

Claims

1. An image processing method, comprising:
 - acquiring an original image; wherein the original image comprises a target image;
 - performing image compression processing on the original image according to a preset compression ratio, to acquire a low-pixel image after the image compression processing;
 - determining borderlines of the target image in the low-pixel image; and
 - mapping the determined borderlines comprised in the low-pixel image into the original image, to acquire the target image comprised in the original image;wherein mapping the borderlines comprised in the low-pixel image into the original image, to acquire the target image comprised in the original image specifically comprises:
 - acquiring an intersection point of every two adjacent borderlines comprised in the low-pixel image;
 - separately mapping the acquired intersection points into the original image according to the preset compression ratio, to generate corresponding mapping points in the original image; and
 - successively connecting the mapping points mapped into the original image, and determining a quadrangle generated after the connection as the target image comprised in the original image.
2. The method of claim 1, wherein the performing image compression processing on the original image according to a preset compression ratio, to acquire a low-pixel image after the image compression processing specifically comprises:
 - determining a position of each pixel point after compression according to the preset compression ratio;
 - performing image compression processing on the original image by using a fast bilinear interpolation algorithm, to acquire a pixel value of each pixel point after compression; and
 - generating the low-pixel image according to the pixel value and the position of each pixel point after compression.
3. The method of claim 2, wherein the performing image compression processing on the original image by using a fast bilinear interpolation algorithm, to acquire a pixel value of each pixel point after compression specifically comprises:
 - determining, among all original pixel points comprised in the original image, four original

pixel points corresponding to each pixel point after compression according to the preset compression ratio; determining, among the four original pixel points corresponding to each pixel point after compression, two pairs of original pixel points in a first direction and two pairs of original pixel points in a second direction, wherein the first direction is a horizontal direction and the second direction is a vertical direction, or, the first direction is a vertical direction and the second direction is a horizontal direction;

acquiring first interpolations respectively corresponding to the two pairs of original pixel points of each pixel point after compression in the first direction, and taking the acquired two first interpolations as initial interpolations; or, acquiring second interpolations respectively corresponding to the two pairs of original pixel points of each pixel point after compression in the second direction, and taking the acquired two second interpolations as initial interpolations; and

calculating an interpolation corresponding to each pixel point after compression according to the initial interpolations corresponding to each pixel point after compression, and determining the pixel value of each pixel point after compression according to the calculated interpolation corresponding to each pixel point after compression.

4. The method of any one of claims 1-3, wherein the determining borderlines of the target image in the low-pixel image specifically comprises:

determining a to-be-detected region from the low-pixel image; and

performing borderline detection processing on the to-be-detected region according to a gradient value between every two adjacent pixel points in the to-be-detected region, to determine the borderlines of the target image.

5. The method of claim 4, wherein the determining a to-be-detected region from the low-pixel image specifically comprises:

binarizing the low-pixel image to convert the low-pixel image into a binary image, wherein the binary image comprises only two colors;

performing edge detection processing on the binary image, to acquire at least one edge line comprised in the binary image;

separately dilating each edge line;

connecting each dilated edge line to acquire connected regions;

screening the connected regions according to position information of each connected region respectively, to acquire a specific region, wherein the specific region is a region comprising a

specific graphic portion in the target image; and

determining a region other than the specific region in the low-pixel image as the to-be-detected region.

6. The method of claim 5, before the performing edge detection processing on the binary image, further comprising:

performing Gauss smoothing on the binary image by using a preset Gauss smoothing parameter.

7. The method of claim 4, wherein the performing borderline detection processing on the to-be-detected region according to a gradient value between every two adjacent pixel points in the to-be-detected region, to determine the borderlines of the target image specifically comprises:

binarizing the low-pixel image to convert the low-pixel image into a binary image, wherein the binary image comprises only two colors;

executing the following operations in an arbitrary direction: separately comparing a gradient value between every two adjacent pixel points in the to-be-detected region of the binary image in the arbitrary direction with a preset initial gradient threshold corresponding to the arbitrary direction, and acquiring an initial borderline in the arbitrary direction according to the comparison result; and

determining the borderlines of the target image respectively according to the number of initial borderlines acquired in each direction.

8. The method of claim 7, wherein the determining the borderlines of the target image respectively according to the number of initial borderlines acquired in each direction specifically comprises:

executing the following operations for a detection result in an arbitrary direction:

separately performing straight line detection on each initial borderline in the arbitrary direction according to position information of each initial borderline in the arbitrary direction when the number of initial borderlines acquired in the arbitrary direction is at least two, to acquire borderlines in the arbitrary direction from the at least two initial borderlines in the arbitrary direction; or

successively decreasing the preset initial gradient threshold corresponding to the arbitrary direction according to a preset first gradient difference when the number of initial borderlines

acquired in the arbitrary direction is less than two, and detecting the to-be-detected region of the binary image in the arbitrary direction by using the decreased initial gradient threshold, until the number of initial borderlines acquired in the arbitrary direction is at least two.

9. The method of claim 4, after the acquiring the target image comprised in the original image, further comprising:

correcting the target image by using a projective transformation algorithm.

