Research Article

Ultrasonic Image Monitoring of High-Risk Pregnant Women Based on Image Deblurring Method

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The method of image deblurring is one of the research hotspots in the field of image restoration, and its purpose is to restore the damaged blurred image to a clear image. Under normal circumstances, the image deblurring process is the key to accurately recovering unknown images, and it is crucial that the image recovery model can be used fully and effectively when configuring the image recovery model. The main task of this paper is to use an effective optimization model to obtain a more accurate core and restore a clear image. High-risk parturients refer to high-risk parturients in pregnancy and pregnant women with high-risk pregnancy factors, and other three-dimensional ultrasound images TUI dynamic monitoring technology provides timely clues to the fetus’s kidney length, width, and abnormal development of the fetal kidney during pregnancy and tracks the fetus Renal pelvis has different outcomes beyond the normal range. In this paper, three-dimensional ultrasound is used to examine the kidneys. At the same time, 3D ultrasound image TUI technology is used to measure the long diameter, transverse diameter, and anteroposterior diameter of the fetal kidney, and the monitoring processing system is used to measure the volume of the fetal kidney. 30 fetuses with unilateral renal pelvis anterior and posterior diameter ≥10 mm were randomly examined during the case using two-dimensional ultrasound. Using three-dimensional ultrasound TUI and VOCA technology to measure the front and back of the renal pelvis, the thickness of the kidney, the resistance index of the renal hilar renal artery, and the resistance index of the renal pelvis content, this can reduce the risk of high-risk mothers and even reduce the risk to zero.

1. Introduction

As an important carrier of information, images are more and more widely used in many fields. However, during the acquisition process, transfer, and storage, some factors may affect the overall quality of the image, and the overall quality of the image being processed may be affected by the imaging device and external factors, making the image unclear. In order to enable image applications and image vision to meet the needs of high-definition images, we are studying methods to restore clear images based on decomposed images [1]. The image deblurring method is an important branch of image restoration, which has important significance and great research value [2]. Image Dutivem refers to a technology that maximizes the restoration of the original image based on the image's previous degradation information and image prior information [3]. It plays an important role for high-risk women. The common clinical situations of high-risk women are as follows: (1) adult pregnancy over 35 years old belongs to high-risk women. (2) Hypertension syndrome during pregnancy and gestational diabetes during pregnancy. (3) Patients with a history of pregnant liver and kidney function. (4) Patients with a history of cesarean delivery during pregnancy, these risks belong to high-risk women [4]. High-risk pregnant women should undergo regular check-ups during pregnancy. High-risk pregnant patients will have fetal abnormalities or pregnant women have abnormal conditions during pregnancy, which will lead to fetal death in the uterus, intrauterine growth retardation, and congenital malformations.
2 Mobile Information Systems

[5]. At the same time, it will also lead to various chronic diseases in the mother. And, abnormal conditions will also appear in the perinatal period. Ultrasound imaging technology is a technology for related inspections of high-risk mothers so that abnormalities can be avoided as much as possible [6]. Ultrasound images can obtain information provided by X-rays and Y-rays. At the same time, it can reflect the difference in acoustic parameters in the medium. Ultrasound has a good resolution in human soft tissues, which allows the microscopic parts of biological tissues to be identified by simple methods [7]. At the same time, it can also obtain useful signal information within a dynamic range of up to 120 dB. Ultrasound images can obtain the required images without staining. Morphological diagnosis, ultrasound, and ultrasound diagnosis can be based on long-term tomography of morphological performance. This makes the connection between histology and anatomy changed, which can make a qualitative and quantitative diagnosis of the disease. And, the monitoring and processing system can be used to study the images produced by certain organs in the physiological tissues, or the changes in the ultrasound spectrum Doppler can be used to study [8].

