

CLAIMS

1. A method for implementing image enhancement, comprising:

performing filtering processing on a to-be-processed image to obtain an image subjected to the filtering processing;

determining similarity degrees between pixel points in the to-be-processed image and a target region of a target object in the to-be-processed image; and

fusing the similarity degrees, the to-be-processed image and the image subjected to the filtering processing, so that the higher a similarity degree between a pixel point and the target object in the to-be-processed image, the stronger a filtering effect of the pixel point, and the lower a similarity degree between the pixel point and the target object in the to-be-processed image, the weaker a filtering effect of the pixel point

wherein performing filtering processing on the to-be-processed image comprises:

performing filtering processing on the to-be-processed image in a manner of updating pixel values of pixel points at predetermined positions within a sliding window by using a calculation result of pixel values of at least part of pixel points within the sliding window, which comprises:

causing an $N \times N$ sliding window to slide in the to-be-processed image, wherein a side length N of the sliding window is an odd number of pixel points not less than 3;

for any one slide of the sliding window, extracting pixel values of a part of pixel points from pixels values of $N \times N$ pixel points within the sliding window, performing weighted summing on at least one extracted pixel value to obtain an updated pixel value, and replacing pixel values of pixel points at predetermined positions within the sliding window with the updated pixel value, wherein a number of pixel points included in the part of pixel points of which the pixel values are extracted is determined by evaluating a real-time property of image enhancement processing and a picture effect of the image enhancement processing; and

after the sliding window completes all sliding operations in the to-be-processed image, obtaining the image subjected to the filtering processing.

2. The method according to claim 1, wherein sizes of weight values respectively corresponding to the at least part of pixel points are inversely proportional to distances from the at least part of pixel points respectively to a central point of the sliding window.

3. The method according to claims 1 or 2, wherein a ratio of a number of pixel points of the at least part of pixel points within the sliding window to a number of all the pixel points within the sliding window is from 1/10 to 1/30.

4. The method according to any one of claims 1 to 3, wherein the at least part of pixel points comprise multiple pixel points, and the multiple pixel points are uniformly distributed within the sliding window.

5. The method according to any one of claims 1 to 4, wherein the to-be-processed image comprises: image frames in a video; and performing filtering processing on the to-be-processed image comprises:

respectively performing filtering processing on multiple image frames in the video in real time.

6. The method according to any one of claims 1 to 5, wherein the target object comprises: a human face; and the target region comprises: a local skin region on the human face determined based on a human face key point.

7. The method according to claim 6, wherein the local skin region comprises: a square region centered on a nose key point.

8. The method according to claim 6 or 7, wherein if the to-be-processed image is image frames in a video, determining similarity degrees between pixel points in the to-be-processed image and the target region of the target object in the to-be-processed image comprises:

for one image frame in the video, detecting a human face key point in the image

frame in real time, determining the local skin region on the human face according to the detected human face key point, and determining similarity degrees between pixel points in the image frame and the local skin region in real time.

9. The method according to any one of claims 1 to 8, wherein determining similarity degrees between pixel points in the to-be-processed image and the target region of the target object in the to-be-processed image comprises:

- calculating a mean value and a variance of pixel values of the target region according to the pixel values of pixel points in the target region;

- calculating a similarity degree between at least one pixel point and the target region of the target object in the to-be-processed image according to a pixel value of the at least one pixel point in the to-be-processed image, the mean value and the variance; and

- performing normalization processing on the similarity degree.

10. The method according to any one of claims 1 to 9, wherein the similarity degree comprises: a similarity degree based on Red Green Blue (RGB) three channels, a similarity degree based on hue and saturation CrCb channels of an optimization-of-color-video-signal YcrCb space, or a similarity degree based on hue IQ channels of a gray-scale value and hue YIQ space.

11. The method according to any one of claims 1 to 10, wherein fusing the similarity degrees, the to-be-processed image and the image subjected to the filtering processing comprises:

- performing linear superposition on the similarity degrees, the to-be-processed image and the image subjected to the filtering processing.

12. A method for implementing image enhancement, comprising performing filtering processing on a to-be-processed image, and the filtering processing comprises:

- obtaining pixel values of at least part of pixel points within a sliding window; and

- updating pixel values of pixel points at predetermined positions within the sliding

window according to a calculation result of the obtained pixel values of the at least part of pixel points, wherein a number of pixel points included in the at least part of pixel points is determined by evaluating a real-time property of image enhancement processing and a picture effect of the image enhancement processing.

