

after the translation; translating each code point in the obtained image by $m+1$ pixels, and calculating an autocorrelation coefficient Z_2 according to projection values of each code point before and after the translation; translating each code point in the obtained image by $m+2$ pixels, and calculating an autocorrelation coefficient Z_3 according to projection values of each code point before and after the translation; continuing to translate the obtained image in this manner, until an autocorrelation coefficient Z_{n+1} is calculated; and taking a maximum value of Z_1 to Z_{n+1} , where a translation amount corresponding to the maximum value is the point spacing e in the row direction; and

in a same way, translating, for n' times along the column direction, a state diagram corresponding to the maximum value of the mean square errors when the image is rotated by 69° to 111° , and calculating a maximum autocorrelation coefficient, so as to obtain the point spacing f in the column direction;

where e and f each are the number of pixels, $m \geq 1$, m is a natural number, $m+n \approx e$, $m+n' \approx f$, and $m+n$ and $m+n'$ each are the number of pixels corresponding to a predicted point spacing.

The parallel row lines and parallel column lines are determined by using the following method:

separately calculating peak values of barycenter projections of code points in $a \cdot e \pm P$ areas along the row direction, and drawing the parallel column lines according to the peak value in each area; and

separately calculating peak values of barycenter projections of code points in $b \cdot f \pm P$ areas along the column direction, and drawing the parallel row lines according to the peak value in each area;

where, P is a natural number not greater than the smaller one of e , f , and a is a natural number.

The foregoing parallel row lines and parallel column lines construct a grid together, as shown in FIG. 11. A grid constructing method is to separately extend the parallel row lines and parallel column lines to so that the parallel row lines and parallel column lines

4. The decoding method for a matrix two-dimensional code according to claim 2, wherein the assigning coordinate values to each code point and positioning point comprises the following steps:

determining a row direction and a column direction in the image;

5 separately drawing a group of parallel row lines and a group of parallel column lines according to the row direction and the column direction to form a grid, wherein distances between the parallel row lines and between the parallel column lines are the point spacing in a column line direction and the point spacing in a row line direction in the code pattern respectively; and

10 calculating coordinates of each cross point in the grid, so as to assign coordinate values to each code point and positioning point in the image.

5. The decoding method for a matrix two-dimensional code according to claim 3-~~or~~ 4, wherein the determining a row direction and a column direction comprises the following steps:

15 A1. recognizing the binary image, so as to determine barycenters of each code point and positioning point;

A2. projecting the barycenter of each code point in the obtained image to any straight line L, calculating the number of projections at each projection point and an average value of the numbers of projections at all projection points, and calculating a mean square error σ_0 ;

A3. rotating the obtained image by a predetermined angle θ , and calculating a mean square error σ_1 according to the method of Step A1;

A4. rotating the obtained image by a predetermined angle θ again, and calculating a mean square error σ_2 according to the method of Step A1; repeating the process until the
25 image is rotated by a total of 180° , and calculating the last mean square error σ_n ;

A5. drawing a line perpendicular to L at a position which is on the line L and has a maximum number of projections falling thereon in an image state corresponding to a

side or an upper side of the positioning point as 9, 8, 7..., 0 cyclically; and

restoring a complete unit two-dimensional code according to the foregoing marks.

5 11. The decoding method for a matrix two-dimensional code according to claim 4,
wherein the determining a row direction and a column direction comprises the following
steps:

A1. recognizing the binary image, so as to determine barycenters of each code point
and positioning point;

10 A2. projecting the barycenter of each code point in the obtained image to any straight
line L, calculating the number of projections at each projection point and an average value
of the numbers of projections at all projection points, and calculating a mean square error
 σ_0 ;

A3. rotating the obtained image by a predetermined angle θ , and calculating a mean
square error σ_1 according to the method of Step A1;

15 A4. rotating the obtained image by a predetermined angle θ again, and calculating a
mean square error σ_2 according to the method of Step A1; repeating the process until the
image is rotated by a total of 180° , and calculating the last mean square error σ_n ;

20 A5. drawing a line perpendicular to L at a position which is on the line L and has a
maximum number of projections falling thereon in an image state corresponding to a
maximum value of the mean square errors σ_0 to σ_n , wherein the drawn line is the row
direction; and

25 A6. rotating the image state corresponding to the row direction by $\pm(90^\circ \pm 21^\circ)$,
taking a maximum value of the mean square errors within this range, and drawing a line
perpendicular to L at a position which is on the line L and has a maximum number of
projection points falling thereon in an image state corresponding to the maximum value,
wherein the drawn line is the column direction.

12. The decoding method for a matrix two-dimensional code according to claim 11,

wherein the point spacing is determined by using a method of solving a discrete signal period by means of autocorrelation, which is specifically described as follows:

B1. translating each code point in the image state corresponding to the maximum value of the mean square error in Step A5 by m pixels along the row direction, and calculating an autocorrelation coefficient $Z1$ according to projection values of the barycenter of each code point before and after the translation; translating each code point in the obtained image by $m+1$ pixels, and calculating an autocorrelation coefficient $Z2$ according to projection values of the barycenters of each code point before and after the translation; translating each code point in the obtained image by $m+2$ pixels, and calculating an autocorrelation coefficient $Z3$ according to projection values of the barycenter of each code point before and after the translation; and continuing to translate the obtained image in this manner, until each code point in the obtained image is translated by $m+n$ pixels, and calculating an autocorrelation coefficient Z_{n+1} ;

B2. taking a maximum value of $Z1$ to Z_{n+1} , wherein a code point translation amount corresponding to the maximum value is the point spacing e in the row direction; and

B3. in a same way, translating each code point in the image state corresponding to the maximum value of the mean square errors in Step A6 for n' times along the column direction, and calculating a maximum autocorrelation coefficient, so as to obtain the point spacing f in the column direction;

wherein e and f are each the number of pixels, $m \geq 1$, m is a natural number, $m+n \approx e$, $m+n' \approx f$, and $m+n$ and $m+n'$ are each the number of pixels corresponding to a predicted point spacing.

13. The decoding method for a matrix two-dimensional code according to claim 11, wherein in the image rotation, a center point of the image is used as a rotation center.