Claims

1. A method for recognizing target object, comprising:

obtaining an image of a target region, wherein the target region comprises at least one sub-region;

determining an image recognition result of each target object in the target region according to the image, wherein the image recognition result comprises N candidate categories having the top-N confidence values of target objects in each sub-region of the target region and the number of the target objects in each sub-region;

obtaining a radio frequency recognition result of each target object in the target region; and

determining the distribution of each target object in the target region according to the radio frequency recognition result and the image recognition result;

wherein the determining the distribution of each target object in the target region according to the radio frequency recognition result and the image recognition result comprises:

matching the number of the target objects and the N candidate categories in each sub-region in the image recognition result with categories and the number of the target objects of each category in the radio frequency recognition result according to a descending order of the confidence values of the N candidate categories of the target objects in the sub-regions in the image recognition result and a descending order of the numbers of the target objects in the sub-regions in the image recognition result; and

obtaining the categories and number of the target objects in each sub-region.

2. The method according to claim 1, wherein the matching the number of the target objects and the N candidate categories in each sub-region in the image recognition result with the categories and the number of the target objects of each category in the radio frequency recognition result according to the descending order of the confidence values of the N candidate categories of the target objects in the sub-regions in the image recognition result and the descending order of the numbers of the target objects in the sub-regions in the image recognition result comprises:

matching a k-th candidate category of the target objects in an m-th sub-region and the number of the target objects in the m-th sub-region with the categories and the number of the target objects of each category in the radio frequency recognition result; wherein the k-th candidate category is a candidate category corresponding to a confidence number k; confidence numbers are obtained by arranging the N candidate categories of the target objects in one sub-region in the image

recognition result according to the descending order of the confidence values; the m-th sub-region is a sub-region corresponding to a sub-region number m; sub-region numbers are obtained by arranging the numbers of the target objects in the sub-regions in the image recognition result in a descending order; and

under the condition that the categories in the radio frequency recognition result comprise the k-th candidate category of the target objects in the m-th sub-region, and the number of the target objects of the category, which is the same as the k-th candidate category of the target objects in the m-th sub-region, in the radio frequency recognition result is greater than zero, determining that the category of the target objects in the m-th sub-region in the image recognition result is the k-th candidate category of the target objects in the m-th sub-region and the number of the target objects in the m-th sub-region is the number of the target objects in the m-th sub-region in the image recognition result; and

deducting the number of the target objects in the m-th sub-region from the category, which is the same as the k-th candidate category of the target objects in the m-th sub-region, in the radio frequency recognition result to obtain an adjusted radio frequency recognition result.

3. The method according to claim 2, further comprising:

under the condition that the categories in the radio frequency recognition result do not comprise the k-th candidate category of the target objects in the m-th sub-region or under the condition that the categories in the radio frequency recognition result comprise the k-th candidate category of the target objects in the m-th sub-region but the number of the target objects of the category, which is the same as the k-th candidate category of the target objects in the m-th sub-region, in the radio frequency recognition result is not greater than zero, determining that the matching is unsuccessful; and

taking the m-th sub-region as a sub-region to be matched.

4. The method according to claim 3, wherein under the condition that a sub-region to be matched exists, the method further comprises:

under the condition that the number of the target objects of each category in the radio frequency recognition result is not greater than zero, determining that categories, in the N candidate categories corresponding to confidence numbers 1 to N of the target objects in one sub-region to be matched, appear in the categories of the radio frequency recognition result, taking the candidate category corresponding to the minimum confidence number in the appeared categories as the category of the target objects in the sub-region to be matched, and taking the number of the target objects in the sub-region to be matched in the image recognition result as the number of the

target objects in the sub-region to be matched.

5. The method according to claim 3, wherein under the condition that a sub-region to be matched exists, the method further comprises:

under the condition that the number of the target objects of each category in the radio frequency recognition result is not greater than zero, determining that none of the N candidate categories corresponding to confidence numbers 1 to N of the target objects in one sub-region to be matched appears in the categories of the radio frequency recognition result, taking the candidate category having the minimum confidence number as the category of the target objects in the sub-region to be matched, and taking the number of the target objects in the sub-region to be matched in the image recognition result as the number of the target objects in the sub-region to be matched.

