

Retraction

Retracted: Retinex Algorithm and Mathematical Methods Based Texture Detail Enhancement Method for Panoramic Images

Mathematical Problems in Engineering

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

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- [1] Y. Kang, "Retinex Algorithm and Mathematical Methods Based Texture Detail Enhancement Method for Panoramic Images," *Mathematical Problems in Engineering*, vol. 2022, Article ID 6490393, 8 pages, 2022.

Research Article

Retinex Algorithm and Mathematical Methods Based Texture Detail Enhancement Method for Panoramic Images

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A panoramic image texture detail enhancement method based on the Retinex algorithm is proposed to work on the nature of panoramic images. Firstly, the panoramic image is collected, then the panoramic image is preprocessed through brightness enhancement, the brightness of the preprocessed panoramic image is normalized, and the panoramic image is optimized and increased by the improved Retinex algorithm. Finally, the simulation test of the panoramic image was carried out. The results show that the improved Retinex algorithm works on the sign to-commotion proportion of the panoramic image. Furthermore, the time required to enhance the panoramic texture detail is short, which can meet the practical requirements of panoramic image subsequent processing.

1. Introduction

Panoramic image displays portray however much of the general climate as could be expected through wide-point articulation, painting, photographs, recordings, three-layered models, etc., 360 display, or at least, catching the image data of the whole scene with an expert camera or delivering the image with demonstrating programming, utilizing the product to gather the image and playing it with a unique player, that is to say, changing the plane photograph or PC displaying the picture into a 360 degree display for computer generated reality perusing and recreating the two-layered plan into a genuine three-layered space and introducing it to the watcher. It uses a wide-angle means of expression, a new way to show the surrounding world from a new perspective and can show all the surrounding scenery as much as possible, so it has attracted more and more attention [1].

Compared with general renderings and 3D animation, the panorama has the following advantages: it avoids the effect that the general plane effect drawing has a single perspective and can not bring an all-round feeling. The picture effect is exactly the same as the general effect drawing when playing on this machine; it is highly

interactive and can be manipulated by customers to interactively observe the scene from any angle, just like immersive and truly feel the final design result, which is also different from the lack of interactive 3D animation; the price is only slightly higher than the general effect drawing. Compared with the three-dimensional animation of hundreds of yuan per second, it is economical and short production cycle. All directions: all the scenes within the 360 degree sphere are displayed in an all-round way; in the example, you can press and drag with the left mouse button to view all directions of the scene; scene: real scene, real scene. Most of the three-dimensional real scenes are images assembled on the basis of photos, which retain the authenticity of the scene to the greatest extent; 360: 360 degree look around effect. Although the photos are planar, the 360 real scene obtained after software processing can give people a three-dimensional spatial feeling, making the viewer feel like he is in it. Notwithstanding, the nature of panoramic images gathered under unfortunate lighting conditions, such as night and shadow, degrades, primarily in the aspects of uneven overall brightness, low contrast, and dark color of the image, which genuinely affects the enhanced visualization of panoramic images and acquaints a few troubles with

ensuing PC vision handling undertakings (for example, image division, target following, target acknowledgment, etc.) [2, 3]. As a result, research into the low illumination panoramic texture detail enhancement algorithm is critical for the field of machine vision.

