CLAIMS

What is claimed is:

1. A method for generating a narrow-strip 2-dimensional bar code, comprising:

determining a rectangular region, wherein the rectangular region comprises blocks to be filled and arranged in a grid shape;

separately filling two square regions at two vertices in the rectangular region with only two positioning graphs, wherein each positioning graph comprises a central square structure formed by a first color block, and an enclosure structure formed by second color blocks and surrounding the square structure by one round;

for each positioning graph in the rectangular region, filling a region surrounding the positioning graph with first color blocks, to form a corresponding isolation region; and

filling a data region with a first color block and a second color block that are corresponding to 2-dimensional bar code data, wherein the data region is a region in the rectangular region excluding the two positioning graphs and corresponding isolation regions.

2. The method according to claim 1, wherein the two vertices are two vertices at both ends of a diagonal line of the rectangular region.

3. The method according to claim 1, wherein a width ratio of the square structure and the enclosure structure is 1:1.

4. The method according to claim 1, wherein the length of the rectangular region is greater than the width thereof.

5. A method for identifying a narrow-strip 2-dimensional bar code, comprising:

obtaining an image of a narrow-strip 2-dimensional bar code;

detecting only two positioning graphs in the image, wherein each positioning graph comprises a central square structure formed by a first color block, and an enclosure structure formed by second color blocks and surrounding the square structure by one round, and wherein each positioning graph has an isolation region formed by first color blocks at the periphery;

when the only two positioning graphs are detected, determining, from the image and based on center positions of the only two positioning graphs, a target region that

comprises a rectangular region corresponding to the narrow-strip 2-dimensional bar code;

determining a data region to be identified from the target region, wherein the data region excludes the two positioning graphs and corresponding isolation regions; and

identifying 2-dimensional bar code data of the data region.

6. The method according to claim 5, wherein the determining a data region to be identified from the target region comprises:

extracting a contour of the rectangular region from the target region based on an erode algorithm; and

determining the data region to be identified based on the extracted contour.

7. The method according to claim 6, wherein the determining the data region to be identified based on the extracted contour comprises:

iteratively selecting two points from the extracted contour and calculating a slope of a connection line constructed by the two points;

after the extracted contour is scanned by one round, counting times of occurrence of each slope;

determining a horizontal direction of the narrow-strip 2-dimensional bar code based on a slope of maximum times of occurrences;

determining four vertices of the narrow-strip 2-dimensional bar code based on the center positions of the two positioning graphs and the horizontal direction; and

determining the data region to be identified based on the four vertices.

8. The method according to claim 7, wherein the determining four vertices of the narrow-strip 2-dimensional bar code based on the center positions of the two positioning graphs and the horizontal direction comprises:

constructing a central connection line based on the center positions of the two positioning graphs;

determining an angle of the central connection line relative to the horizontal direction; and

determining the four vertices of the narrow-strip 2-dimensional bar code based on the center positions of the two positioning graphs and the angle.

9. The method according to claim 5, wherein the detecting a positioning graph in the image comprises:

detecting, in the image, a positioning graph whose width ratio of the square structure and the enclosure structure is 1:1.

10. The method according to claim 5, wherein the determining, from the image and based on center positions of the two positioning graphs, a target region that comprises a rectangular region corresponding to the narrow-strip 2-dimensional bar code comprises:

determining, based on the center positions of the two positioning graphs, a diagonal line of the rectangular region corresponding to the narrow-strip 2-dimensional bar code; and

determining, from the image and based on the diagonal line, the target region comprising the rectangular region.

11. A narrow-strip 2-dimensional bar code, comprising:

only two positioning graphs, wherein the two positioning graphs are located at two vertices of a rectangular region, each positioning graph comprises a central square structure formed by a first color block, and an enclosure structure formed by second color blocks and surrounding the square structure by one round;

two isolation regions, each of which is formed by first color blocks, in the rectangular region, surrounding one of the positioning graphs; and

a data region, used to form 2-dimensional bar code data and comprising a region in the rectangular region excluding the two positioning graphs and corresponding isolation regions.

12. The narrow-strip 2-dimensional bar code according to claim 11, wherein the two vertices are two vertices at both ends of a diagonal line of the rectangular region.

13. The narrow-strip 2-dimensional bar code according to claim 11, wherein a width ratio of the square structure and the enclosure structure is 1:1.

14. The narrow-strip 2-dimensional bar code according to claim 11, wherein the length of the rectangular region is greater than the width thereof.

15. An apparatus for generating a narrow-strip 2-dimensional bar code, comprising:

a determining unit, configured to determine a rectangular region, wherein the rectangular region comprises blocks to be filled and arranged in a grid shape; and

a filling unit, configured to separately fill, with only two positioning graphs, two square regions at two vertices in the rectangular region determined by the determining unit, wherein each positioning graph comprises a central square structure formed by a first color block, and an enclosure structure formed by second color blocks and surrounding the square structure by one round;

the filling unit is further configured to: for each positioning graph in the rectangular region determined by the determining unit, fill a region surrounding the positioning graph with first color blocks, to form a corresponding isolation region; and

the filling unit is further configured to fill a data region with a first color block and a second color block that are corresponding to 2-dimensional bar code data, wherein the data region is a region in the rectangular region excluding the two positioning graphs and corresponding isolation regions.

