Hindawi
Wireless Communications and Mobile Computing
Volume 2022, Article ID 9208495, 11 pages
https://doi.org/10.1155/2022/9208495

Research Article

3D Animation Graphic Enhancing Process Effect Simulation Analysis

Bing Liu,[1] **Huiying Liu**,[1] **and Vinh Phuc Dung**[2]

[1]*College of Art and Design, Jimei University, Xiamen 361021, China*
[2]*Department of Computer Science, Saigon University, Ho Chi Minh City 700000, Vietnam*

Correspondence should be addressed to Vinh Phuc Dung; dungvinhphuc@sg.edu.vn

Received 21 June 2022; Revised 7 July 2022; Accepted 12 July 2022; Published 22 July 2022

Academic Editor: Kalidoss Rajakani

Processing of graphics is the intermediate stage of an animated film. The adequacy of the preproduction preparation often requires the creators to repeatedly discuss a series of issues such as the story of the script, the structure of the play, the style of the art design and the setting of the scenes, the shape of the characters, and the style of the music. The study of the process of 3D animation graphics enhancing effect optimization can effectively improve the visual effect of images. The optimization of the effect of authenticity of 3D animation graphics requires the optimization of lighting of animation graphics, and the optimization of texture processing of images by extending the shadow map method to complete the optimization of the effect of authenticity of animation graphics. Image enhancement is a very important branch in the field of digital processing of graphics. It is a method of making some transformations to the information or data of an image by some strategy to make the region of interest more prominent in the image while suppressing the secondary information that does not need to be enhanced, with the ultimate goal of making the image conform to the visual response characteristics. It is in this context that this paper proposes to build a process of graphics simulation platform to simulate and analyze the effect of process of 3D animation graphics enhancing. The experimental results show that the enhancement of graphics reduces the running time by 16.5 s and 14.3 s compared to the CDD and FMM algorithms, respectively, and that the MSE and PSNR are both improved, indicating that the enhancement of graphics effectively improves the restoration effect while running quickly. Therefore, it is confirmed that the process of 3D animation graphics enhancing effect has a good balance to obtain a more desirable animation in 3D enhancement effect.

1. Introduction

The continuous development of computer technology has led to an increasing ability to process graphics in different forms, which has led to a propulsive development of processing of graphics technology [1]. The process of 3D animation graphics enhancing effect technology is processing of graphics is one of the key technologies in processing of graphics [2]. 3D animation images are made by computer 3D technology, and the optimization of its realism effect is the realistic and delicate reproduction of lighting and atmosphere range, etc., for the goal of 3D animation software development [3]. China's animation industry is lagging behind and still needs to be developed more vigorously, especially to pay attention to the construction of such basic disciplines as digital processing of graphics, computer graphics, and computer vision [4]. Animation in 3D's image key frame feature point matching refers to the matching of animation images between the same targets according to the target information; in the same scene, the key frames of animation in 3D images establish the visual correlation process [5]. Therefore, Chinese animation in 3D technology is not able to meet the market demand, and the backwardness of animation production technology is the key factor to limit the quantity and quality of Chinese animation products.

The two most promising industries in this century are the information industry and the cultural industry. As one of the complexes of information and culture, animation industry is playing an increasingly important role [6]. In

the information acquired by human beings, visual information accounts for about 65%, auditory information accounts for about 15%, and other information such as taste information and tactile information adds up to about 20%, while images are the main source of visual information [7]. Digital processing of graphics technology has played a great role in allowing humans to understand the world more objectively and accurately [8]. A large and growing number of researchers have been devoted to this field to explore and understand the unknown world together [9]. It uses computers to perform a series of operations on digital images in order to obtain certain desired results [10]. Image enhancement techniques are often used to improve the quality of images when they are processed [11]. Human understanding and utilization of images are still at a low level, and more and more in-depth research is needed on the processing of graphics techniques and even on the definition of images itself [12].

The traditional adaptive-based process of 3D animation graphics enhancing has the problem of poor visual effect of enhancement [13]. In order to improve the visual effect of process of 3D animation graphics enhancing effect and obtain clearer feature information, the process of 3D animation graphics enhancing has received extensive attention and research [14]. The rotation difference between the animation images affects the accurate matching of image key frame features, and the feature points of the animation images need to be extracted stably. Making the image free from noise interference and with clear contours, animation in 3D image key frame feature matching method is the development trend and mainstream direction of image matching methods [15]. Therefore, in this context, this topic is to study the process of 3D animation graphics enhancing in the field of digital processing of graphics and computer graphics, which has good practical significance and economic value.

The innovative points of this paper are as follows.

(1) Combining the graphic enhancing process with animation in 3D and using the advantage of wavelets in denoising to compensate for the defects of traditional enhanced images, the method of key frame feature point extraction is elaborated

(2) Based on the previous research, we continue to improve the process of graphics simulation. The mathematical relationship between the variance of Gaussian function and the maximum value of Lee's exponent and wavelet transform at different scales is directly introduced to construct a simulation platform for the process of graphics

(3) The simulation of the graphic enhancing process of animation is analyzed, and the noise phenomenon that often occurs in the enhanced image is also analyzed, and effective solutions are proposed

The full text includes the following five main aspects.

The first part of this paper introduces the background and significance of the research, the process of 3D animation graphics enhancing piano note recognition algorithm and piano teaching model, and the work related to graphic enhancing process. The third part of this paper introduces the key frame feature extraction of animation in 3D image and the process of 3D animation graphics enhancing method, so that the readers of this paper can have a more comprehensive understanding of the process of 3D animation graphics enhancing idea. The fourth part is the core of the thesis, which describes the design and analysis of the process of graphics simulation platform from two aspects: the general architecture analysis of the process of graphics simulation platform and the simulation analysis of the graphic enhancing process of animation. The last part of the thesis is the summary of the whole work.

2. Related Work

2.1. Process of 3D Animation Graphics Enhancing. The purpose of the process of 3D animation graphics enhancing is to improve the visualization of feature information, increase clarity, and at the same time convert feature information into a form more suitable for human vision or computer system analysis and processing.