The study of [4] proposed a fractal image texture detail enhancement method based on Newton iterative algorithm; Newton iterative algorithm is used to obtain the extreme value of fractal image coordinates and set the iterative initial point value. The rotation transformation of the image around the origin 120° completes the zero point attraction domain mapping; the RGB color channel expression is constructed by using iterative distance parameters, initial parameters, initial color value, color gradient parameters, and relevant operation symbols, and the number of meshes covering the target part of the image is calculated. The relationship between compression mapping and compression factor is obtained by calculating shrinkage affine transformation, and the texture detail enhancement is completed by iterative calculation. The study of [5] separates caries-related highlights from a computerized display got by vatech 400 gear utilizing image texture examination in view of the dim level coevent framework (GLCM) algorithm. The advanced image is first placed into the PC, then changed over completely to grayscale, the extraction cycle is handled and denoised, the measurable highlights of the GLCM lattice are extricated, and lastly the best elements are picked. Image enhancement is acknowledged, therefore. A powerful panoramic image delivering and smooth progress algorithm for contiguous perspectives was proposed in reference [6]. The element points of contiguous perspective images are extricated first, then the nearby point matches are laid out utilizing a powerful matching algorithm, and the matching triangle is shaped utilizing a similar name focuses. Then, at that point, a unique change model is made by at the same time controlling the shape and texture of every triangle. Finally, the dynamic transition model is superimposed on top of the 360-degree panoramic roaming scene to achieve a smooth transition between adjacent viewpoints. The consequences of the analyses show that this technique enjoys clear benefits in visual execution and visual movement.

The panoramic image can show all the scenes within a 360 degree sphere as a new way to show the new perspective of the surrounding world. In the process of panoramic image acquisition, because of the weather's influence, illumination, and other factors, the quality of the acquired panoramic image becomes worse, which is difficult to meet people's visual requirements and brings difficulties to the subsequent panoramic image processing operations. The existing methods mainly achieve the purpose of image enhancement through modern digital technology. There are two main purposes for panoramic texture detail enhancement: one is to improve the clarity of the image [7], and the other is to work on the special visualization of the image, so as to make interesting information or useful image detail information in the image more prominent [8]. In order to achieve a better image visual effect, a panoramic image texture detail enhancement method based on the Retinex algorithm is

proposed, and its performance is tested by comparative experiments.

2. Panoramic Texture Detail Enhancement Method Based on Retinex

In terrible circumstances, for example, climate and light, the brilliance and differentiation of the gathered panoramic image are generally low. To work on the general brilliance of the low-light panoramic image, make the detailed information of the object in the image clearer and make it a good visual effect, the research on high-quality image enhancement algorithm has attracted the attention of many scholars at home and abroad, it has as of late turned into a hotly debated issue in the field of image handling. Retinex theory was first proposed by Land, also known as color constancy theory, which is widely used in image enhancement. In recent years, based on the theory of the Retinex algorithm, many improved Retinex algorithms have been proposed by scholars at home and abroad. However, a large number of experimental results show that the Retinex theory still has the defects of "halo artifact," image over enhancement, and low algorithm efficiency. In order to further make the Retinex algorithm have a better image enhancement effect and better retain the object detail information in the image, aiming at the shortcomings of the current Retinex algorithm, a panoramic texture detail enhancement method based on improved Retinex is proposed in this paper.

2.1. Panoramic Texture Detail Enhancement Process. The illumination intensity has a great impact on the panoramic image. Strong and weak illumination intensity will reduce the accuracy of image environment information [9]. The flow chart of panoramic texture detail enhancement under different illumination intensity is shown in Figure 1. The CIEXYZ color space method is used to identify the light power information in the image. After the recognition of the light power information in the image is completed, the low illumination part and high illumination part in the image are normalized [10], so as to solve the influence of the change of light power on the panoramic image when the light intensity is insufficient or too strong. The normalized panoramic image is enhanced by the improved Retinex algorithm.

2.2. Image Brightness Enhancement. Although noise removal can effectively improve image quality, multisource data are information transmitted in different ways, which will be limited by terminal hardware and reduce its own contrast. Therefore, this paper uses the multisource big data analysis method to analyze the color unevenness of small feature points in the image and enhance the brightness of the panoramic image on the basis of single-scale Retinex [11] for followup work.