13. An apparatus for implementing image enhancement, comprising:

- a filtering processing module, configured to perform filtering processing on a to-be-processed image to obtain an image subjected to the filtering processing;

- a similarity degree module, configured to determine similarity degrees between pixel points in the to-be-processed image and a target region of a target object in the to-be-processed image; and

- a fusion processing module, configured to fuse the similarity degrees, the to-be-processed image and the image subjected to the filtering processing, so that the higher a similarity degree between a pixel point and the target object in the to-be-processed image, the stronger a filtering effect of the pixel point, and the lower a similarity degree between the pixel point and the target object in the to-be-processed image, the weaker a filtering effect of the pixel point,

- wherein the filtering processing module is configured to perform filtering processing on the to-be-processed image in a manner of updating pixel values of pixel points at predetermined positions within a sliding window by using a calculation result of pixel values of at least part of pixel points within the sliding window,

- wherein the filtering processing comprises:

- causing an $N \times N$ sliding window to slide in the to-be-processed image, wherein a side length N of the sliding window is an odd number of pixel points not less than 3;

- for any one slide of the sliding window, extracting pixel values of a part of pixel points from pixels values of $N \times N$ pixel points within the sliding window, performing weighted summing on at least one extracted pixel value to obtain an updated pixel value, and replacing pixel values of pixel points at predetermined positions within the sliding window with the updated pixel value, wherein a number of pixel points included in the part of pixel points of which the pixel values are extracted is determined by evaluating a

real-time property of image enhancement processing and a picture effect of the image enhancement processing; and

after the sliding window completes all sliding operations in the to-be-processed image, obtaining the image subjected to the filtering processing.

14. An apparatus for implementing image enhancement, comprising a filtering processing module configured to perform filtering processing on a to-be-processed image, and the filtering processing module comprises:

a pixel point extracting unit, configured to obtain pixel values of at least part of pixel points within a sliding window; and

a filtering processing unit, configured to update pixel values of pixel points at predetermined positions within the sliding window according to a calculation result of the obtained pixel values of the at least part of pixel points, wherein a number of pixel points included in the at least part of pixel points is determined by evaluating a real-time property of image enhancement processing and a picture effect of the image enhancement processing.

15. An electronic device, comprising:

a memory, configured to store a computer program; and

a processor, configured to execute the computer program stored in the memory, wherein when the computer program is executed, the following instructions are run:

an instruction for performing filtering processing on a to-be-processed image to obtain an image subjected to the filtering processing;

an instruction for determining similarity degrees between pixel points in the to-be-processed image and a target region of a target object in the to-be-processed image; and

an instruction for fusing the similarity degrees, the to-be-processed image and the image subjected to the filtering processing, so that the higher a similarity degree between a pixel point and the target object in the to-be-processed image, the stronger a filtering effect of the pixel point, and the lower a similarity degree between the pixel point and the target

object in the to-be-processed image, the weaker a filtering effect of the pixel point,

the instruction for performing filtering processing on the to-be-processed image is specifically:

an instruction for performing filtering processing on the to-be-processed image in a manner of updating pixel values of pixel points at predetermined positions within a sliding window by using a calculation result of pixel values of at least part of pixel points within the sliding window, which is specifically:

an instruction for causing an $N \times N$ sliding window to slide in the to-be-processed image, wherein a side length N of the sliding window is an odd number of pixel points not less than 3;

for any one slide of the sliding window, an instruction for extracting pixel values of a part of pixel points from pixels values of $N \times N$ pixel points within the sliding window, performing weighted summing on at least one extracted pixel value to obtain an updated pixel value, and replacing pixel values of pixel points at predetermined positions within the sliding window with the updated pixel value, wherein a number of pixel points included in the part of pixel points of which the pixel values are extracted is determined by evaluating a real-time property of image enhancement processing and a picture effect of the image enhancement processing; and

after the sliding window completes all sliding operations in the to-be-processed image, obtaining an image subjected to the filtering processing.

16. An electronic device, comprising:

a memory, configured to store a computer program; and

a processor, configured to execute the computer program stored in the memory, wherein when the computer program is executed, an instruction for performing filtering processing on a to-be-processed image is executed, and the instruction for performing filtering processing on a to-be-processed image comprises:

an instruction for obtaining pixel values of at least part of pixel points within a sliding window; and

an instruction for updating pixel values of pixel points at predetermined positions

within the sliding window according to a calculation result of the obtained pixel values of the at least part of pixel points, wherein a number of pixel points included in the at least part of pixel points is determined by evaluating a real-time property of image enhancement processing and a picture effect of the image enhancement processing.

17. A computer-readable storage medium, having a computer program stored thereon, wherein when the computer program is executed by a processor, the method according to any one of claims 1 to 12 is implemented.