Zhang proposed a real-time robust matching algorithm based on dynamic frame feature points for determining the edges of an animated image, and the anchor points of feature points were detected in the region, and the symmetric matching distance of the image was determined by calculating their anchor points to determine the orientation of the feature points [16]. Wang et al. applied cloud data to texture optimization of object surfaces. The unit quaternion method was used to solve for the orientation elements of the image to achieve texture optimality and compensate for the occluded area [17]. Chambers et al. used a new frame feature point matching algorithm based on FPGA technology to extract from edge feature points and then perform edge feature point matching by computing feature descriptors [18]. Ancuti et al. used the 3D graphics software 3 ds MAX to model that the effect of ABAQUS simulation model was optimized. Using three self-developed 3 ds MAX function plug-ins, a large number of animated models in TRML format were bootstrapped and the corresponding animated models were created [19]. Mohammadi and Guise proposed a key frame feature point matching algorithm for motion images based on center surround filtering, used the feature points of the image, constructed the description operator of the feature points, calculated the distance of the key frame, and analyzed the scale of the animated image and matched the adopted feature points with the selected feature points [20].

As an industrial development, it is necessary to invest more material and human resources in the production of animation in 3D to develop a wider market and create more economic benefits. The main method is to rely on scientific and technological progress, and establish a set of perfect process of 3D animation graphics enhancing methods to adapt to their own national conditions, reduce production costs, and improve production efficiency, so that the relationship between production and the market into a virtuous circle.

2.2. Graphic Enhancing Process. Image is a kind of information, and it is the most informative form of information. The images obtained from nature are generally processed to meet human needs and have greater scientific and practical value, so the technology of processing of graphics has emerged. Although Chinese animation has achieved brilliant achievements, its production is mostly based on traditional two-dimensional animation technology, while at this stage, the emerging computer 3D technology has become the mainstream of animation production. The research on animation in 3D image key frame feature point matching has become the focus of attention by domestic and foreign scholars.

Yao et al. pointed out that the three most used processing methods internationally are transformation-based graphics processing framework, partial differential equation-based graphics processing framework, and statistical-based graphics processing architecture [21]. Chen et al. proposed a fuzzy nonlinear regression-based image enhancement algorithm and applied it to noise reduction and edge enhancement of remotely sensed images [22]. The Retinex algorithm proposed by Pambudi et al. is based on a random path, which is a fixed target pixel point with a randomly selected path from the start point to the end point and then calculates the contrast between the brightness and luminance of the adjusted neighboring pixel values to obtain a reflected image [23]. Kim et al. make full use of the advantages of fuzzy in dealing with the uncertainty problem and solving the edge detection problem of color images affected by collision noise [24]. Zhang et al. proposed the McCann99 Retinex model, which is a pyramid model that segments the image into multiple layers and then computes the final result by stratification [25].

The development of electronic entertainment industry has led animation to stand out gradually due to its interactivity and diversity. As one of the main ways of human-computer interaction, animation has become a new industry and has received wide attention. Enhancement of the image is based on the blurring of the image using a variety of special techniques to highlight certain information in the image and weaken or eliminate irrelevant information to achieve the purpose of emphasizing the overall or local characteristics of the image. The process of 3D animation graphics enhancing effect simulation, which is the soul of animation, has become an urgent problem to be solved.

3. Ideas for 3D Animation Graphics Enhancement Process

3.1. Feature Point Extraction of Animation in 3D Image Key Frame. The rapid development of computer and digital communication technologies, especially the rise of network and multimedia technologies, has led to a dramatic increase in the amount of image data, which has brought enormous pressure on the storage and transmission of images [26]. Therefore, the key frame feature point extraction of image data is becoming more and more important. From the point of view of image quality evaluation, the main purpose of image enhancement is to improve image intelligibility, which is different from another image improvement technique and image restoration, which requires restoring the original image as much as possible and improving the image fidelity [27]. For different researchers, the focus of processing of graphics research must be different; therefore, the process of the graphics simulation platform we designed must have the ability to extend the functionality based on the integration of the basic common process of graphics functions. Animation in 3D production is different from the traditional real movie or 2D animation movie, which needs to use the computer to create a virtual but real world; the specific process is shown in Figure 1.

First, the Gaussian difference function of the animation in 3D image is derived to obtain the maximum and minimum eigenvalues of the animated image. The eigenvalues of the image are used to analyze whether the edge points of the key frame feature points of the animation in 3D image are stable or not. The noise-removed image is transferred to the computer by the image acquisition card, and the image is processed by the processes of preprocessing, character segmentation, character training, and character recognition to obtain the segmentation results. The segmentation can be expressed by the following equation:

$$g(x,y) = \begin{cases} 1, \text{if } (f(x,y) \geq T), \\ 0, \text{if } (f(x) < T), \end{cases} \tag{1}$$

where T is the effect of image segmentation.

Each pixel in the animated character texture corresponds to the four byte space, and the RGB values and transparency values of the red, green, and blue color components of that pixel point are stored in turn [28]. The realism effect is optimized by mapping the animated character data into the virtual canvas texture by traversing the rendering points. According to the idea of the design content, the schematic structure of process of 3D animation graphics enhancing is given as shown in Figure 2.

It can be said that the tasks in the preplanning of the animation, the art department, and the technical department should fall within the work tasks of the plot environment setting [29]. Usually, a video sequence of animation effect can be realized by outputting frames per second, so the images processed by the stereoscopic animation module are outputted at one frame per second. The image is outputted after the exaggerated deformation module, so that the animation in 3D effect is achieved by successive output of the processed image. The gray levels of the original image are listed, and the total number of occurrences of each gray level is calculated. The histogram of the original image is calculated according to the following formula:

$$p(r_i) = \frac{n_i}{N} \ (i = 0, 1.2, \cdots, 300), \tag{2}$$

where $\mathrm{p}(r_i)$ is the probability of gray level occurrence, r_i is the grayscale, N is the total number of original image pixels, and n_i is the total number of gray level occurrences.