In general, a panoramic image can be described as follows:

$$S(x, y) = L(x, y) \times R(x, y), \quad (1)$$

where $S(x, y)$ represents the initial image, $L(x, y)$ represents the data image after adaptive median filtering [12], and

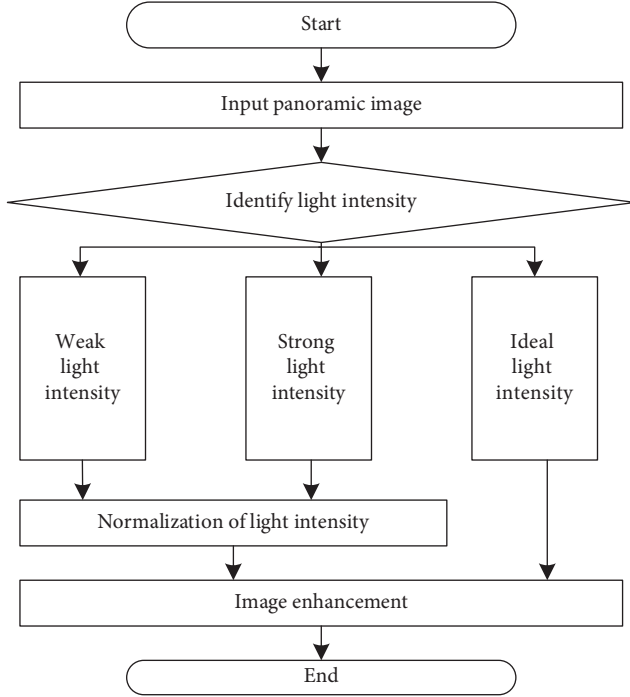


FIGURE 1: Flow chart of panoramic texture detail enhancement.

$R(x, y)$ represents the reflection image. Retinex can be obtained by merging and converting the above-given three images into the corresponding number field:

$$lbR(x, y) = lbS(x, y) - lb[F(x, y) \otimes S(x, y)], \quad (2)$$

where lb is the conversion coefficient and $F(x, y)$ is the center surround function. The center surround function can be further obtained according to (2):

$$F(x, y) = \lambda \exp \left[-\frac{(x^2 + y^2)}{c^2} \right]. \quad (3)$$

where c represents the scale of the surrounding function, and λ represents a scale in the scale of the surrounding function.

According to the above-given results, the Gaussian model [13, 14] is substituted into the traditional model to obtain the average brightness, enhance the panoramic image and improve the image edge feature comparison. According to the model, the color space conversion can be completed to obtain the brightness component I :

$$I(x, y) = \max\{I_R(x, y), I_G(x, y), I_B(x, y)\}, \quad (4)$$

where (x, y) represents the color component in the panoramic image, and $I_R(x, y)$, $I_G(x, y)$, and $I_B(x, y)$ address the RGB (red, green, and blue) color component. The average brightness $\bar{I}(x, y)$ can be further obtained according to bilateral filtering:

$$\bar{I}(x, y) = G_r(x, y) G_u \lg \frac{1 + I(x_i, y_i)}{\sum_{i=1}^m G_r(x, y) G_u} \quad (5)$$

where m represents the color of a region in the image, $G_u(x, y)$ represents the traditional Gaussian kernel function,

and $G_r(x, y)$ represents the kernel function close to the Gaussian state in the color space [15], which can be obtained:

$$\begin{aligned} G_r(x, y) = & \lambda_1 \exp\{-(x^2 + y^2)/(2\sigma_1^2)\} \\ & - \lambda_2 \exp\{-(x^2 + y^2)/(2\sigma_2^2)\} \\ & + \lambda_3 \exp\left\{-\frac{(x^2 + y^2)}{(2\sigma_3^2)}\right\}, \end{aligned} \quad (6)$$

where r represents the radius distance of the calculated filter, λ_1 and λ_2 represent the peak value coefficients around the middle and center points, respectively, λ_3 represents the edge peak value, and $\sigma_1, \sigma_2, \sigma_3$ represents the scale coefficient.