2. Related Work

The literature describes how to estimate the blur kernel under the RGB channel and use it for deblurring in a robust image model [9]. Its main advantage is that it takes into account the different conditions of natural color images that are subject to blur kernels under RGB channels. On this basis, this article is different from the restoration method of only estimating the fuzzy kernel in the gray domain and the subchannel processing and proposes to use the edge information of the image as a priori constraint of the regularization and conducts it under a variety of conditions. In an iterative way, a more accurate blur kernel can be obtained. The literature introduces the accuracy of the blur kernel that provides us with the RGB channel and compares the image blur effect from the RGB channel with the blur kernel obtained in the gray field [10, 11]. Through comparison, we can know that the accuracy of the blur kernel from the RGB channel is more accurate. The literature introduces the use of the RGB channels obtained in the sparse representation model with the structural block as the reference block and the blur kernel obtained in the gray domain to blur the image and compares it with the restoration method with a better deblurring effect at this stage [12]. The literature describes conventional methods and traditional blurred images [13]. The application and feasibility analysis of the used images are carried out, in which the improved method of the blurred image can be obtained through detailed data, and the method can be used to improve the operation [14]. The literature introduces that as a factor of punishment, it affects the restoration of the image, and the value of the punishment factor is adjusted to a similar nature before and after the image restoration [15, 16]. An improved method for blurring the image using the ADMM-OGS-TVFN adaptive method is proposed [17]. It can be understood through experiments that the proposed algorithm for solving the model has been greatly improved both subjectively and objectively.

3. Image Deblurring and Ultrasound Image Monitoring Model

3.1. Image Deblurring. Due to the urgent needs of various industries for image clarity, in recent years, image deblurring methods have sprung up, and these methods have been widely used in engineering. When dealing with scientific research and practical problems, according to the cognition of the spread function, the image deblurring technology can be divided into blind deblurring and nonblind deblurring. Nonblind deblurring is performed on the premise of accurately obtaining the spread function; blind deblurring is performed on the spread function for which no information is obtained as shown in Figure 1.

Unblind image blur can be regarded as an independent branch, or applied to blind image deblurring, which can be used as the second stage of image deblurring operation. The nature of unblind image blur or blind image blur research will make the deblurring process very complicated. Using noise information to blur an image makes it difficult to achieve deblurring. Nonblind images provide an indispensable support for deblurring images and are also the basis for deblurring images. Due to the indispensable nature of nonblind images and the complexity of research, this paper only studies some models and algorithms of nonblind image blur.

Image deblurring is to deblur the image whose prior information has been damaged. Therefore, it is important to understand the process of image materialization to build a model. Generally, the image destruction process is considered to be spatially constant, and the mathematical model has degraded accordingly, as shown in Eq. 1.

\[ g(x, y) = h(x, y) \ast f(x, y) + n(x, y). \]

The process of image degradation is generally considered to be the influence of a spatial motion invariant function (denaturing function) and additional noise, and the process of image degradation can be expressed by the following formula:

\[ g(x, y) = H[f(x, y)] + n(x, y). \]

In the formula, if the function \( H \) satisfies,

\[ H[af_1(x, y) + bf_2(x, y)] = aH[f_1(x, y)] + bH[f_2(x, y)]. \]

In the formula, \( a \) and \( b \) are arbitrary constants; \( f_1(x, y) \), \( f_2(x, y) \) are arbitrary images of the same size, then the function \( H \) represents a linear system.

\[ H[f(x - \alpha, y - \beta)] = g(x - \alpha, y - \beta). \]

Then, it is usually said that the system has space shift invariance. It shows that the output of any point in the system is only affected by the input of this point, but not by the spatial position of this point.
The unit collision function in the digital signal processing system has the following definitions:
\[
\begin{aligned}
&\int_{-\infty}^{\infty} \delta(t)dt = 1, \quad t = 0, \\
&\delta(t) = 0, \quad t \neq 0.
\end{aligned}
\] (5)

The unit shock function has a function value only when \( t = 0 \), all output values except the Gajimoy point are 0, and the unit shock function can be defined by the pulse with an integral of 1. If the time delay of the unit influence function (\( t \)) is 0, the following information is obtained:
\[
\begin{aligned}
&\int_{-\infty}^{\infty} \delta(t-t_0)dt = 1, \quad t = t_0, \\
&\delta(t-t_0) = 0, \quad t \neq t_0.
\end{aligned}
\] (6)

