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LOW-QUALITY IMAGE ENHANCEMENT ALGORITHMS

The article is devoted to an algorithm for improving two types of low-quality amateur image.

INTRODUCTION

As an important source of visual information acquisition, images are the most used information carrier in human activities. However, image quality is often challenged due to various factors such as noise, blur, and distortion. [1]

This article aims to improve the image quality for several common low-quality image types. One is the improvement of image quality at low light intensity, the other is motion blur image quality improvements.

I. IMPROVEMENT OF IMAGE QUALITY AT LOW LIGHT INTENSITY

Low-light images are an extremely common phenomenon when taking photos at night. Insufficient illumination will greatly reduce the visual quality of the image. The loss of details and low contrast not only lead to annoying subjective feelings, but also affect the performance of many computer vision systems . In the past decade, many researchers have studied low-light image enhancement and proposed various techniques. Such as Histogram Equalization (HE) and its improvements. [2] Histogram equalization achieves this function by effectively expanding the commonly used brightness.The following is its principle formula:

$$J(x, y) = (L - 1) * CDF(I(x, y)$$

whereas the original image be I, the equalized image be J, and the gray level of the image be L (usually 256).Among them, CDF represents the cumulative distribution function, which calculates the cumulative probability of the occurrence of pixels at each gray level.

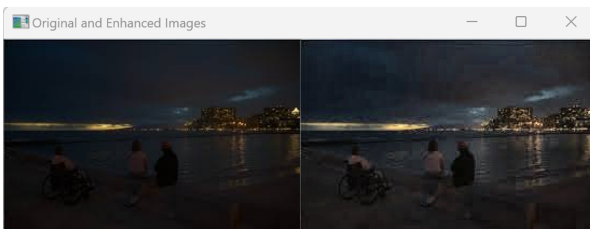The following are the original and improved images, they are shown in figure 1:

Рис. 1 – Figure 1 - The original and improved low light images

II. MOTION BLUR IMAGE QUALITY IMPROVEMENTS

Motion blur is a common type of image blur that is caused by the movement of the camera or an object.Motion blur can be caused by several factors: The first is camera Motion Blur.This usually happens when taking handheld photos, when the camera shakes, or when the camera tracks a moving object. The second is the blurred object movement. For example, when photographing a fast-moving vehicle or athlete, their shape can leave a blurry trail on the image. The third is blurry lens movement. his usually happens during zoom or focusing, and when the lens is adjusting the focal length or focal plane, it can cause blurry images.

Motion blur can be mitigated or avoided by reducing camera movement, using a camera with a faster shutter speed, using a stabilizer or tripod, increasing flash brightness, and more. In addition, in post-image processing, some deblurring algorithms can also be used to try to restore the clarity of the image.
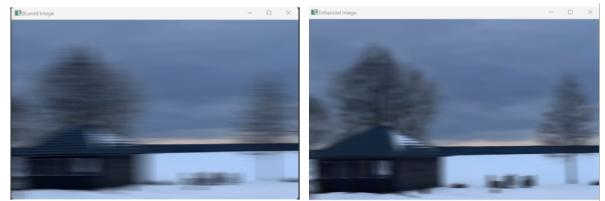

Рис. 2 – Figure 2 - The original and improved images

III. CONCLUSION

It has been provided several improvements in common low-quality images, including improved image quality in low-light conditions and improved image quality in motion-blur images. Through these example, it has been demonstrated the effectiveness and potential of image quality improvement algorithms based on feature extraction in practical applications.

1. Chenxue Yang, Research on image feature learning methods and applications/ page 1.
2. Yanling Chen, Research on low-light image enhancement algorithm / Page 1.

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