During the enhancement process, the scale value and quantity can be related to the final result [16]. Assuming that the surround function and the center function only enhance one-sided areas and do not enhance all pixel areas, the result will be unsatisfactory. The gain constant is the standard constant in the formula. The value is calculated after the fusion of the center function and the surround function, which can avoid one-sided enhancement. In order to ensure a uniform luminance pixel value, the constant a is substituted into the kernel function in the calculation to obtain the optimal value. The enhanced image $R_j(x, y)$ is

$$R_j(x, y) = \lg \left[a_j \times \frac{I(x, y)}{F_j(x, y) \times I(x, y)} \right], \quad j = 1, 2, 3. \quad (7)$$

The enhanced luminance component I is expressed as follows:

$$I(x, y) = \frac{1}{3} \left\{ a_1 a_2 a_3 \frac{I(x, y)^3}{G_1(x, y) \times G_2(x, y) \times G_3(x, y)} \right\}, \quad (8)$$

where a_1, a_2, a_3 represents the gain constant with difference.

2.3. Brightness Normalization. For the image whose recognition result is that the illumination intensity is too high or too low, the panoramic image can be equalized by the illumination normalization method [17, 18], which is convenient for the subsequent texture detail enhancement.

- (1) Gamma correction. Traditional gamma correction usually changes the brightness of the input image, and it is difficult to achieve a good enhancement effect in both too dark and too bright areas at the same time. The bilateral gamma correction curve designed in this paper can improve the visual effect of over dark area and over the bright area in the input image at the same time. Multiscale image decomposition can make the image brightness and detail processed separately. The image's brightness information is primarily concentrated in low frequency, while detail information is primarily concentrated in high frequency. Based on the above-given two points, this paper realizes image gamma correction by editing the gamma curve of the panoramic image [19, 20], edits the nonlinear tone of the image,

separates the light color part and dark part in the image signal, and uses gamma correction to compress and expand the high gray value and low gray value of the image, respectively, to improve the image contrast, reduce the influence of illumination intensity on panoramic image quality. The gamma correction formula is as follows:

$$I_{out} = \left(\frac{I_{in}}{\max \text{gray}} \right)^{(1/\lambda)} \max \text{gray}, \quad (9)$$

where I_{in} and I_{out} , respectively, represent the original gray value and the corrected gray value of the input panoramic image; $\max \text{gray}$ and λ represent the maximum gray value and correction coefficient of the input image, respectively.

- (2) Gaussian differential filtering. Gamma correction is used to improve the contrast of the panoramic image, and the shadow area of the image edge still needs further processing. The edge of the panoramic image is extracted by band-pass filter and Gaussian difference filter [21, 22], so as to reduce the influence of illumination intensity on the edge region of the panoramic image. The panoramic image $I(x, y)$ is filtered by a Gaussian difference filter, also, the equation is as per the following:

$$G(x, y) = \frac{1}{\sqrt{2\pi}\varphi_1} \exp\left[-\frac{x^2 + y^2}{2\varphi_1^2}\right] - \frac{1}{\sqrt{2\pi}\varphi_2} \exp\left[-\frac{x^2 + y^2}{2\varphi_2^2}\right], \quad (10)$$

where φ_1 and φ_2 are Gaussian differential filter coefficients, and $\varphi_1 < \varphi_2$.

$$g(x, y) = G(x, y) * I(x, y). \quad (11)$$

Formula (10) and formula (11) are Gaussian difference filter and filtering processing results, respectively.

2.4. Improved Retinex Texture Detail Enhancement Algorithm.

For the normalized image, the improved Retinex algorithm is used to enhance the texture details. The panoramic image is down sampled by Gaussian pyramid, and the sampling is completed by even line sampling and convolution sampling. The sampling formula is as follows:

$$G_{h+1}(i, j) = \sum_{m=-2}^2 \sum_{n=-2}^2 R(m, n) G_h(2i - m, 2j - n), \quad (12)$$

where m addresses the quantity of lines, n addresses the quantity of sections, and h and $R(m, n)$ represent pyramid algebra and Gaussian convolution kernel respectively.

The Gaussian weight is obtained by pixel difference and spatial distance. The points with a large difference in peripheral pixel values and the center point is the minimum or maximum are noise points. The noise points are processed by reducing the center weight. Filter the x -axis direction and y -axis direction of the image, respectively and obtain the filter function as follows:

$$I(x) = z^{-1}(x) (o(\psi, x) + s(f(\psi), f(x))) d\psi, \quad (13)$$

where ψ and $z(x)$, respectively, represent the sum of spatial pixels and the weight normalized to the result, and o and s , respectively, represent the distance function and similarity function.