Second, according to the animation image key frames, the vector direction of the image feature points can be limited, and the image weights need to be calculated before

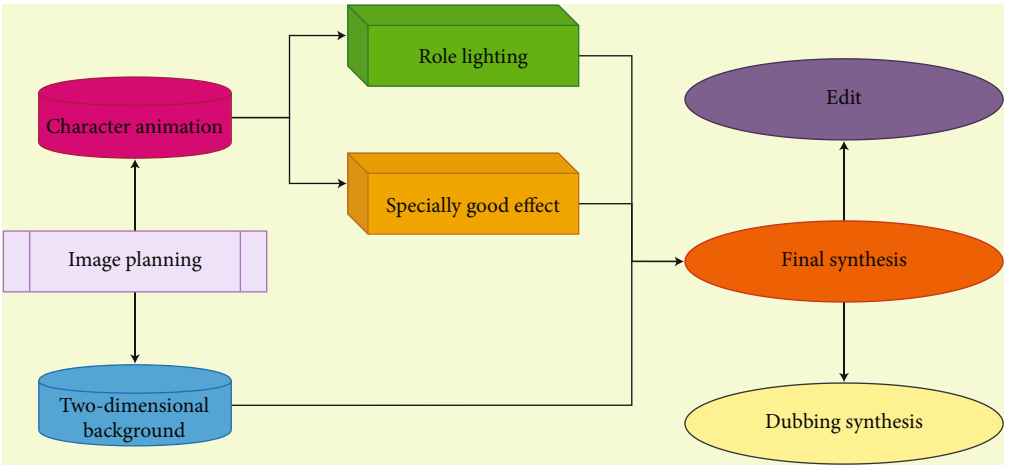

Figure 1: 3D animation production process.

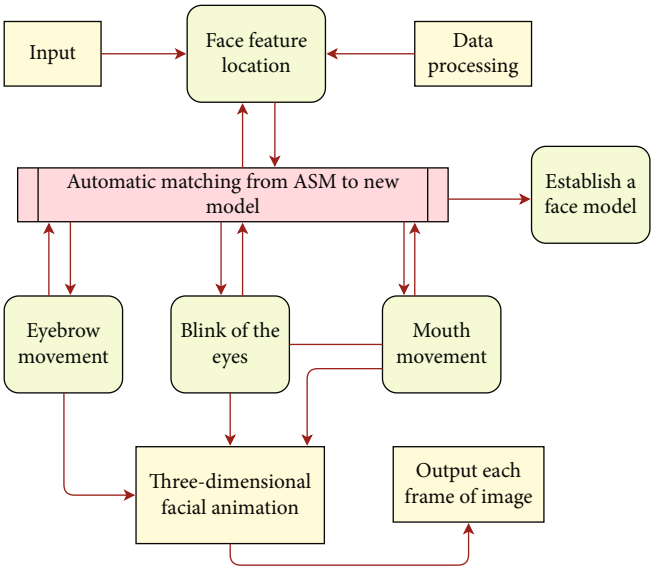

Figure 2: Process of 3D animation graphics enhancing.

the matching calculation of the animation in 3D image key frame feature points. It contains both the basic elements needed for script creation and the plot settings that reflect the central idea and main values of the work [30]. Third, training models based on sample data.(A new paragraph). This process requires the creation of two models, a statistical shape model and a local texture model. The shape model is used to reflect the two-dimensional shape variation pattern of the target object image, and the local texture model is used to reflect the grayscale variation pattern of the local area of the feature points [31]. The image size is assumed to be $M \times N$, and the images before and after restoration are denoted by $I_0(x, y)$ and $I_1(x, y)$, respectively, and (x, y) denotes the pixel coordinates. The mathematical expression of peak signal-to-noise ratio PSNR is

$$\mathrm{PSNR} = 10 \times \lg \frac{255^2}{\mathrm{MSE}}. \tag{3}$$

The mathematical expression of SNR is

$$\mathrm{SNR} = 10 \times \lg \left[\frac{\sum_{x=1}^{M} \sum_{y=1}^{N} I_0(x, y)^2}{\sum_{x=1}^{M} \sum_{y=1}^{N} [I_0(x, y) - \mathrm{I}_1(x, y)]^2} \right]. \tag{4}$$

The mathematical expression of mean square error MSE is

$$\mathrm{MSE} = \frac{\sum_{x=1}^{M} \sum_{y=1}^{N} [I_0(x, y) - I_1(x, y)]}{M \times N}. \tag{5}$$

Finally, set the threshold value to adjust it, calculate the gradient size and direction of the animation image feature points, get the direction parameter of the feature points, and combine with the Gaussian difference function of the image to complete the extraction of the animation in 3D image feature points. The important thing in the preplanning stage is in the planning perspective, only as a macro

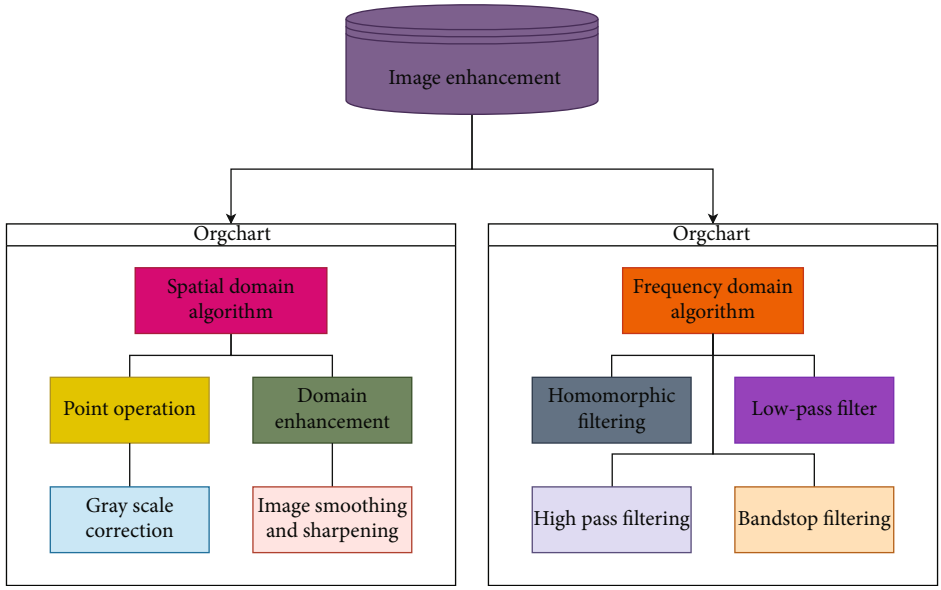

Figure 3: Classification of image enhancement methods.

arrangement of plot elements of the overall project and not into the specific plot and event development of each episode, not to mention the need to come up with specific character dialogues and scenes fine. In the search process, the initial positioning is performed first, and the local texture model information is used to match and get the best position of each feature point, then the shape model is used to constrain the overall shape, and then similar transformation and alignment are performed, so that the repeated cycle is iterated to the best matching effect, thus completing the positioning of feature points. There are a lot of correlations between adjacent pixels within an image and between adjacent images in the video sequence of adjacent rows, which form a large amount of redundant information, temporal redundancy, and spatial redundancy, and there are also information full redundancy, structural redundancy, knowledge redundancy, and visual redundancy in the image data. Therefore, by removing these redundant information, we can achieve the purpose of reducing the data volume of images.

