IMAGE CORRELATION WAVELET THRESHOLDING IMAGE DENISING OVER TRADITIONAL WAVELET THRESHOLDING

MONIKA RITU SHARMA ASHOK SAINI

ECE,B.M.I.E.T., Sonipat, India[1,2,]
Monika.hooda1@gmail.com[1]

Abstract— Edge-preserving denoising is of great interest in image processing. This paper presents a wavelet-based multiscale products thresholding scheme for noise suppression of the images. A dyadic wavelet transform (A Canny edge detector-) is also employed. In the result we can see that the with the decay in noise rapidly it evolve the high magnitude across wavelet scale. To take advantage of the wavelet interscale dependencies we multiply the adjacent wavelet sub bands to enhance edge structures while weakening noise. In the multiscale products, edges can be effectively distinguished from noise.

An adaptive scale correlation wavelet thresholding technique is then proposed. In which the adaptive threshold is calculated which is imposed on the products, instead of on the wavelet coefficients. This proposed scheme suppresses the noise effectively and preserves the edges features than other wavelet-thresholding denoising methods. In the result we can see the better visual quality and increment in the signal to noise the last node will die in the network is to be discussed. In which round ratio as compare to the traditional technique.

Keywords:

SWT (stationary wavelet transform), RF radio frequency, ,WT(wavelet Transform)

1.1Introduction To Wavelets And Wavelet Transforms

Wavelets are used to transform the signal under investigation into another representation which presents the signal information in a more useful form. When working with signals, the signal itself can be difficult to interpret. Therefore the signal must be decomposed or transformed in order to see what the signal actually represents.

The continuous wavelet transform is the most general wavelet transform. The problem is that a continuous wavelet transform operates with a continuous signal, but since a computer is digital, it can only do computations on discrete signals. The discrete wavelet transform has been developed to accomplish a wavelet transform on a computer.

Wavelets and wavelet transforms are used to analyze signals. The transformed signal is a decomposed version of the original signal, and can be converted back to the original signal. No information is lost in the process. When studying a musical tone, one of the features that is interesting is the frequency. The frequency for a clean A is 440Hz, see top plot in Figure 1.1. To determine the frequency of the signal one must measure the period of each wave, and calculate the frequency. The period of one wave is the time it takes from it is at one point in the wave, until it reaches the same position again. For example the time between two wave tops.

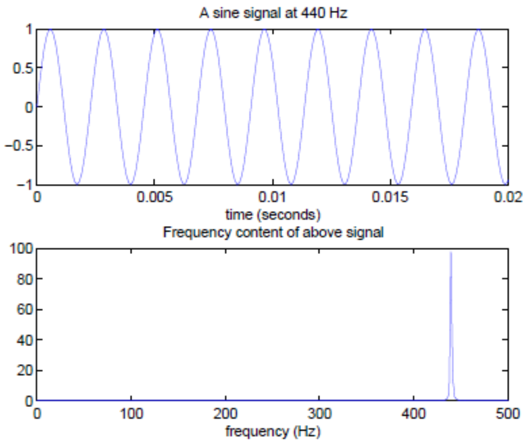

Figure 1.1: A sine wave at 440 Hz, and its Fourier transform

Using different transforms, the signal can be transformed into other representations. For this example, instead of having amplitude as a function of time, it would be better to have the amplitude as a function of frequency. This can be done by using the Fourier transform. Once one knows what frequencies are present, one can easily determine which tones the signal consists of, in the case of a musical signal. The bottom part of Figure 1.1 shows that it is easy to determine that the signal in the upper part of Figure 1.1 actually is an A when you perform the Fourier transform. Wavelet transforms can do the same, but they can also tell you when the tone A appeared in time, effectively giving you amplitude, time and frequency, all in one.

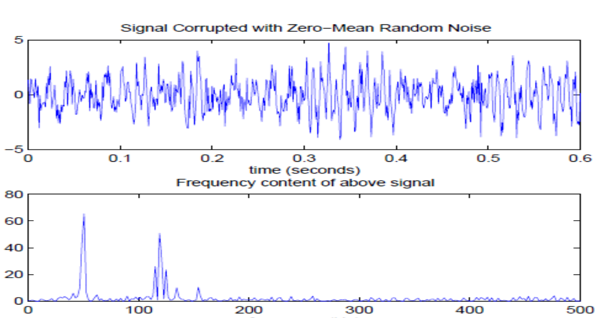

Figure 1.2: A noise input signal, and corresponding Fourier transform.