After bilateral filtering, the image contrast is compressed to avoid image degradation [23]. The bicubic difference algorithm is used to restore the image, obtain accurate interpolation graphics through the four neighborhood pixel information of the image, and enhance the image magnification effect. The bicubic difference formula is as follows:

$$D(X, Y) = \sum_{i=0}^3 \sum_{j=0}^3 w_{ij} W(i) W(j), \quad (14)$$

where w_{ij} represents the weight coefficient; $W(i)$ and $W(j)$ represent abscissa weight and ordinate weight, respectively.

After the bicubic difference processing is completed, the handled image is deducted from the first image in logarithmic space, and the color constancy and detail enhancement of the image are realized based on the constant scale.

3. Simulation Experiment

In order to test the texture detail enhancement method of panoramic image based on the Retinex algorithm studied in this paper and optimize the effectiveness of panoramic image, 10 panoramic images under different illumination were selected from a website, and the enhancement effects of multiple low illumination panoramic images are compared on the MATLAB experimental platform (CPU Intel (R) core (TM) i5-2320 3.0 GHz); The effectiveness of texture details is enhanced through subjective visual effect and objective quality evaluation.

In order to verify the advantages of texture detail enhancement of this method, Newton iterative algorithm (reference [4]) and GLCM algorithm (reference [5]) are selected as comparison methods. Brightness, information entropy, clarity, mean square error (MSE), and peak signal-to-noise ratio (PNSR) are used as objective test indicators. The specific evaluation indicators are shown in Table 1.

The parameters for setting the target image are shown in Table 2.

According to the above parameter settings, the texture detail enhancement simulation is carried out. The original image is shown in Figure 2.

Taking the image of Figure 2 as the research sample, the panoramic image texture detail enhancement processing is carried out. Through the comparative test of the methods in reference [4] and reference [5], the panoramic image texture detail enhancement results are obtained, as shown in Figure 3. Figure 3 shows that the output quality of panoramic image texture detail enhancement by this method is better than the traditional method, the definition is higher, and the image's brightness and contrast are more balanced.

The results of detailed visual communication are shown in Figure 4. According to the analysis of Figure 4, the

TABLE 1: Evaluation index content.

Objective evaluation index	Index content
Brightness	The brightness of the picture, an image gives people an intuitive feeling.
Information entropy	It addresses the typical measure of data in the image. The higher the entropy, the more information there is.
Definition	It not just mirrors the image's little detail difference and texture change qualities, but it also reflects the image's clarity. The greater the size, the better.
Mean square error (MSE)	The greatness of the mean square worth of the pixel contrast between the first image and the contorted image decides the bending level of the twisted image.
Peak signal to noise ratio (PNSR)	It is typically used to compare the quality of an image after compression to the original image. The lower the distortion after compression, the higher the PSNR.

TABLE 2: Experimental parameters.

Parameter	Numerical value
Light intensity	125 dB
Intensity of image pixels	249×350
Resolution of image spatial sampling	360×360
Feature matching coefficient	0.21
Pixel spatial gain	0.02



FIGURE 2: Panoramic image.

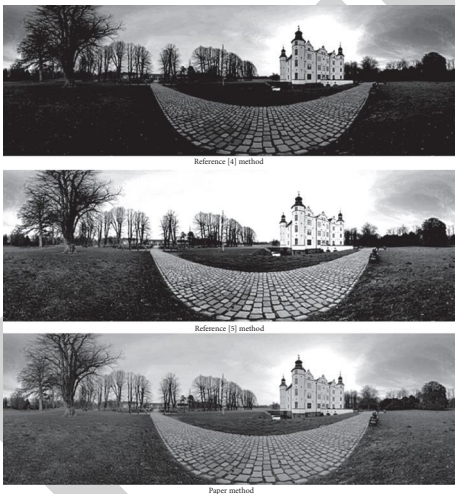


FIGURE 3: Comparison of texture detail enhancement results of panoramic image.

panoramic image texture detail enhancement method in this paper has good visual communication ability and high output quality of image imaging. The brighter parts in the original image still maintain rich texture details, while the parts with weak reflected light at the rear of the wheel are compensated by illumination, and the contrast is also improved.