3.2. The Method of the Process of 3D Animation Graphics Enhancing. In the enhancement of the animation in 3D feature information, it is necessary to equalize the animation in 3D feature information using the global histogram equalization algorithm and the local histogram equalization algorithm. Each pixel point of the output image is uniquely determined by each pixel point of the input image through the mapping function. Therefore, the process of 3D animation graphics enhancing is particularly important. The image enhancement methods can be broadly classified into two categories: one is frequency domain processing and the other is space domain processing. The specific classification is shown in Figure 3.

The first step is to preprocess the animation in 3D feature information by value domain filtering and spatial domain filtering and then calculate the discrete form of bilateral filtering of the animation in 3D feature information to obtain the Gaussian kernel function of the animation in 3D feature information. When using wavelet transform-based iterative recovery algorithm to recover the image, the algorithm requires more transform operations, which is more demanding for computer memory space. Therefore, the optimal fusion estimation error square is obtained as

$$p_0 = A^T P\bar{A} = \left(e\bar{T}P^{-1}e\right)^{-1}, \tag{6}$$

where $\bar{A}$ is the average weighting matrix and A^T is the weighted matrix.

Then, the feature description operator of the animation image area is calculated using the conditions such as pixel point and gray value of the image. The art designer designs and establishes the art style based on the script and director's requirements and designs and completes the main scene and main scene color samples, as well as the color designation of character shapes and character models. By calculating the center of mass position of each color grouping, the pixel position information is incorporated to make the tracking more accurate and fast. Calculate the center of mass of each color unit i:

$$K_i^n = \frac{\sum_{i=1}^{n_h}\delta[b(X_i)-u]X_i}{\sum_{i=1}^{n_h}\delta[b(X_i)-u]}, \tag{7}$$

where n is the frame image, X_i is the pixel position in the target area, μ is the histogram color value, and $b(X_i)$ is the color value of pixel.

In various realistic game scenes, if the facial information of the characters in the game is replaced with the user's own facial information and the facial expressions and avatar structure are exaggerated appropriately, it will make the creation of this game more realistic and humorous, add more interesting effects, make the user can be immersed in this pleasant game process, and realize the entertainment effect

of this game. So the sequential iterative recursive computation of the Kalman filter basic equation is carried out, so that the optimal estimate of the state at the moment of interest k can be calculated. The weighted least squares estimation expression is

$$x = \operatorname{argmin} \frac{1}{N} (Z - CX)^T W \left(Z - C\bar{X}\right), \tag{8}$$

where W is the weighted matrix.

The next step is to eliminate the noise contained in the animation in 3D feature information based on the results of Gaussian kernel function calculation. The weighted vector structure of the key frame of the animation image is analyzed according to the vector direction and distance of the key feature points of the animation in 3D image. The weights of the image and the matching weights of the image key frames are calculated to get the key frame coordinates of the animation image, and the first and last feature points of the image key frames are calculated. In general, the block to be repaired with high confidence value should be repaired first so that the repair process is more reliable, and the confidence degree is defined as

$$C(p) = \frac{\sum_{q \in \psi_p \cap \varphi} C(q)}{\left|\psi_p\right|}, \tag{9}$$

where $C(p)$ is the confidence level and $|\psi_p|$ is the area of ψ_p.

Since the dot operation maps each pixel point of the input image to each pixel point of the output image, the gray value of its output image is determined by the gray value of the input image only. Therefore, the dot operation maintains the spatial position of each pixel of the image. The drawing of the screen split tableau is a concrete recreation of the story and script visualized by the director who turns the text of the text split screenplay into a screen, not a simple illustration. The bilateral filtering kernel is constructed by multiplying the Gaussian kernel function of spatial proximity (spatial Gaussian kernel) with the Gaussian kernel function of similarity in the value domain (luminance Gaussian kernel):

$$g(x) = \frac{1}{C_{d,\gamma}} \sum_{x,y \in \Omega} w_d(x,y) w_r(x,y) f(x), \tag{10}$$

where $f(x)$ is the original image, $g(x)$ is the output image, $w_d(x,y)$ is the spatial information weight function, and $w_r(x,y)$ is the gray similarity weight function.

Finally, the minimum magnification factor of the contrast enhancement of the animation in 3D feature information is calculated, and the enhancement of the animation in 3D feature information is realized based on the calculation results. Then, the invariance of the color of the animation in 3D image and the standard deviation of the Gaussian function are used to define the scale space of the animation in 3D image, and the Gaussian difference function of the animation in 3D image is calculated according to the fixed coefficients of the image. The method is to let the gray value of the input image stretch into another specified range according to some linear relationship to achieve the purpose of adjusting its dynamic range. Image inversion is a typical linear transformation means that the gray value of the original image is flipped. It is the main basis for the drawing and production of an animation film. All the links in the middle and late stages are based on the screen shot script and must strictly obey the requirements of the script. The low-bandwidth teleconference only needs to send the animation control parameters extracted from the live video at one end and recover the animation movement according to these control parameters at the receiving end, so it is necessary to study the movement law of the animation expression change and the structure information of the animation in depth.

4. Design and Analysis of Processing of Graphics Simulation Platform

4.1. Overall Architecture Analysis of Processing of Graphics Simulation Platform. The processing of graphic simulation platform software provides the user with an easy-to-operate and friendly interface. Its scalability is reflected in the processing of graphics functions, the processing of graphics modes, and the setting of parameters in the processing of graphics process. The main difference between signal and noise in multiscale space is their local maxima characteristics. The binary subwave discrete transform with Lipschitz indices of 1, 2, and 3 is shown in Figure 4.

Conventional methods have been processed to make the number of pixels distributed on each gray level equal or almost equal. However, since the grayscale histogram is only an approximate probability density function, it is difficult to obtain completely flat and uniform results when transforming with discrete grayscale levels. The overall architecture of the processing of graphics simulation platform is in the neighborhood of each pixel.

First, the appearance of the processing of graphics simulation platform can be set by editing the property settings in the property editor. The menu editor allows you to add menu options, adjust the relative position of the menu, and define the name of the callback subfunction. The denoising and enhancement is done with a single gain function, so that one or several adjustable parameters must be used to control the noise suppression during enhancement. Based on different soft domain values, the noise rejection is also different. Figure 5 is the noise rejection diagram under different soft domain values.