16. The apparatus according to claim 15, wherein the two vertices are two vertices at both ends of a diagonal line of the rectangular region.

17. The apparatus according to claim 15, wherein a width ratio of the square structure and the enclosure structure is 1:1.

18. The apparatus according to claim 15, wherein the length of the rectangular region is greater than the width thereof.

19. An apparatus for identifying a narrow-strip 2-dimensional bar code, comprising:

an acquisition unit, configured to obtain an image of a narrow-strip 2-dimensional bar code;

a detection unit, configured to detect only two positioning graphs in the image obtained by the acquisition unit, wherein each positioning graph comprises a central square structure formed by a first color block, and an enclosure structure formed by second color blocks and surrounding the square structure by one round, and wherein each positioning graph has an isolation region formed by first color blocks at the periphery;

a determining unit, configured to: when the detection unit detects the only two positioning graphs, determine, from the image and based on center positions of the only two positioning graphs, a target region that comprises a rectangular region corresponding to the narrow-strip 2-dimensional bar code; wherein

the determining unit is further configured to determine a data region to be identified from the target region, wherein the data region excludes the two positioning graphs and corresponding isolation regions; and

an identification unit, configured to identify 2-dimensional bar code data of the data region determined by the determining unit.

20. The apparatus according to claim 19, wherein the determining unit is specifically configured to:

extract a contour of the rectangular region from the target region based on an erode algorithm; and

determine the data region to be identified based on the extracted contour.

21. The apparatus according to claim 20, wherein the determining unit is further specifically configured to:

iteratively select two points from the extracted contour and calculate a slope of a connection line constructed by the two points;

after the extracted contour is scanned by one round, count times of occurrence of each slope;

determine a horizontal direction of the narrow-strip 2-dimensional bar code based on a slope of maximum times of occurrences;

determine four vertices of the narrow-strip 2-dimensional bar code based on the center positions of the two positioning graphs and the horizontal direction; and

determine the data region to be identified based on the four vertices.

22. The apparatus according to claim 21, wherein the determining unit is further specifically configured to:

construct a central connection line based on the center positions of the two positioning graphs;

determine an angle of the central connection line relative to the horizontal direction; and

determine the four vertices of the narrow-strip 2-dimensional bar code based on the center positions of the two positioning graphs and the angle.

23. The apparatus according to claim 19, wherein the detection unit is specifically configured to:

detect, in the image, a positioning graph whose width ratio of the square structure and the enclosure structure is 1:1.

24. The apparatus according to claim 19, wherein the determining unit is specifically configured to:

determine, based on the center positions of the two positioning graphs, a diagonal line of the rectangular region corresponding to the narrow-strip 2-dimensional bar code; and

determine, from the image and based on the diagonal line, the target region comprising the rectangular region.

25. A device for generating a narrow-strip 2-dimensional bar code, comprising:

a memory;

one or more processors; and

one or more programs, wherein the one or more programs are stored in the memory and configured to be executed by the one or more processors, the program being executed by the processor to implement the following steps:

determining a rectangular region, wherein the rectangular region comprises blocks to be filled and arranged in a grid shape;

separately filling two square regions at two vertices in the rectangular region with only two positioning graphs, wherein each positioning graph comprises a central square structure formed by a first color block, and an enclosure structure formed by second color blocks and surrounding the square structure by one round;

for each positioning graph in the rectangular region, filling a region surrounding the positioning graph with first color blocks, to form a corresponding isolation region; and

filling a data region with a first color block and a second color block that are corresponding to 2-dimensional bar code data, wherein the data region is a region in the rectangular region excluding the two positioning graphs and corresponding isolation regions.

26. A device for identifying a narrow-strip 2-dimensional bar code, comprising:

a memory;

one or more processors; and

one or more programs, wherein the one or more programs are stored in the memory and configured to be executed by the one or more processors, the program being executed by the processor to implement the following steps:

obtaining an image of a narrow-strip 2-dimensional bar code;

detecting only two positioning graphs in the image, wherein each positioning graph comprises a central square structure formed by a first color block, and an enclosure structure formed by second color blocks and surrounding the square structure by one round, and wherein each positioning graph has an isolation region formed by first color blocks at the periphery;

when the only two positioning graphs are detected, determining, from the image and based on center positions of the only two positioning graphs, a target region that comprises a rectangular region corresponding to the narrow-strip 2-dimensional bar code;

determining a data region to be identified from the target region, wherein the data region excludes the two positioning graphs and corresponding isolation regions; and

identifying 2-dimensional bar code data of the data region.