

IMPROVING IMAGE QUALITY ALGORITHMS

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This article mainly introduces image feature extraction and briefly introduces how to improve image quality through image feature extraction.

INTRODUCTION

Image features mainly include color features, texture features, shape features and spatial relationship features of images.

The color feature is a global feature, which describes the surface properties of the scene corresponding to the image or image area; the texture feature is also a global feature, which also describes the surface properties of the scene corresponding to the image or image area; there are two types of shape features Representation methods, one is contour features, the other is regional features. The contour features of the image are mainly aimed at the outer boundary of the object, while the regional features of the image are related to the entire shape area; the spatial relationship features refer to the segmentation of the image. The mutual spatial position or relative direction relationship between multiple objects, these relationships can also be divided into connection/adjacency relationship, overlapping/overlapping relationship and inclusion/inclusive relationship, etc.

Feature extraction is a concept in computer vision and image processing. It refers to using a computer to extract image information to decide whether each image point belongs to an image feature. The result of feature extraction is to divide the points on the image into different subsets, which often belong to isolated points, continuous curves or continuous regions. The data obtained by image feature extraction further improves the image quality step by step.

I. THE IMPORTANCE OF FEATURE EXTRACTION TO IMPROVE IMAGE QUALITY.

Feature extraction occupies a crucial position in computer vision, especially in traditional computer vision algorithms. For example, the more famous target recognition models such as HOG and DPM, the main research experience is in image feature extraction. aspect. Image enhancement can effectively enhance the valuable information in the image, improve the image quality, and meet the needs of some feature analysis. Therefore, it can be used in computer vision data preprocessing, which can effectively improve the quality of the image, thereby improving the target recognition. precision.

II. IMAGE ENHANCEMENT

Image enhancement consists of modifying some characteristics of the original image, such as sharpness and noise removal, so that the resulting image can be used in specific applications . Since this paper deals with an improvement of extraction and matching of gradient-based image features, we focus on contrast enhancement, which is to provide a better extraction of features

To enhance image contrast, grayscale transformation methods are usually used, such as gamma correction and histogram equalization . These work in many ways. For example, but some require parameter adjustment and may not be effectively enhanced local image regions in grayscale and color images. Retinex is an effective comparison method enhance color images applied in real scenes.

III. THE METHODS OF THE IMAGE ENHANCEMENT

1. Gamma Correction

Gamma correction is usually used for adjusting the different characteristics in brightness and color between monitors. The gamma coefficient is introduced to characterize the non-linear relationship between the pixel value and its actual luminance . The higher the gamma value is, the steeper the curve of this relationship is, thereby causing the increase of contrast. Gamma correction is defined as: $I' = I(\text{gamma})$

where I is the original image, I' is the correction result, and $\text{gamma} = [-\infty, \infty]$. We should choose an appropriate gamma value for an effective conversion. In our case, it is necessary to adjust the value on an image-by-image due to a variety of illumination conditions over scenes.

2. Histogram Equalization

The objective of histogram equalization is to convert the images so that the cumulative probability of pixel values becomes linear. This is achieved by converting each pixel value to the new one so that the number of pixels in each bin of the intensity histogram becomes as similar as possible, without inverting the pixel orders in terms of intensity.

The effect of histogram equalization is image enhancement, which is very useful for images where both the background and foreground are too bright or too dark. Histogram is a statistical method. According to the statistics of the probability of each pixel value in the image, the pixels of the image

are redistributed according to the probability distribution function to achieve the effect of image stretching, and the image pixel values are evenly distributed between the minimum and maximum values. between pixel levels.

3. Sharpening with Unsharp Masking

Image sharpening using unsharp masking is another image enhancement method. The process is to first blur the original image (unsharpen the mask), then subtract the blurred image from the original. This method is effective for contrast enhancement.

4. GAN-based low-light enhancement method

EnlightenGAN is a method that can be easily shelved to improve images. Acquired in low-light environments, as it removes the reliance on training data and it allows processing of various images from different domains.

IV. COMPARISON OF IMAGE ENHANCEMENT METHODS.

It can be seen the improvement of the histogram equalization and image sharpening methods, and the comparison chart of the image enhancement methods below.



Figure 1 – Figure 1 :Original



Figure 2 – Figure 2 :Histogram equalization



Figure 3 – Figure 3 :Gamma correction



Figure 4 – Figure 4 :Sharpening



Figure 5 – Figure 5 :EnlightenGAN

V. CONCLUSIONS AND FUTURE WORK

This article mainly describes the centralized image enhancement method that changes the extracted data by changing the characteristics of the image. Through this article, it can be found that through image analysis, the quality of the image can be improved, and then the computer vision resolution can be improved. This is very helpful for the follow-up study.

1. S. Patil and S. R. Patil, "Enhancement of featureextraction in image quality," in 2019 Third International conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud)(I-SMAC), pp. 490–495, IEEE, 2019.
2. E. Salahat and M. Qasaimeh, "Recent advances in features extraction and description algorithms: A comprehensive survey," in 2017 IEEE International Conference on Industrial Technology (ICIT), pp. 1059–1