The modeling and expression target system is typical of the relationship between objective reality and artistic reality and should be made by carefully observing life and using objective facts as the basis for modeling, but virtual characters do not replicate objective reality but rather redecompose it to create a new real world. The information we need to enhance is often localized; i.e., we only need to highlight the area of interest and suppress or not enhance other areas, which uses segmented linear mapping. It is possible to map grayscale regions with lower pixel values in the input image to higher grayscale regions in the output image while

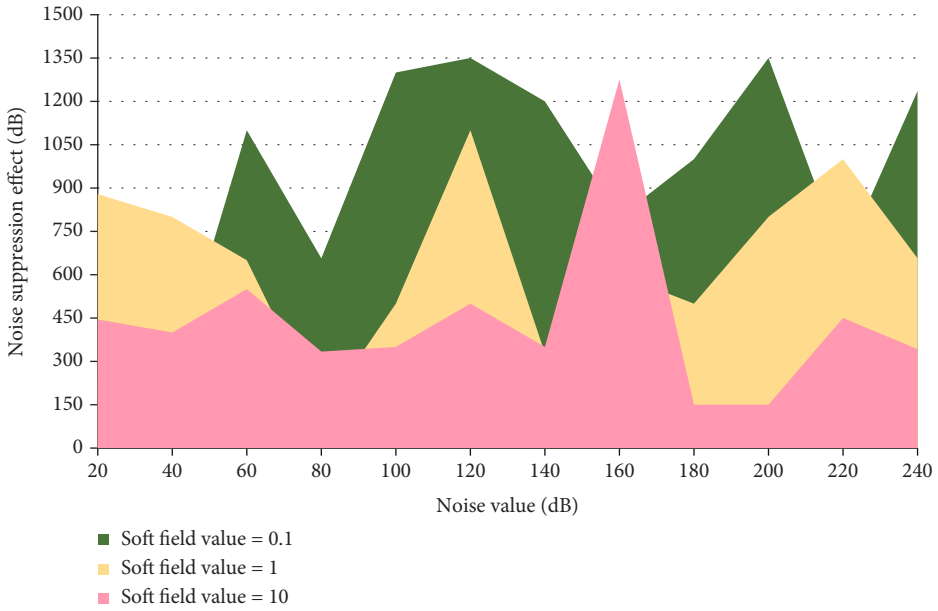

Figure 4: Discrete transform of dyadic wavelet with different Lipschitz exponents.

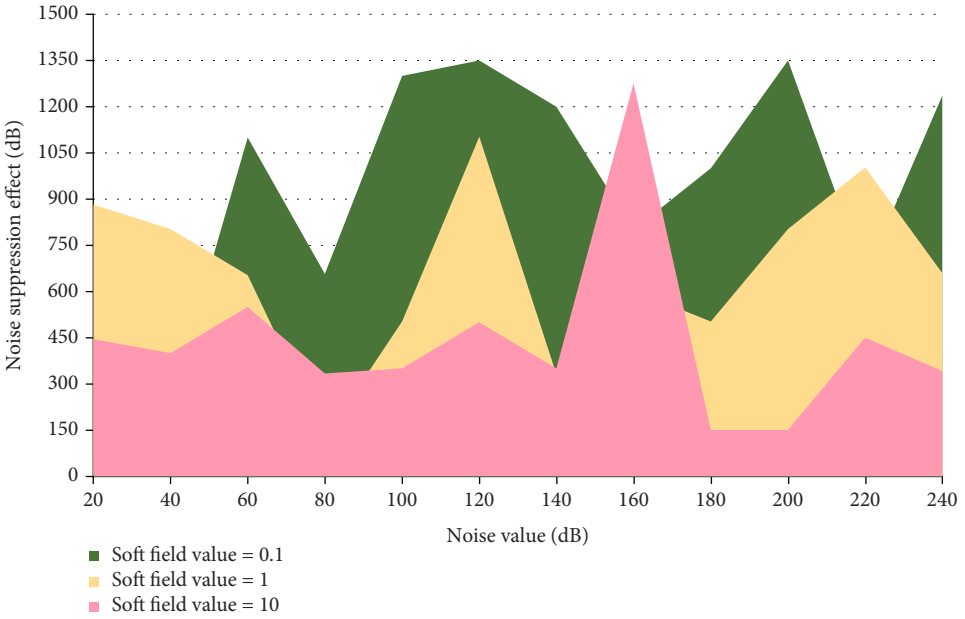

Figure 5: Noise suppression under different soft domain values.

mapping regions with higher grayscale values in the input image to lower grayscale regions in the output image.

Second, in the process of processing of graphics, it is necessary to iterate on the original image. It is necessary to set the image parameters and compare the effect of the intermediate result images, adjust the image parameter settings according to the feedback parameters provided by the processing of graphics simulation platform, etc. If we can reasonably interpret and use the virtual characteristics of polygons to create the real surface flavor of the character model and the real emotional characteristics of the expression target, the audience can also feel the reality of the character's life and emotions when facing the virtual character. A comparison of the image signal-to-noise ratio before and after image enhancement is shown in Figure 6.

In primary vision, including feature enhancement, directional selection, multichannel signal decomposition, and initial lateral integration of information, enhancement, and extraction of points, lines, and edges, as well as extraction and segmentation of texture information, can be achieved. The shape of the fold function can be determined by the slope of the inflection point and the segmented straight line, and the purpose of extending or compressing the gray interval can be achieved by adjusting the value of both. Similar to