Then, for the one-dimensional time-domain signal \( f(x) \),
\[
f(x) = \int_{-\infty}^{\infty} f(t)\delta(x-t)dt.
\] (7)

According to formula (7), the two-dimensional time domain signal \((x, y)\) can be replaced by the following formula accordingly:
\[
f(x, y) = \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} f(\alpha, \beta)\delta(x-\alpha, y-\beta)d\alpha d\beta.
\] (8)

Substituting formula (8) into (2), we can obtain the following equation:
\[
g(x, y) = H[f(x, y)]
= H\int_{-\infty}^{\infty} \int_{-\infty}^{\infty} f(\alpha, \beta)\delta(x-\alpha, y-\beta)d\alpha d\beta.
\] (9)

Since the function \( H \) is a linear operator with spatial motion invariance, the formula (9) can be changed as follows:
\[
g(x, y) = \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} H[f(\alpha, \beta)\delta(x-\alpha, y-\beta)]d\alpha d\beta
= \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} f(\alpha, \beta)H[\delta(x-\alpha, y-\beta)]d\alpha d\beta.
\] (10)

Formula (10) can be converted to the following equation:
\[
g(x, y) = \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} f(\alpha, \beta)h(x, \alpha, y, \beta)d\alpha d\beta.
\] (11)

Due to the invariant characteristics of the space shift of the system \( H \), we can obtain the following equation:
\[
H[\delta(x-\alpha, y-\beta)] = h(x-\alpha, y-\beta).
\] (12)

So formula (11) can be converted to the following equation:
\[
g(x, y) = \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} f(\alpha, \beta)h(x-\alpha, y-\beta)d\alpha d\beta.
\] (13)

In this way, formula (11) can be converted as follows to generate additional noise:
\[
g(x, y) = \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} f(\alpha, \beta)h(x, \alpha, y, \beta)d\alpha d\beta + n(x, y).
\] (14)

Due to the invariance of the spatial motion of the system \( H \), formula (14) can be transformed as follows:
\[
g(x, y) = \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} f(\alpha, \beta)h(x-\alpha, y-\beta)d\alpha d\beta + n(x, y).
\] (15)

Therefore, the convolution integral formula (15) can be expressed as follows:
\[
g(x, y) = h(x, y) \ast f(x, y) + n(x, y).
\] (16)

Then, the following formula is used to simplify and replace in the deblurring process:
\[
g = h \ast f + n.
\] (17)
According to the convolution summary, formula (16) can be converted into frequency domain representation.

\[
G(u, v) = H(u, v)F(u, v) + N(u, v). \tag{18}
\]

The subsequent image deblurring process is simplified and modified using the following formula:

\[
G = HF + N. \tag{19}
\]

The subjective evaluation method may also be a visual evaluation method that evaluates the test image through the subjective visual recognition of the tester. The most commonly used method for image deblurring is the absolute evaluation method, which is directly classified based on vision and distinguished by five evaluation scales according to international standards. The specific conditions are shown in Table 1. This method can best reflect the effect of restoring image quality, but due to the influence of other testers and other environments on image quality evaluation, different evaluation results will be produced.

It is important to choose the number of iterations in the MM algorithm because the MM algorithm has a greater impact on the time required to solve the subproblem. To see the influence of the number of repetitions of subquestions \( v_x \) and \( v_y \) on the results of the experiment, please select 1, 3, 5, 12, and 25 as the experiment objects. When the two-dimensional images overlap and when \( K \) is an odd number, it is a complete overlap centered on the overlap point. Theoretically, the experimental effect is better. Therefore, first, select the overlap degree of 3 for testing. After determining the parameters, you need to select a test image for testing. Here, the cleaned images “Cameraman” and “Goldhill” that are polluted by Gaussian blur and Gaussian noise can be used as test images. Among them, the fuzzy (Gaussian) kernel size is \( 7 \times 7 \), the standard deviation is 2, and the noise uses Gaussian noise with \( \text{BSNR} = 40 \). At the same time, the same image (kernel size blur \( 7 \times 7 \) polluted by average blur and Gaussian noise \( \text{BSNR} = 40 \)) is selected as the experimental supplement. The experimental results are shown in Table 2.