Based on the above-given experiments, the fitness of the three methods after enhancement in Figure 4 is compared, as shown in Figure 5.

As can be seen from Figure 5, the image enhanced by the method in reference [5] has the slowest convergence speed and the lowest fitness, and the average fitness fluctuation is relatively gentle, but the fitness convergence is limited; The average fitness convergence speed of the image enhanced by the method in reference [4] is higher than that of the method in reference [5], but it is still slower than that of the method in this paper. The average fitness curve fluctuates greatly and is in an extremely unstable state; the average fitness of this strategy is significantly greater than reference [4] and reference [5], and the fluctuation of average fitness is relatively flat.

The image quality of panoramic texture details enhanced by three methods is detected from the three indexes of image brightness, information entropy, and definition. The statistical results are shown in Table 3. As per the comparison results in Table 3, the brightness of the panoramic image optimized by this method is between 120 cd/M and 130 cd/m, the information entropy is higher than 7.4 bit and the definition is higher than 5; The brightness of the panoramic image optimized by the comparison method is between 90 cd/M and 140 cd/m, the information entropy is less than 7 bit and the definition is less than 5. The comparison results show that the brightness of the panoramic image optimized by this method is very uniform, there is no high or low brightness, has high information entropy and clarity, and the optimized image quality is high. It is verified that this method has a high optimization effect [18, 24, 25].

Taking 10 min as a unit time, the changes of the number of texture details in the panoramic image are recorded in 6 unit times respectively. After being optimized by three groups of algorithms.

Table 4 shows that as the experimental time is increased, the number of texture details in this method maintained a significant upward trend in the first two unit times, maintained a small upward trend from the third unit time, and continued to remain stable in the fifth and sixth unit times, with the maximum value of the full name reaching $10.3 \times 1011T$; the number of texture details in reference [4] and reference [5] methods always keeps the change trend of rising and falling alternately, the phased maximum value continues to decrease, the phased minimum value basically remains unchanged, and the global maximum value reaches $8.9 \times 1011t$ and $7.6 \times 1011t$, much lower than the method in this paper. To sum up, the application of visual image antioclusion moving target



FIGURE 4: Visual communication results of texture detail enhancement.

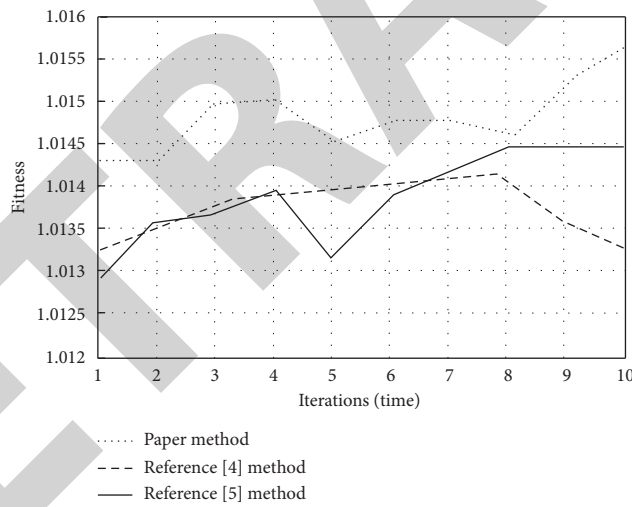


FIGURE 5: Fitness comparison chart.

TABLE 3: Comparison of image quality after optimization by different methods.