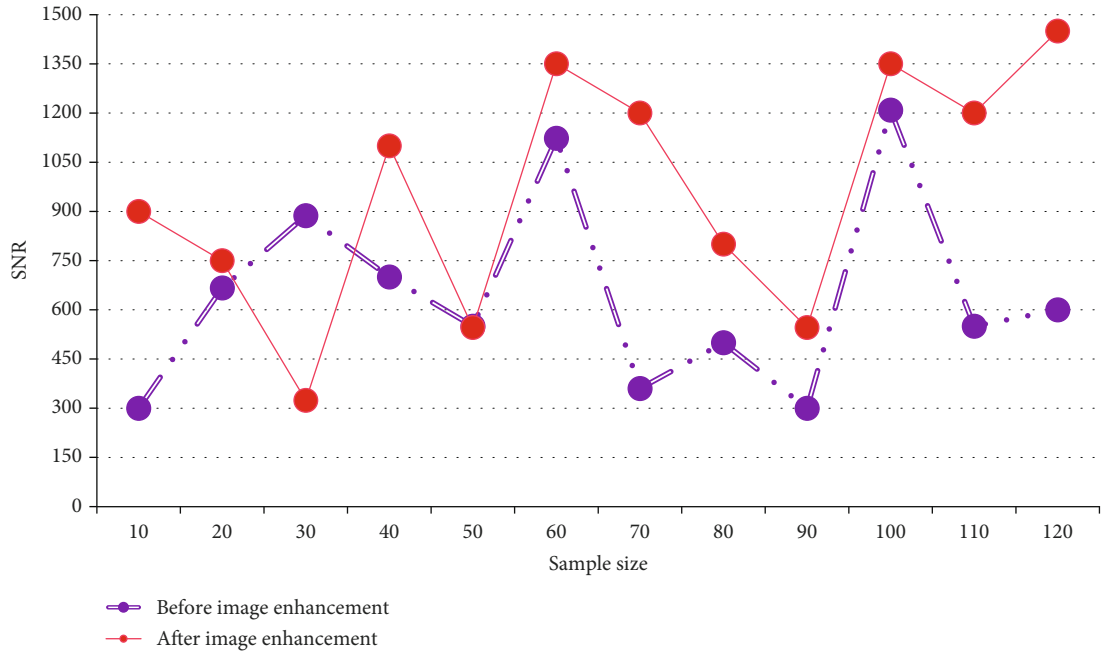

Figure 6: Signal-to-noise ratio of image before and after enhancement.

Table 1: Comparison of peak signal-to-noise ratio after restoration by two algorithms.

	Loss rate	30%	60%	90%
PSNR/dB	p-Laplace	22.243	41.346	54.324
	Algorithms in this chapter	35.268	64.293	72.319

the linear transform, the nonlinear grayscale change differs from it in terms of the implementation method and the final effect obtained, but the aim is to make the image quality improved. For the effect of extending the gray range, the middle part of the template coefficients in the direction perpendicular to the grain lines is positive, and the coefficients on both sides are negative. The restoration effect of the image is evaluated by the repaired PSNR, and the performance comparison between p-Laplace and the enhanced image algorithm is given, as shown in Table 1.

Finally, the layout of the image objects is adjusted using the adjustment tool to design the interface effect of the whole processing of graphics simulation platform. The callback function editor is used to write the response function code to respond to the researcher's interface operations. Therefore, the modeler needs to understand the design carefully and discuss with the design department to improve the required information in detail. If all the gray levels are concentrated in a small range, the dynamic range of the image's grayscale values is small. The contrast of the corresponding image is low. All gray levels are evenly distributed in a large gray range, and the corresponding image has a large contrast. It is possible to extend the dynamic range of grayscale, to compress it, or to compress it in one dynamic region and extend it in another. The grayscale contrast between regions of interest in an image can be improved by selecting the appropriate grayscale transformation rules.

4.2. Simulation Analysis of Graphic Enhancing Process of Animation Based on. Since the blurred image itself contains some information of the imaging system, the edge sharpness of the blurred image is closely related to the out-of-focus of the system and the depth of the 3D object.

Firstly, starting from the relationship between the maximum value of Lee's index and wavelet transform, the mathematical relationship between the variance of Gaussian function and the maximum value of Lee's index and wavelet transform under different scales is directly introduced, and applying this relationship, the variance of Gaussian function can be calculated accurately in theory. For example, during a violent fight, the character's body movements will be very exaggerated, which will make the model very susceptible to false deformation and interpolation, and this will require improved settings for specific actions. The comparison of image edges, texture details, noise, and total information after image enhancement is shown in Figures 7 and 8.

In order to keep the image color without distortion, the enhanced image technique of DCT domain color processes not only the luminance component but also the color component, because of the principle that JPEG samples, the color component, and the computation of the image will also be reduced compared with the traditional method. If the gray level of the original image is k, the gray level of the output image is still k after mapping. However, due to the increase of the grayscale range of the output image, the jump of each level of grayscale stratification is larger than the original image, which will produce the pseudo contour effect.

Second, the noise must be removed before the calculation. The common methods of image denoising are neighborhood averaging and median filtering. But after smoothing, the variance of the calculation will become larger. So Gaussian function is chosen as the smoothing denoising function. The runtime of the enhanced image,

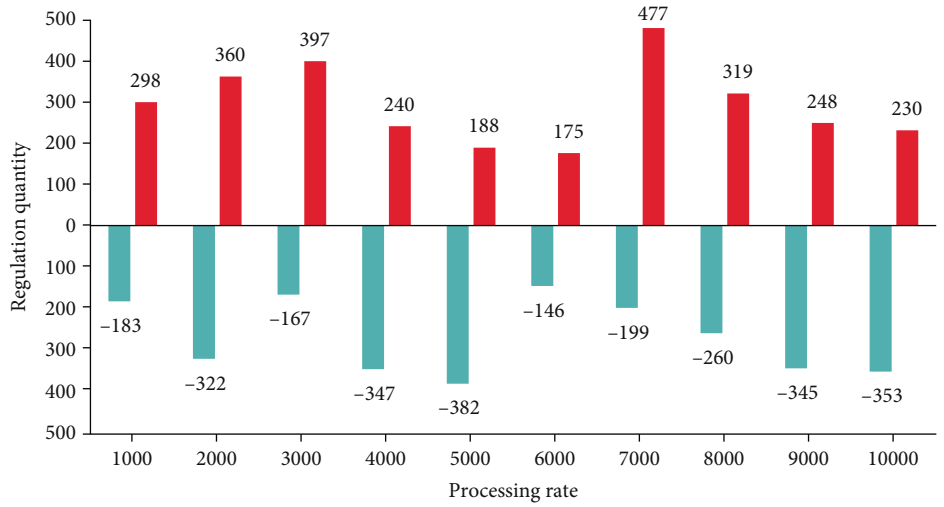

Figure 7: Contrast of image edges and texture details after image enhancement.