It can be seen from Table 2 that the number of repetitions of the subproblem is 3 times, and the deblurring method mentioned in the article achieves the best results in restoring the image. In this case, compared with the case where the number of repetitions is 5 and the PSNR value is 0.02 dB (the maximum difference is 0.04 dB), the calculation time is shortened to 0.5 seconds within 0.2 seconds. In addition, if the number of repetitions is 3 or more, the PSNR value of the restored image is basically unchanged, and it can be confirmed in the table that it only increases at runtime.

In this article, the choice of the degree of overlap of the image gradient \( K \) has a great impact on the image quality restored by the image deblurring algorithm, but the impact on the calculation time is basically negligible, so the parameters are determined at the end. The value chosen in the experiment is 1–10. The choice of the test image is the same as the choice of the MM algorithm, and the final experimental result is shown in Figure 2.

Figure 2 shows that other overlapping degrees of \( K \) will have a great impact on the image restoration results. Through the experimental data, we conclude that when the gradient of different blur types of images overlap \( K \) value of 3, different images have the best recovery effect. According to the results shown in the figure, we can understand that the setting of parameters in the image deblurring process is very important.

In order to compare the PSNR values of the restored images of different models more conveniently, please average the PSNR values of the restored images of different blur types in Table 2, and draw the obtained values with histograms. It can be seen more intuitively in Figure 3 that the model proposed in this paper can obtain a higher PSNR value.

3.2. Ultrasound Image Monitoring. According to the principle of ultrasound imaging technology, the reflected ultrasound will be attenuated or interfered during the recovery process, and the generated B-ultrasound image will show different brightness, that is, speckle noise. In the process of ultrasound imaging, because the reflected wave is generated by overlapping scattered wave signals from many scattered particles in space, the position where the reflected wave interferes is random, which leads to random noise in the entire image distributed. The following is the overlapping process and calculation method of the scattered wave signals emitted by the scattering particles.

Assuming that the scattered wave signal emitted by each scattering particle is \( X \) and the displacement is \( X \), the overlapping result of the scattering signals of many particles is \( f d 20 \).

\[
X = X e^{i \theta} = \sum_{i=0}^{N-1} X_i e^{i \theta_i}. \tag{20}
\]

Among them,

\[
\xi_i = \frac{X_i}{\sqrt{N}}. \tag{21}
\]

Assuming that the number of scatterers in the resolution unit of the reflected wave signal is large enough, and its phase is uniformly distributed, the joint probability density is

\[
P(X_r, X_i) = \frac{1}{2\pi\sigma^2} \exp \left( -\frac{X_r^2 + X_i^2}{2\sigma^2} \right). \tag{22}
\]

The formula (23) can be obtained by formula (22).

\[
X = \sqrt{X_r^2 + X_i^2}. \tag{23}
\]

The probability density function of formula (24) is obtained from formula (23).

\[
P(X) = \begin{cases} 
\frac{X}{\sigma^2} \exp \left( \frac{X^2}{2\sigma^2} \right), & X \geq 0, \\
0, & \text{other.}
\end{cases} \tag{24}
\]
Ja (Jain) proposed a classic model, which contains two types of noise: multiplicative and additive, as in

\[ f(i, j) = g(i, j)n_m(i, j) + n_a(i, j). \]  

(25)

The model of (23) can be simplified in (24), and the speckle noise model can use a model that only contains the unit conversion noise passed through,

\[ f(i, j) = g(i, j)n_m(i, j). \]  

(26)

\[ \log[f(i, j)] = \log[g(i, j)]n_m(i, j), \]  

(27)

In order to see the effect of the algorithm, this article uses the PM model Catte-PM, Lin Shi operator, and Wang Changhong for each kidney detection image and fetal head image and uses two ultrasound image algorithms. Compare filtering and provide a filtering effect diagram for each algorithm (as shown in Figure 4).