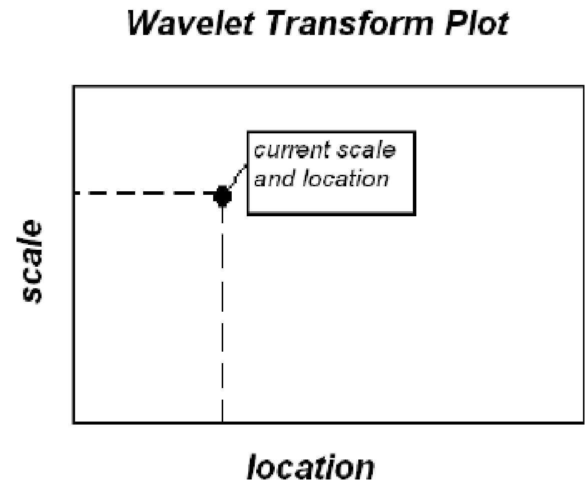

Figure 1.3: Wavelet Transform Plot

1.2 Present Work:

It was analyzed that previous traditional thresholding techniques are not giving satisfactory result for image denoising. Disadvantage of this technique is that the SNR ratio decreases with the increase in image size and this technique is time variant. So we proposed a new method named Scale Correlation Wavelet thresholding method with the help of 2D dyadic wavelet. Advantage of 2D dydaic wavelet is that it is time invariant , also changes only scale parameter. So using this, an adaptive wavelet can be designed to enhance instantaneous feature of the image.

A New sure approach to Image Denoising: Interscale Orthonormal Wavelet Thresholding beyond the point wise approach, more recent investigations have shown that substantially larger denoising gains can be obtained by considering the intra- and interscale correlations of the wavelet coefficients. In addition, increasing the redundancy of the wavelet transform is strongly beneficial to the denoising performance. We have selected three such techniques reflecting the state-of-the-art in wavelet denoising, against which we will compare our results.

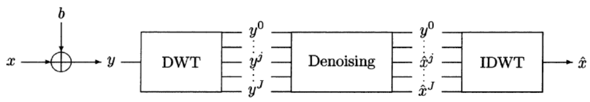

Figure4.1-Principle of wavelet denoising.

1.3 Proposed Work:

In "**Adaptive Wavelet Thresholding for Image Denoising and Compression**" On a seemingly unrelated front, lossy compression has been proposed for denoising in several works [6], [5], [21], [25], [28]. Other works [4], [12]–[16] also addressed the connection between compression and denoising.

STEPS INVOLVED IN THIS WORK

In this paper, an adaptive scale correlation wavelet thresholding technique is promoted over traditional wavelet thresholding. For this paper the following steps are involve-

1. Taking original image
2. Calculate original SNR from the image
3. Create a noisy image.
4. 2D dyanic wavelet transform
5. Compute the coefficient of correlation.
6. Do the traditional thresholding on the image.
7. Calculate the SNR after traditional thresholding
8. Apply the scale correlation thresholding on the image now.
9. Calculate the SNR after scale correlation thresholding.
10. Measure the effect of use of scale correlation thresholding over traditional thresholding.

1.6 RESULTS AND DISCUSION

In this section, the performances by the proposed scheme on some INPUT images are compared with the traditional wavelets thresholding technique. We made a comparison by using parameter i.e. signal to noise ratio and visual quality.

(a). VISUAL QUALITY : When we compare these techniques on the basis of visual quality the result is very clear that adaptive scale correlation wavelet thresholding technique give the best quality picture in the result. Figure (1.4) show the original image which is further made noisy by adding the random