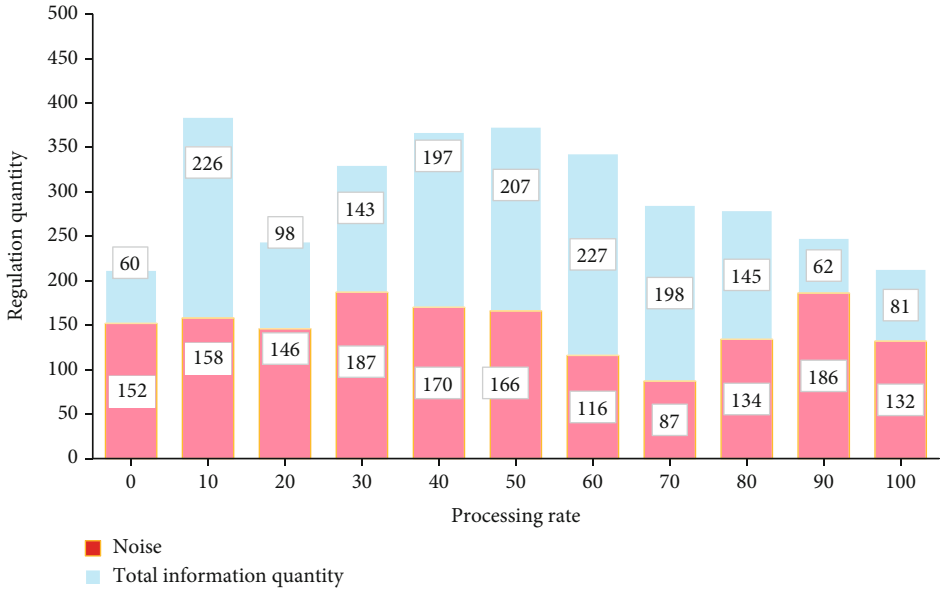

Figure 8: Comparison of noise and total information after image enhancement.

Table 2: Comparison of running time of enhanced image, MSE algorithm, and PSNR algorithm.

	FMM	CDD	Image enhancement
Runtime	34.7	32.5	18.2
MSE	0.1334	0.2154	0.3673
PSNR	67.10	69.36	72.88

CDD algorithm, and FMM algorithm are compared, and the results are shown in Table 2.

Both MSE and PSNR have improved considerably, indicating that the enhanced image effectively improves the restoration results while running quickly.

By carefully adjusting the position of the nodes and controlling the slope of the segmented linear line, any grayscale interval can be stretched or compressed. The segmented linear transformation stretches the grayscale details of the feature object according to the user's needs, although there is a loss of detail information corresponding to the other grayscale intervals, which has little effect on the recognition of the target. Thus, through the settings, the skeleton and joints of the characters are created, and the muscles are twisted, squeezed, and expanded, so that the characters can stand, sit, fight, and dance in front of the audience. By setting up the animation in 3D, the neck of the character can be stretched several times, allowing the animator to easily manipulate mechanical devices that seem to weigh several tons. In the transform domain, most of the energy of the image signal is concentrated in the low frequency part, and the human eye is much more sensitive to the low frequency component than the high-frequency component. Based on this property, the amount of data transmitted or stored in the image can be reduced while maintaining image quality

by omitting the high-frequency components that have little energy or by assigning fewer bits to these high-frequency components.

Finally, in order to verify the correctness of the algorithm, a black and white rectangular map is generated for testing. The black and white rectangular map is a step signal with Lipschitz exponent of 1, and the modal maxima of the wavelet transform of both the original and fuzzy images are at the four vertices of the rectangle. In the process of graphics research, the diversification of image input and output formats and the adjustable parameters and parameter feedback in the process of graphics are the manifestations of the scalability of the process of graphics simulation platform. For the main, the role of more, he may be in front of the camera for a long time or multiple appearances, or located closer to the camera, or even close-up, and then, more time is needed to do more detailed settings for the role and control the details of the character changes in many ways. Simulate the inner workings of real objects as realistically as possible, down to a muscle, a ribbon, a piece of clothing. Then, we calculate the 4th order moments of the brightness distribution of the animation in 3D feature information. The low-pass filter is used to remove the high-frequency component that reflects the detail and variability, and the effect on the image is not only to remove the spikes but also to remove the variation information at the edges, thus making the image blurred.

5. Conclusions

Animation, as an audio-visual art and a popular form of artistic expression, has become more and more recognizable to the public. It is highly entertaining, enjoyable, and educational, which is its main function in this highly interactive modern social ideology. The process of graphics in animation is a very professional task, emphasizing scientific and systematic, taking into account originality and commercial practice. With the advancement of the digital information age and the development of computer technology, the digital process of graphics has penetrated into various fields of society and has become a hot topic of research in the discipline. Graphic enhancing process is a model that follows the human visual system to perceive the luminance and color of an object, and it can eliminate the effect of light on the image. It is able to restore the essence of the image by removing the irrelevant luminance image and obtain a clear image. It is a valuable research topic as it is related to the whole software system in digital processing system. In this paper, we propose a simulation analysis of the effect of graphic enhancing process for animation in 3D, analyze the main aspects of the process of graphics research, integrate them into the simulation platform, facilitate the research work of researchers, and improve the efficiency of the process of graphics research. The process of 3D animation graphics enhancing effect simulation can effectively suppress the interference of background information while enhancing the target feature information in animation in 3D, making the target feature information in animation in 3D clearer and faster, which can provide a better solution for the subsequent dynamic analysis, identification, and recognition of animation in 3D. It provides a good basis for dynamic analysis, recognition, and evaluation of animation in 3D and has good practical value.

Data Availability

The figures and tables used to support the findings of this study are included in the article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Acknowledgments

The authors would like to express sincere thanks to the contributors of the techniques used in this research.

References

[1] X. Cui, J. Diao, and Y. Liu, "Study on the three dimensional animation creation based on digital technology and multimedia simulation," *Revista de la Facultad de Ingenieria*, vol. 32, no. 3, pp. 65–72, 2017.

[2] M. Marzouk and M. Hassouna, "Quality analysis using three-dimensional modelling and image processing techniques," *Construction Innovation*, vol. 19, no. 4, pp. 614–628, 2019.

[3] Q. Wang and X. Ji, "Research on the 3d animation design and model simulation optimization based on multimedia technology," *Boletin Tecnico/Technical Bulletin*, vol. 55, no. 6, pp. 541–547, 2017.

[4] B. Stadlinger, S. Jepsen, I. Chapple, M. Sanz, and H. Terheyden, "Technology-enhanced learning: a role for video animation," *British Dental Journal*, vol. 230, no. 2, pp. 93–96, 2021.

[5] J. Sun, D. Lu, L. Liu, and H. Ma, "A visual disparity adjustment method for stereoscopic 3D animation production," *Jisuanji Fuzhu Sheji Yu Tuxingxue Xuebao/Journal of Computer-Aided Design and Computer Graphics*, vol. 29, no. 7, pp. 1245–1255, 2017.