The comparison of the filtering effects of various algorithms for fetal images is shown in Figure 5.

According to the point noise in the kidney image, the noise density compares the PSNR and FOM of other images in Table 3.

According to the point noise in the kidney image, when comparing PSNR and FOM in other images, the noise density is shown in Table 4.

### 4. Design and Application of Ultrasound Image Monitoring and Processing System for High-Risk Parturients

#### 4.1. System Requirement Analysis

The system mainly includes ultrasonic RAW image data collection, communication, and image data processing system. The main functions realized and provided by the data communication

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**Table 1: Subjective (absolute) evaluation methods.**

<table>
<thead>
<tr>
<th>Points</th>
<th>Hinder the scale</th>
<th>Quality scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 points</td>
<td>That’s good</td>
<td>I cannot see that the image quality has deteriorated at all</td>
</tr>
<tr>
<td>4 points</td>
<td>It is good</td>
<td>We can see the image quality, but it will not affect the effect</td>
</tr>
<tr>
<td>3 points</td>
<td>General</td>
<td>The quality of the image is changing and it is clearly an obstacle to viewing</td>
</tr>
<tr>
<td>2 minutes</td>
<td>Difference</td>
<td>Hinder viewing</td>
</tr>
<tr>
<td>1 point</td>
<td>Very bad</td>
<td>Very serious obstruction to viewing</td>
</tr>
</tbody>
</table>

**Table 2: The number of iterations of MM algorithm subproblems.**

<table>
<thead>
<tr>
<th>Image</th>
<th>Fuzzy kernel</th>
<th>Number of iterations</th>
<th>PSNR (dB)</th>
<th>time (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cameraman Gauss</td>
<td>1</td>
<td>28.4472</td>
<td>0.4472</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>28.7454</td>
<td>0.5672</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>28.7751</td>
<td>0.7328</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>28.781</td>
<td>1.1 636</td>
<td></td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>28.7856</td>
<td>2.0611</td>
<td></td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>28.7856</td>
<td>9.4939</td>
<td></td>
</tr>
<tr>
<td>Goldhill Gauss</td>
<td>1</td>
<td>30.01 69</td>
<td>1.8244</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>30.3056</td>
<td>2.5738</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>30.3283</td>
<td>3.0667</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>30.3348</td>
<td>4.8439</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>30.3352</td>
<td>8.4673</td>
<td></td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>30.3352</td>
<td>36.4351</td>
<td></td>
</tr>
<tr>
<td>Cameraman Aver</td>
<td>1</td>
<td>29.1374</td>
<td>0.4489</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>29.3999</td>
<td>0.5626</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>29.4273</td>
<td>0.71 63</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>29.4355</td>
<td>1.1 479</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>29.4369</td>
<td>2.0214</td>
<td></td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>29.4359</td>
<td>8.7783</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 2: Test results of different K values.**

**Figure 3: Average PSNR values of various restoration models of different blur types.**
subsystem to realize the normal interaction with each subsystem include the following parameters:

(1) Reception of ultrasound raw image data
(2) Analysis of ultrasound raw image data
(3) Preprocessing of ultrasonic RAW image data

(4) Transmission and execution of control commands

The super image processing system first supports the image processing algorithms that need to be implemented and delivered by the subsystem. The main points are as follows:

Figure 4: Comparison of filtering effects of various algorithms on kidney images. (a) Pollution-free map, (b) add noise graph, (c) P-M algorithm, (d) CATTE-PM algorithm, (e) forest stone operator, (f) Wang Changhong algorithm, (g) SRAD algorithm, and (h) algorithm in this paper.

