pixel in a region of the remote sensing image to be recognized that corresponds to the remote sensing image block, is lower than a predetermined ratio, determine the remote sensing image block as the remote sensing image block to be processed.

20. The apparatus according to any one of claims 18-19, wherein the image block selection module further comprises:

a fourth unit, configured to, under a condition that the resolution reduction processing is performed for the first time, map category probability information of at least one pixel in each remote sensing image block to be processed, that is output by the neural network, into the remote sensing image to be recognized, to obtain category probability information of the at least one pixel of the remote sensing image to be recognized, wherein

the category probability information of the at least one pixel of the remote sensing image to be recognized is determined as the present category probability information of the at

least one pixel of the remote sensing image to be recognized.