6. The method according to claim 3, wherein under the condition that a sub-region to be matched exists, the method further comprises:

under the condition that the category with the number of the target objects being greater than zero exists in the radio frequency recognition result, taking the category with the maximum number of the target objects in the radio frequency recognition result as the category of the target objects in the sub-region to be matched with the maximum number of the target objects in the image recognition result, and taking the number of the target objects in the sub-region to be matched with the maximum number of the target objects in the image recognition result as the number of the target objects in the sub-region to be matched with the maximum number of the target objects in the image recognition result; and

deducting the number of the target objects in the sub-region to be matched with the maximum number of the target objects in the image recognition result from the number of the target objects in the category with the maximum number of the target objects in the radio frequency recognition result to obtain an adjusted radio frequency recognition result.

7. An apparatus for recognizing target object, comprising:

a first obtaining module, configured to obtain an image of a target region, wherein the target region comprises at least one sub-region;

a first determining module, configured to determine an image recognition result of each target object in the target region according to the image, wherein the image recognition result comprises N candidate categories having the top-N confidence values of target objects in each sub-region of the target region and the number of the target objects in each sub-region;

a second obtaining module, configured to obtain a radio frequency recognition result of each

target object in the target region; and

a second determining module, configured to:

match the number of the target objects and the N candidate categories in each sub-region in the image recognition result with categories and the number of the target objects of each category in the radio frequency recognition result according to a descending order of the confidence values of the N candidate categories of the target objects in the sub-regions in the image recognition result and a descending order of the numbers of the target objects in the sub-regions in the image recognition result; and

obtain the categories and number of the target objects in each sub-region.

8. The apparatus according to claim 7, wherein the second determining module comprises:

a matching unit, configured to match a k-th candidate category of the target objects in an m-th sub-region and the number of the target objects in the m-th sub-region with the categories and the number of the target objects of each category in the radio frequency recognition result; wherein the k-th candidate category is a candidate category corresponding to a confidence number k; confidence numbers are obtained by arranging the N candidate categories of the target objects in one sub-region in the image recognition result according to the descending order of the confidence values; the m-th sub-region is a sub-region corresponding to a sub-region number m; sub-region numbers are obtained by arranging the numbers of the target objects in the sub-regions in the image recognition result in a descending order;

a determining unit, configured to, under the condition that the categories in the radio frequency recognition result comprise the k-th candidate category of the target objects in the m-th sub-region, and the number of the target objects of the category, which is the same as the k-th candidate category of the target objects in the m-th sub-region, in the radio frequency recognition result is greater than zero, determine that the category of the target objects in the m-th sub-region in the image recognition result is the k-th candidate category of the target objects in the m-th sub-region and the number of the target objects in the m-th sub-region is the number of the target objects in the m-th sub-region in the image recognition result; and

an adjusting unit, configured to deduct the number of the target objects in the m-th sub-region from the category which is the same as the k-th candidate category of the target objects in the m-th sub-region, in the radio frequency recognition result to obtain an adjusted radio frequency recognition result.

9. The apparatus according to claim 8, further comprising:

a third determining module, configured to, under the condition that the categories in the radio frequency recognition result do not comprise the k-th candidate category of the target objects in the m-th sub-region or under the condition that the categories in the radio frequency recognition result comprise the k-th candidate category of the target objects in the m-th sub-region but the number of the target objects of the category, which is the same as the k-th candidate category of the target objects in the m-th sub-region, in the radio frequency recognition result is not greater than zero, determine that the matching is unsuccessful; and

a fourth determining module, configured to take the m-th sub-region as a sub-region to be matched.

10. The apparatus according to claim 9, wherein under the condition that a sub-region to be matched exists, the apparatus further comprises:

a fifth determining module, configured to, under the condition that the number of the target objects of each category in the radio frequency recognition result is not greater than zero, determine that categories, in the N candidate categories corresponding to confidence numbers 1 to N of the target objects in one sub-region to be matched, appear in the categories of the radio frequency recognition result, take the candidate category corresponding to the minimum confidence number in the appeared categories as the category of the target objects in the sub-region to be matched, and take the number of the target objects in the sub-region to be matched in the image recognition result as the number of the target objects in the sub-region to be matched.

11. The apparatus according to claim 9, wherein under the condition that a sub-region to be matched exists, the apparatus further comprises:

a sixth determining module, configured to, under the condition that the number of the target objects of each category in the radio frequency recognition result is not greater than zero, determine that none of the N candidate categories corresponding to confidence numbers 1 to N of the target objects in one sub-region to be matched appears in the categories of the radio frequency recognition result, take the candidate category having the minimum confidence number as the category of the target objects in the sub-region to be matched, and take the number of the target objects in the sub-region to be matched in the image recognition result as the number of the target objects in the sub-region to be matched.