Figure 5: Comparison of filtering effects of various algorithms on fetal images. (a) Pollution-free map, (b) Add noise graph, (c) P-M algorithm, (d) CATTE-PM algorithm, (e) Forest stone operator, (f) Wang Changhong algorithm, (g) SRAD algorithm, (h) Algorithm in this paper.
Adjust the brightness and contrast of ultrasound images
(2) False color of an ultrasound image
(3) Flip and transform the ultrasound image
(4) Ultrasound image zoom
(5) Correlation processing of ultrasound image frames
(6) Noise reduction processing after the ultrasound image is frozen

The main purpose of this course is to design and implement the original ultrasound image data by collecting it and using the image processing system to study and improve the method of ultrasound noise reduction. The data scanned by the ultrasonic front-end hardware (probe) are mainly transmitted to the data acquisition communication system via USB, and the data acquisition system receives and preprocesses the transmitted data (DSC, gray conversion, and noise reduction). The B-ultrasound image is processed at a frequency of 40 Hz in the image display area of the ultrasound interface to form a real-time dynamic ultrasound detection image that can be analyzed and diagnosed by a doctor. The system can also perform various basic processing and conversion on the active image in the display area, including image brightness, contrast, image scaling, image inversion, and image coloring. When the active image is fixed, the current image frame is processed to reduce noise and displayed. The system preprocesses the original ultrasound data so that doctors can adjust the brightness, color, proportion, etc., of the image according to their needs, so as to observe and improve the condition more clearly, and to further diagnose it. This topic is mainly divided into two subsystems of ultrasound data acquisition communication system and ultrasound image data processing system. The interface system is dedicated to auxiliary display.

4.2. System Module Design. The main function of the ultrasound readout module is to read and analyze the frame of the original ultrasonic data of the image transmitted via USB, encapsulate the frame, send the hardware, and return the software that reads the status data. Applicable ultrasonic reading functions include: retrieving and analyzing the original ultrasound frame of the data sent by the main device, the ultrasound frame of encapsulating the data, sending a command to the device, reading the result, and transmitting it to the main trunk.

This article provides a block diagram of a module. The module mainly uses ProbeFactory to read ultrasound image data to create probes. A probe is a type of probe. OriginalImageBFrameReader is an ultrasound image reading class, which encapsulates an algorithm for reading a single ultrasound image inherited from ImageFrameReader. SCTRL_CMD is the data structure transmitted to the subcomputer. DbfHardware is a class that interacts with the subcomputer, and DbfFrameReader is the DbfHardware class. FrameReadThread is a thread class that can read data from the subcomputer.

For the original ultrasound image data, column headers are added to the data in 155 columns and 521 rows for reliable transmission. Due to the requirements of hardware equipment, the amount of data read each time must be an integer multiple of the minimum amount of data read. In the process of collecting and storing ultrasound image data in the system, multiple data buffers are used. The following briefly introduces multiple data buffers. The data must be an integer multiple of the minimum read data volume. Original ultrasound data temporary storage buffer: each column of data analyzed by the original ultrasound data analysis buffer reads the first column number, and when 155 columns of data are read, the original ultrasound data temporary storage buffer will be temporarily stored in it. Therefore, these buffers are allocated globally and need to be reused and are not suitable for storage.

The ultrasound image data processing module mainly preprocesses the frames of the original ultrasound image data and manages the frame display buffer of the generated ultrasound image data. Its data processing thread functions

<table>
<thead>
<tr>
<th>Noise</th>
<th>P-M model</th>
<th>Catte-PM algorithm</th>
<th>Linshi algorithm</th>
<th>SRAD algorithm</th>
<th>Wang Changhong algorithm</th>
<th>Algorithm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density (%)</td>
<td>PSNR</td>
<td>FOM</td>
<td>PSNR</td>
<td>FOM</td>
<td>PSNR</td>
<td>FOM</td>
</tr>
<tr>
<td>5</td>
<td>26.7791</td>
<td>0.8233</td>
<td>28.0415</td>
<td>0.611</td>
<td>28.8434</td>
<td>0.8215</td>
</tr>
<tr>
<td>10</td>
<td>22.9093</td>
<td>0.7974</td>
<td>26.0173</td>
<td>0.7744</td>
<td>26.8104</td>
<td>0.8007</td>
</tr>
<tr>
<td>30</td>
<td>17.4742</td>
<td>0.7474</td>
<td>22.2328</td>
<td>0.7312</td>
<td>23.3921</td>
<td>0.7512</td>
</tr>
</tbody>
</table>