[6] Z. Lv, M. S. Khan, and H. Li, "An anaglyph 2D-3D stereoscopic video visualization approach," *Multimedia Tools and Applications*, vol. 79, no. 1-2, pp. 825–838, 2020.

[7] D. Liu and B. Pu, "Research on physical education and training based on the theoretical teaching of computer three-dimensional animation technology," *Journal of Physics: Conference Series*, vol. 1744, no. 3, p. 032052, 2021.

[8] L. Qiu, "Application and analysis of computer virtual simulation technology in three-dimensional animation production," *Management science and research*, vol. 1, pp. 19–21, 2019.

[9] M. Nasir, R. B. Prastowo, and R. Riwayani, "Design and development of physics learning media of three dimensional animation using blender applications on atomic core material," *Journal of Educational Sciences*, vol. 2, no. 2, p. 23, 2018.

[10] U. Florjanczyk, D. P. Ng, S. Andreopoulos, and J. Jenkinson, "Developing a three-dimensional animation for deeper molecular understanding of Michaelis–Menten enzyme kinetics," *Biochemistry and Molecular Biology Education*, vol. 46, no. 5, pp. 561–565, 2018.

[11] N. Rani, "Image processing techniques: a review," *Journal on Today s Ideas-Tomorrow s Technologies*, vol. 5, no. 1, pp. 40–49, 2017.

[12] T. Singh, A. Alsadoon, P. W. Prasad, O. H. Alsadoon, H. S. Venkata, and A. Alrubaie, "A novel enhanced hybrid recursive algorithm: image processing based augmented reality for gallbladder and uterus visualisation," *Egyptian Informatics Journal*, vol. 21, no. 2, pp. 105–118, 2020.

[13] S. Sakman, "Animasyon Teknikleriyle Çoklu Ortam Öğrenme Materyallerinin Zenginleştirilmesi," *E-Journal of New World Sciences Academy*, vol. 15, no. 2, pp. 116–126, 2020.

[14] Z. Li, Z. Wei, C. Wen, and J. Zheng, "Detail-enhanced multi-scale exposure fusion," *IEEE Transactions on Image Processing A Publication of the IEEE Signal Processing Society*, vol. 26, no. 3, pp. 1243–1252, 2017.

[15] V. Raghavendra, N. V. Kumar, and M. Kumar, "Latest advancement in image processing techniques," *Engineering & Technology*, vol. 7, no. 2.12, 2018.

[16] L. Zhang, "Application research of automatic generation technology for 3D animation based on UE4 engine in marine animation," *Journal of Coastal Research*, vol. 93, no. sp1, p. 652, 2019.

[17] Q. Wang, W. Zhao, and J. Ren, "Intrusion detection algorithm based on image enhanced convolutional neural network," *Journal of Intelligent and Fuzzy Systems*, vol. 41, no. 1, pp. 2183–2194, 2021.

[18] O. Chambers, J. Milenkovic, and J. F. Tasic, "A pre-processing scheme for real-time registration of dynamic contrast-enhanced magnetic resonance images," *Journal of Real-Time Image Processing*, vol. 14, no. 4, pp. 763–772, 2018.

[19] C. O. Ancuti, C. Ancuti, C. De Vleeschouwer, and P. Bekaert, "Color balance and fusion for underwater image enhancement," *IEEE Transactions on Image Processing*, vol. 27, no. 99, pp. 379–393, 2017.

[20] H. M. Mohammadi and J. Guise, "Enhanced X-ray image segmentation method using prior shape," *IET Computer Vision*, vol. 11, no. 2, pp. 145–152, 2017.

[21] C. Y. Yao, K. Y. Chen, H. N. Guo, C. C. Li, and Y. C. Lai, "Resolution independent real-time vector-embedded mesh for animation," *IEEE Transactions on Circuits & Systems for Video Technology*, vol. 27, no. 9, pp. 1974–1986, 2017.

[22] W. Chen, X. Chen, and X. Sun, "Emotional dialog generation via multiple classifiers based on a generative adversarial network," *Virtual reality and intelligent hardware*, vol. 3, no. 1, pp. 18–32, 2021.

[23] S. Pambudi, I. Hidayatulloh, H. D. Surjono, and T. Sukardiyono, "Development of instructional videos for the principles of 3D computer animation," *Journal of Physics: Conference Series*, vol. 1737, no. 1, p. 012022, 2021.

[24] N. Kim, S. Park, D. Jeong, M. Hwang, and S. Park, "In HP. EURECA: end-user requirements engineering with collaborative animation," *Software: Practice and Experience*, vol. 47, no. 7, pp. 1001–1012, 2017.

[25] H. Zhang, N. P. Avdelidis, A. Osman et al., "Enhanced infrared image processing for impacted carbon/glass fiber-reinforced composite evaluation," *Sensors*, vol. 18, no. 2, p. 45, 2018.

[26] M. M. T. Wickramasinghe and M. H. M. Wickramasinghe, "Impact of using 2D animation as a pedagogical tool," *Psychology and Education*, vol. 58, no. 1, pp. 3435–3439, 2021.

[27] L. Wu, G. Wen, Y. Wang, L. Huang, and J. Zhou, "Enhanced automated guidance system for horizontal auger boring based on image processing," *Sensors*, vol. 18, no. 2, p. 595, 2018.

[28] M. Johari, M. Abdollahzadeh, F. Esmaeili, and V. Sakhamanesh, "Metal artifact suppression in dental cone beam computed tomography images using image processing techniques," *Journal of Medical Signals & Sensors*, vol. 8, no. 1, pp. 12–24, 2018.

[29] K. Z. Szabó, G. Jordan, A. Petrik, Á. Horváth, and C. Szabó, "Spatial analysis of ambient gamma dose equivalent rate data by means of digital image processing techniques," *Journal of Environmental Radioactivity*, vol. 166, Part 2, pp. 309–320, 2017.

[30] H. Cheng and L. Wang, "A transient well test method for well-head pressure fall-off test after acid fracturing," in *International Field Exploration and Development Conference*, pp. 1796–1806, Springer, Singapore, 2020.

[31] M. P. Kumar, B. Poornima, H. S. Nagendraswamy, C. Manjunath, and B. E. Rangaswamy, "Structure preserving image abstraction and artistic stylization from complex background and low illuminated images," *ICTACT Journal on Image and Video Processing*, vol. 11, no. 1, pp. 2201–2210, 2020.