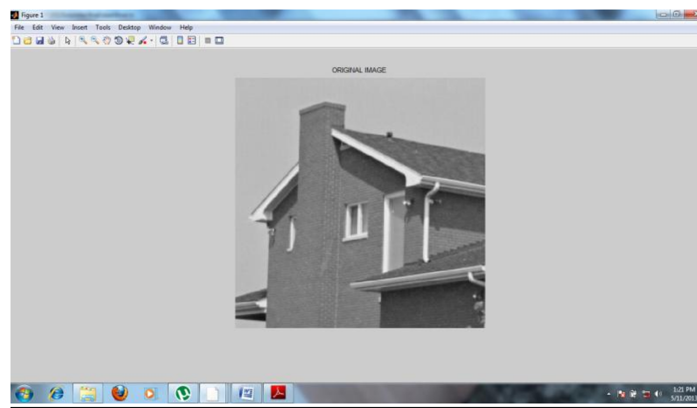

Figure 1.4 : ORIGINAL IMAGE

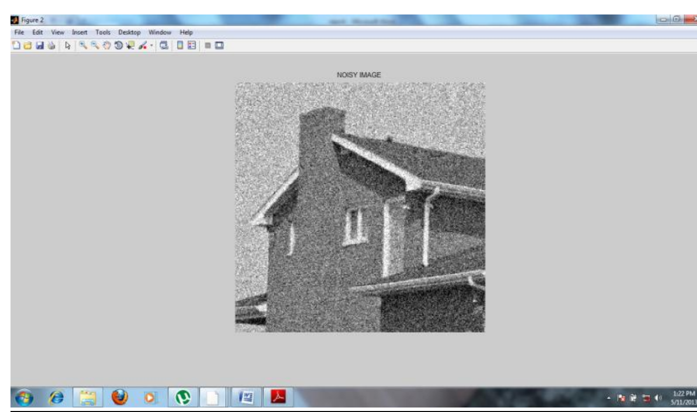

Figure 1.5 : NOISY IMAGE

Noise in the input image figure(1.5). Then after this by applying the traditional wavelet thresholding the output image is shown in figure(1.6).

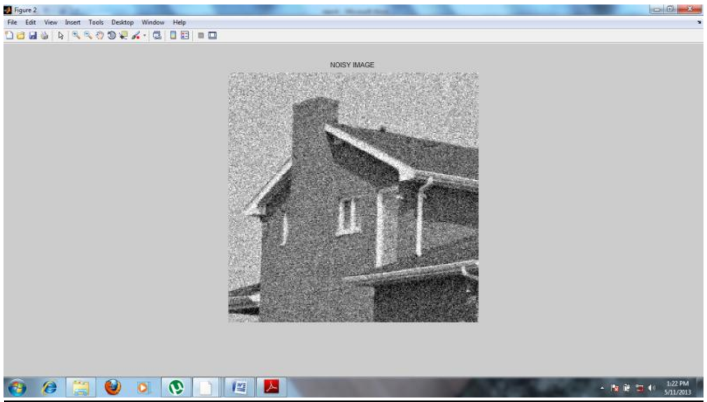

Figure 1.6 : Image After Traditional Wavelet Thresholding

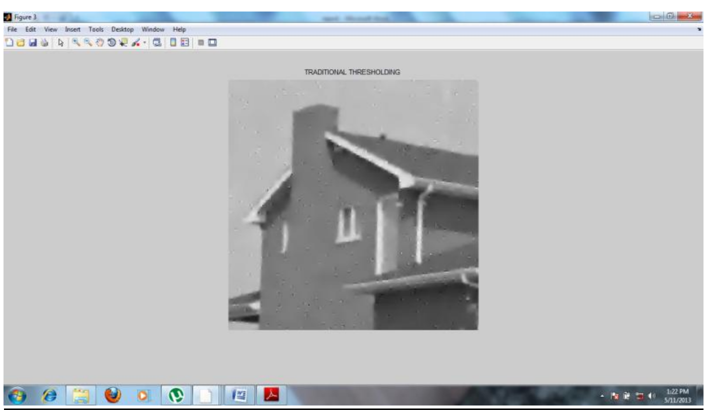

Figure 1.7 : Image after SCALE CORRELATION WAVELET THRESHOLDING

Finally the figure (1.7) show the result of adaptive scale correlated wavelet thresholding image from where it is clear that the image quality is far better in this case as compare to traditional wavelet thresholding.

(b) SIGNAL TO NOISE RATIO: We calculated the value of signal to noise ratio at three different point though which we can compare the both technique. The signal to noise ratio for the input or we can say original image is

snr_o = 14.3144 dB

Then apply the traditional wavelet thresholding and calculate the signal to noise ratio, which is

snr_ft = 23.5478 dB

The value for signal to noise ratio after adaptive scale correlation wavelet thresholding is

snr_f = 24.7967 dB

From the above calculated value for signal to noise ratio we can conclude that the scale correlation wavelet thresholding technique give the best result over traditional wavelets thresholding.

1.4 Conclusion And Future Scope

This paper proposes an image denoising scheme using an adaptive scale correlation wavelet thresholding technique. Unlike traditional schemes that directly threshold the wavelet coefficients, the proposed scheme multiplies the adjacent wavelet subbands to amplify the significant features and then applies the thresholding to the multiscale products to better differentiate edge structures from noise. The distribution of the products was analyzed and an adaptive threshold was formulated to remove most of the noise. Experiments on the input images show that the proposed scheme not only achieves high SNR and VISUAL QUALITY measurements but also preserves more edge features.

By this adaptive scale correlation wavelet thresholding technique we get high quality of image and better value for the signal to noise ratio. This can be used in the medical images because edge features preserving nature. We can also design the further effective technique by forwarding this for getting more clear visuality and better in signal to noise ratio. By getting more correctively threshold value get the better in the output which is further beneficial in many areas.

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