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<td>PSNR</td>
<td>FOM</td>
<td>PSNR</td>
<td>FOM</td>
<td>PSNR</td>
<td>FOM</td>
</tr>
<tr>
<td>5</td>
<td>25.9035</td>
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<td>0.7959</td>
<td>28.0877</td>
<td>0.8057</td>
</tr>
<tr>
<td>10</td>
<td>22.2959</td>
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<td>26.8479</td>
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<td>26.7905</td>
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</tr>
<tr>
<td>30</td>
<td>17.7694</td>
<td>0.7798</td>
<td>24.4317</td>
<td>0.7318</td>
<td>22.1456</td>
<td>0.7413</td>
</tr>
</tbody>
</table>
include: additional processing of original frame data, generating a frame of ultrasound image data, and generating results; the transmission room is mainly used to process frames of ultrasound image data. After collecting the raw ultrasound data, it is preprocessed (in this section, only the preprocessed noise reduction algorithm is introduced, and the DSC algorithm and frame-related algorithms are introduced into the image processing system). The collected raw ultrasound data must be preprocessed because the ultrasound imaging mechanism will generate scale noise in the image, which will reduce the image quality and seriously affect the resolution of subtle features. As an image preprocessing noise elimination technology, it mainly filters noise interference.

Considering the real-time filtering performance requirements in the preprocessing process based on the ultrasonic speckle noise model, this paper uses an improved fast median filter to reduce the preprocessing noise. Through many practices, it has been found that the median filter can remove pink noise very well and has an excellent suppression effect on impulse interference and isolated point and line noise. With the excellent edge protection effect, we can obtain the collection effect in real time. However, the median filter does not have a good Gaussian noise suppression effect, and the noise reduction effect still cannot meet the requirements. In recent years, continuous progress has been made in the noise reduction of ultrasound images, and good results have been achieved in noise reduction and edge protection. However, due to the time limitation of the algorithm, it cannot be well applied to real-time processing.

The system uses a fast median filter algorithm for preprocessing, can better complete the work according to the system’s real-time noise reduction requirements, and is more effective than other types of algorithms. Once the image in the active area is fixed, this article will implement an improved noise reduction algorithm, so that the doctor can make clearer calculations and more accurate diagnosis after the image is fixed, so that deeper effect processing can be performed.

The system has been improved in two main aspects by adopting a fast median filtering algorithm that has been improved for noise reduction preprocessing. You can consider sorting adjacent fields and use the sorted rows or columns directly in subsequent programs. Second, binary sort storage is used, and the time interval method is used to get the effect of removing the median $O(1)$.

4.3. System Performance Test. The system sets the image refresh rate to 25 Hz so that the system can perform user interface operations normally and timely meets the system’s requirements for digital image processing and has a better response rate. The test results are shown in Table 5.

Test method: first, turn on the power and run for 24 hours to check whether the whole machine is operating normally, sometimes after turning on the power and running for 24 hours, perform some functional test tasks continuously to ensure that it has stopped. Due to various operating systems, hardware, and software reasons, the specific response of a single operation is meaningless when testing the response time of the entire system. The test results are listed in Table 6.

5. Conclusion

The hot image deblurring technology in the field of image restoration has broad application potential and strong technical requirements, leading to the rapid development of today’s multimedia communications. In general, we have a clear understanding of the process of deblurring images. Therefore, image restoration has also become a blind restoration problem. Accurate estimation of the fuzzy kernel function is very important for the restoration of clear images. In the process of establishing image restoration and effective prior knowledge, making full use of the signal itself to obtain the model also plays an important role. Then, relying on the digital B-ultrasound terminal software system to realize the collection and processing of digital B-ultrasound terminal medical image data, select the B-ultrasound image data as the research content, mainly design and realize the ultrasound image acquisition, communication, and processing system.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.
Conflicts of Interest

The authors declare that they have no conflicts of interest.

References