12. The apparatus according to claim 9, wherein under the condition that a sub-region to be matched exists, the apparatus further comprises:

a seventh determining module, configured to, under the condition that the category with the number of the target objects being greater than zero exists in the radio frequency recognition result,

take the category with the maximum number of the target objects in the radio frequency recognition result as the category of the target objects in the sub-region to be matched with the maximum number of the target objects in the image recognition result, and take the number of the target objects in the sub-region to be matched with the maximum number of the target objects in the image recognition result as the number of the target objects in the sub-region to be matched with the maximum number of the target objects in the image recognition result; and

an adjusting module, configured to, deduct the number of the target objects in the sub-region to be matched with the maximum number of the target objects in the image recognition result from the number of the target objects in the category with the maximum number of the target objects in the radio frequency recognition result to obtain an adjusted radio frequency recognition result.

13. A system for recognizing target object, comprising:

an image collection apparatus, configured to obtain an image of a target region, wherein the target region comprises at least one sub-region;

a radio frequency detection apparatus, configured to obtain a radio frequency recognition result of each target object in the target region; and

a processor, configured to determine an image recognition result of each target object in the target region according to the image, and determine the distribution of each target object in the target region according to the radio frequency recognition result and the image recognition result, wherein the image recognition result comprises N candidate categories having the top-N confidence values of target objects in each sub-region of the target region and the number of the target objects in each sub-region;

wherein the processor configured to determine the distribution of each target object in the target region according to the radio frequency recognition result and the image recognition result, is configured to:

match the number of the target objects and the N candidate categories in each sub-region in the image recognition result with categories and the number of the target objects of each category in the radio frequency recognition result according to a descending order of the confidence values of the N candidate categories of the target objects in the sub-regions in the image recognition result and a descending order of the numbers of the target objects in the sub-regions in the image recognition result; and

obtain the categories and number of the target objects in each sub-region.

14. The system according to claim 13, wherein the processor configured to match the number

of the target objects and the N candidate categories in each sub-region in the image recognition result with the categories and the number of the target objects of each category in the radio frequency recognition result according to the descending order of the confidence values of the N candidate categories of the target objects in the sub-regions in the image recognition result and the descending order of the numbers of the target objects in the sub-regions in the image recognition result is configured to:

match a k-th candidate category of the target objects in an m-th sub-region and the number of the target objects in the m-th sub-region with the categories and the number of the target objects of each category in the radio frequency recognition result; wherein the k-th candidate category is a candidate category corresponding to a confidence number k; confidence numbers are obtained by arranging the N candidate categories of the target objects in one sub-region in the image recognition result according to the descending order of the confidence values; the m-th sub-region is a sub-region corresponding to a sub-region number m; sub-region numbers are obtained by arranging the numbers of the target objects in the sub-regions in the image recognition result in a descending order;

under the condition that the categories in the radio frequency recognition result comprise the k-th candidate category of the target objects in the m-th sub-region, and the number of the target objects of the category, which is the same as the k-th candidate category of the target objects in the m-th sub-region, in the radio frequency recognition result is greater than zero, determine that the category of the target objects in the m-th sub-region in the image recognition result is the k-th candidate category of the target objects in the m-th sub-region and the number of the target objects in the m-th sub-region is the number of the target objects in the m-th sub-region in the image recognition result; and

deduct the number of the target objects in the m-th sub-region from the category, which is the same as the k-th candidate category of the target objects in the m-th sub-region, in the radio frequency recognition result to obtain an adjusted radio frequency recognition result.

15. The system according to claim 14, wherein the processor is further configured to:

under the condition that the categories in the radio frequency recognition result do not comprise the k-th candidate category of the target objects in the m-th sub-region or under the condition that the categories in the radio frequency recognition result comprise the k-th candidate category of the target objects in the m-th sub-region but the number of the target objects of the category, which is the same as the k-th candidate category of the target objects in the m-th sub-region, in the radio frequency recognition result is not greater than zero, determine that the

matching is unsuccessful; and

take the m-th sub-region as a sub-region to be matched.

16. A computer-readable storage medium having a computer program stored thereon, wherein when the program is executed by a processor, the method according to any one of claims 1-6 is implemented.

17. A computer device, comprising a memory, a processor, and a computer program stored on the memory and running on the processor, wherein when the program is executed by the processor, the method according to any one of claims 1-6 is implemented.