10. An image processing apparatus, comprising:

an original image acquisition unit configured to acquire an original image, wherein the original image comprises a target image;

a low-pixel image acquisition unit configured to perform image compression processing on the original image according to a preset compression ratio, to acquire a low-pixel image after the image compression processing;

a borderline determination unit configured to determine borderlines of the target image in the low-pixel image; and

a target image acquisition unit configured to map the determined borderlines comprised in the low-pixel image into the original image, to acquire the target image comprised in the original image; and wherein the target image acquisition unit is specifically configured to:

acquire an intersection point of every two adjacent borderlines comprised in the low-pixel image; separately map the acquired intersection points into the original image according to the preset compression ratio; and successively connect the points mapped into the original image, and determine a quadrangle generated after the connection as the target image comprised in the original image.

11. The apparatus of claim 10, wherein the low-pixel image acquisition unit is specifically configured to:

determine a position of each pixel point after compression according to the preset compression ratio; perform image compression processing on the original image by using a fast bilinear interpolation algorithm, to acquire a pixel value of each pixel point after compression; and generate the low-pixel image according to the pixel value and the position of each pixel point after

compression.

12. The apparatus of claim 11, wherein the performing, by the low-pixel image acquisition unit, image compression processing on the original image by using a fast bilinear interpolation algorithm, to acquire a pixel value of each pixel point after compression specifically comprises:

determining, among all original pixel points comprised in the original image, four original pixel points corresponding to each pixel point after compression according to the preset compression ratio; determining, among the four original pixel points corresponding to each pixel point after compression, two pairs of original pixel points in a first direction and two pairs of original pixel points in a second direction, wherein the first direction is a horizontal direction and the second direction is a vertical direction, or, the first direction is a vertical direction and the second direction is a horizontal direction; acquiring first interpolations respectively corresponding to the two pairs of original pixel points of each pixel point after compression in the first direction, and taking the acquired two first interpolations as initial interpolations; or, acquiring second interpolations respectively corresponding to the two pairs of original pixel points of each pixel point after compression in the second direction, and taking the acquired two second interpolations as initial interpolations; calculating an interpolation corresponding to each pixel point after compression according to the initial interpolations corresponding to each pixel point after compression, and determining the pixel value of each pixel point after compression according to the calculated interpolation corresponding to each pixel point after compression.

13. The apparatus of any one of claims 10-12, wherein the borderline determination unit is configured to:

determine a to-be-detected region from the low-pixel image; and perform borderline detection processing on the to-be-detected region according to a gradient value between every two adjacent pixel points in the to-be-detected region, to determine the borderlines of the target image.

14. The apparatus of claim 13, wherein the determining, by the borderline determination unit, a to-be-detected region from the low-pixel image specifically comprises:

binarizing the low-pixel image to convert the low-pixel image into a binary image, wherein the binary image comprises only two colors; performing edge detection processing on the binary image to acquire at least one edge line comprised in the binary image; separately dilating each edge line; connecting each dilated edge line to acquire connected regions; screening the connected regions

according to position information of each connected region respectively, to acquire a specific region, wherein the specific region is a region comprising a specific graphic portion in the target image; and determining a region other than the specific region in the low-pixel image as the to-be-detected region.

15. The apparatus of claim 14, further comprising a Gauss smoothing unit configured to: perform Gauss smoothing on the binary image by using a preset Gauss smoothing parameter before the edge detection processing is performed on the binary image.

16. The apparatus of claim 13, wherein the performing, by the borderline determination unit, borderline detection on the to-be-detected region according to a gradient value between every two adjacent pixel points in the to-be-detected region, to determine the borderlines of the target image specifically comprises:

binarizing the low-pixel image to convert the low-pixel image into a binary image, wherein the binary image comprises only two colors; and executing the following operations in an arbitrary direction: separately comparing a gradient value between every two adjacent pixel points in the to-be-detected region of the binary image in the arbitrary direction with a preset initial gradient threshold corresponding to the arbitrary direction, and acquiring an initial borderline in the arbitrary direction according to the comparison result; and determining the borderlines of the target image respectively according to the number of initial borderlines acquired in each direction.

17. The apparatus of claim 16, wherein the determining, by the borderline determination unit, the borderlines of the target image respectively according to the number of initial borderlines acquired in each direction specifically comprises:

executing the following operations for a detection result in an arbitrary direction: separately performing straight line detection on each initial borderline in the arbitrary direction according to position information of each initial borderline in the arbitrary direction when the number of initial borderlines acquired in the arbitrary direction is at least two, to acquire borderlines in the arbitrary direction from the at least two initial borderlines in the arbitrary direction; or successively decreasing the preset initial gradient threshold corresponding to the arbitrary direction according to a preset first gradient difference when the number of initial borderlines acquired in the arbitrary direction is less than two, and detecting the to-be-detected region of the binary image in the arbitrary direction by using the decreased initial gradient threshold, until the number of initial

borderlines acquired in the arbitrary direction is at least two.

18. The apparatus of claim 13, further comprising: a correction unit configured to:
correct the target image by using a projective transformation algorithm after the target image
comprised in the original image is acquired.