Image serial number	Paper method			Reference [4] method			Reference [5] method		
	Brightness	Information entropy	Definition	Brightness	Information entropy	Definition	Brightness	Information entropy	Definition
1	128.6	7.8	5.8	90.5	6.5	2.8	91.5	5.6	3.6
2	125.6	7.4	5.6	135.6	6.8	3.5	94.5	5.8	4.5
3	127.5	7.5	5.7	105.6	6.7	3.4	115.4	5.7	3.8
4	123.5	7.6	5.6	98.5	6.4	3.6	139.5	5.6	3.9
5	124.5	7.5	5.9	138.5	6.2	3.5	135.4	5.8	3.7
6	129.5	7.4	5.4	139.5	5.8	2.9	107.4	5.7	3.5
7	124.5	7.5	5.2	110.4	6.4	3.4	106.8	5.9	4.8
8	123.5	7.6	5.9	98.5	6.5	3.5	105.4	6.1	4.1
9	122.4	7.8	5.4	97.5	6.1	4.7	96.5	6.5	3.5
10	126.5	7.5	5.6	96.5	5.9	4.1	94.5	6.4	3.9

TABLE 4: Comparison of texture details per unit time.

Unit time group	Paper method		Unit time group	Reference [4] method		Unit time group	Reference [5] method	
	Experimental time/(min)	Number of texture details/ $(\times 10^{11}T)$		Experimental time/(min)	Number of texture details/ $(\times 10^{11}T)$		Experimental time/(min)	Number of texture details/ $(\times 10^{11}T)$
1	5	6.9	1	5	7.6	1	5	6.3
	10	8.5		10	8.9		10	7.6
	15	9.7		15	7.7		15	6.4
2	20	9.8	2	20	8.8	2	20	7.5
	25	9.9		25	7.6		25	6.3
3	30	10	3	30	8.7	3	30	7.4
	35	10.1		35	7.6		35	6.3
4	40	10.2	4	40	8.6	4	40	7.3
	45	10.3		45	7.6		45	6.3
5	50	10.3	5	50	8.5	5	50	7.2
	55	10.3		55	7.7		55	6.4
6	60	10.3	6	60	8.4	6	60	7.1

tracking algorithm in augmented reality can ensure a stable increase in the number of texture details per unit time.

To sum up, this method uses the multi-scale decomposition method to construct the patch visual information detection model of the panoramic image, so as to realize the visual communication and information enhancement of the panoramic image. Compared with the traditional methods, this method improves the detection and recognition rate, contrast, brightness, illumination compensation, and detail enhancement of the panoramic image. It can produce an enhanced image with a good visual effect and improve the processing ability of texture detail enhancement of panoramic image [26–28].

4. Conclusion

Image enhancement innovation is one of the essential assignments of present day PC vision and advanced image handling. The implementation of this operation is to further improve the human sensory ability to observe images, better analyze and process the contents contained therein and enhance the readability of images. Retinex is an image enhancement theory based on scientific testing and scientific analysis. It simulates the way the human visual system perceives brightness and color under differentiated lighting conditions. Retinex theory holds that the reflection ability of an object to light determines the color of the object. Its essence is to obtain the reflection component of the object in the image without the illumination component, to reestablish the first appearance of the item. In contrast with other customary image enhancement strategies, the image enhancement model and algorithm in light of the Retinex hypothesis work on the image's edge, constant color, and large dynamic compression range, so that the image can obtain the maximum color stability without change and distortion, also, genuinely reestablish the first appearance of the article in the image.

The force of the light essentially affects the delivering impact of a panoramic image. The panoramic image enhancement under different illumination intensities is

studied, the illumination intensity of the panoramic image is recognized, the illumination normalization is implemented for the images with high and low illumination intensity, and the improved Retinex algorithm is utilized to understand the panoramic image enhancement handling and complete the image enhancement. The exploratory outcomes demonstrate the way that the examination technique can streamline top notch images in a short measure of time. The optimized image can retain more image details and has a high image enhancement effect. The image is optimized because it has a high peak signal-to-noise ratio and a low image mean square blunder, which can meet the actual needs of panoramic image enhancement.

Data Availability

The data used to support the findings of this study are included within the article.

Conflicts of Interest

The author declares that there are no conflicts of interest.

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