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AN APPROACH FOR IMAGE ENCHANCING AND SHAPENING WITH IMPROVED DENOISED PROPERTIES

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Abstract: **This is an approach for image enhancement and denoising with advanced rendering of media such as digital image. Lack of contrast is the main drawbacks in high resolution image creation. Our proposed system is, initially an input in any format is given. Then high signal frequency sub-image is obtained by multi-wavelet transformation, now the image is denoised using inverse stationary wavelet transform and later the image is reconstructed through inverse wavelet transform. Lastly, contrast is enhanced and edge is detected and subtracted with the processed image this will sharpen the image. Sobel and Laplacian filter are used for image sharpening. To show the performance of the system some important parameters are graphed.**

Keywords: **Multiwavelet Transform, Haar Transform, Sobel and Laplacian filters.**

1. INTRODUCTION

In the modern world every environment isdominated with an advanced surveillance system and this needs an advanced and efficient image processing .Knowledge on frequency domain transform deals with wavelet transform. Equalization it is a classic method in image processing in view of spatial domain. In 1980s time frequency analysis tool was developed and successfully implemented in the processing any image. Intensity and detected edge of the images during image sharpening are used to render and achieve the recognisable picture. All of above steps adds to the eminence of image Such as contrast, edge, absolute error in each pixel.

Further, according to the research image sharpening is attuned with each values in the image. Basically the whole algorithm for image sharpening is based on the colour variation between each pixel and also relies on the area of geometry of the image. Conversely, high frequency information cannot be obtained by just multiscale-wavelet transformation. The image is disintegrated to high signal sub-images; we obtain high-frequency information which will improve a picture efficiently. In addition, image can be enhanced better with transform field and spatial field process. Also, denoising should be done because there will be huge amount of noise in any sub-image. This approach is more effective with nonlinear histogram equalization, wavelet transform and Haar transform.

2. METHODOLOGY

2.1 Image Enhancement

The main goal of image enhancement is to create an enhanced image than input image. This is applicable for all the images but might not be efficient for noisy images. There are two main technique classified by their domain. They are frequency domain and spatial domains. In frequency Fourier Transforms is considered and in spatial represent each pixel in a image and they also directly operate pixels. Some important spatial domain techniques are logical and arithmetic operations, histogram and high- low pass filters.

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2.2 Wavelet Model

Initially image is decomposed into high signal images by wavelet decomposition. The images are sub divided into different bandwidth, The frequency are divided into HH, HL, LH and LL. The image with high-high is separated and selected for further enhancement. Let us Consider i = 1,2,3,..., k, where 'k' represent levels after decomposition, LLk represent k'th lower sub image ,and HLj, LHj, HHj represent i'th higher level sub-images. Detailed sub images are obtained after separating high frequency images using multi wavelet decomposition.

{ HLi00,HLi01,HLi10,HLi11}
{ LHi00,LHi01,LHi10,LHi11}
{HHi00,HHi01,HHi10,HHi11}

Here i = 1, 2,3,.., k, i00, i01 and i10 represents coordinates of decomposed picture after decomposition.

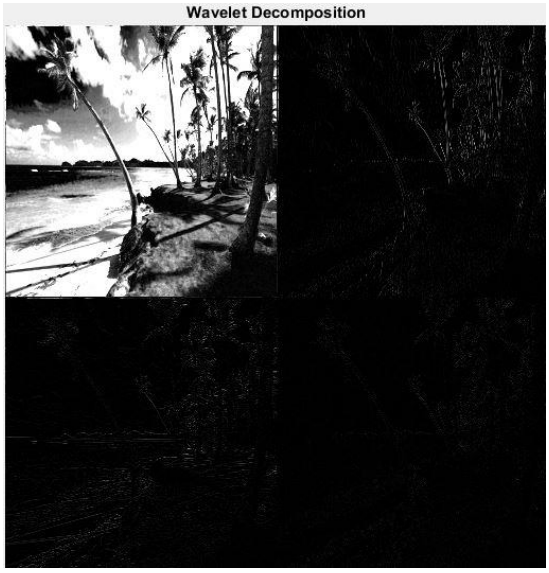

Fig.2.2a

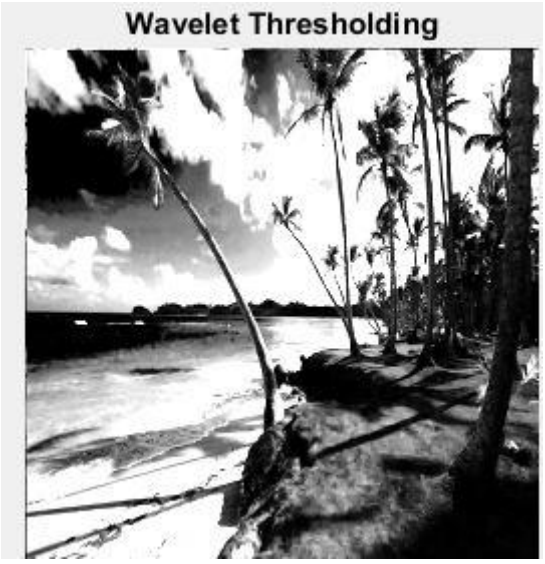

Fig.2.2b

The above Image describes the high-high part of the decomposed image. The separated image is then inverse transformed for specified number of iterations and then finally denoised by high and low pass filters during thresholding. Finally the filtered image is generated.

2.3 Linear contrast stretch

The word contrast enhancing mainly deals with improving the brightness and other entities of theimage. The contrast can be measured by obtaining the difference between the lowest value and highest values, that is the grey scale ranging from 0-255.

Contrasting can be explained using the following equation:

P[x,y]=A[Q(x,y)]

Where,

P[x,y] = The brightness units of the part of the image at the exit.

Q[x,y] = The brightness units of the part of image at the entrance.

A= Linear transformation function.

2.4 Sharpening model

This approach of sharpening method mainly begins with brightness enhancement. The algorithm we use to perform an edge detection process is done by Laplacian and Sobel. The contrast enhancement techniques is used to render the

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contrast of the image and to enhance the brightness of the image. Here the images must be carefully analysed and understood.

Edge Detection:

The contrast enhanced images are considered for edge detection only for a cause that the geometrical edges are very difficult to handle. This edge detection technique plays a key role in concentrating the edges of the satellite images.

Fig.2.3a

3. RESULTS

The parameters are graphed against our proposed system.The graph are based on RMSE, PSNR and Entropy. As the bar graph represents our proposed system is more efficient in both PSNR and RMSE against existing inbuilt systems (mean and median filter).Other parameters like SSIM and Absolute Error are noticably lower.Finally the entropy is calculated and plot with scatter graph ,this graph also compare the original image with processed image.The figure 2.2a shows the decomposed image, figure 2.2b shows image after thersholding and denoising.finally figure 3.1a shows the Sharpened image.

	Proposed	Median Filter	Mean Filter
PSNR	28.7976	24.0113	21.2056
RMSE	1.3005	1.3170	1.4854
Entropy	7.8739	7.6070	7.8740
Cross-Correlation	0.9582	0.9399	0.9426
SSIM	0.9290	0.9951	0.9739
Average Difference	-9.3656	0.1712	9.6521
Absolute Error	0.0785	0.0327	0.0936

Fig 4.1

This table contains the combined values of all the aspects which describes the characteristics of any image.The mean and median are the values of the original image used whereas the values of the proposed system describes the qualities of the enhanced image.

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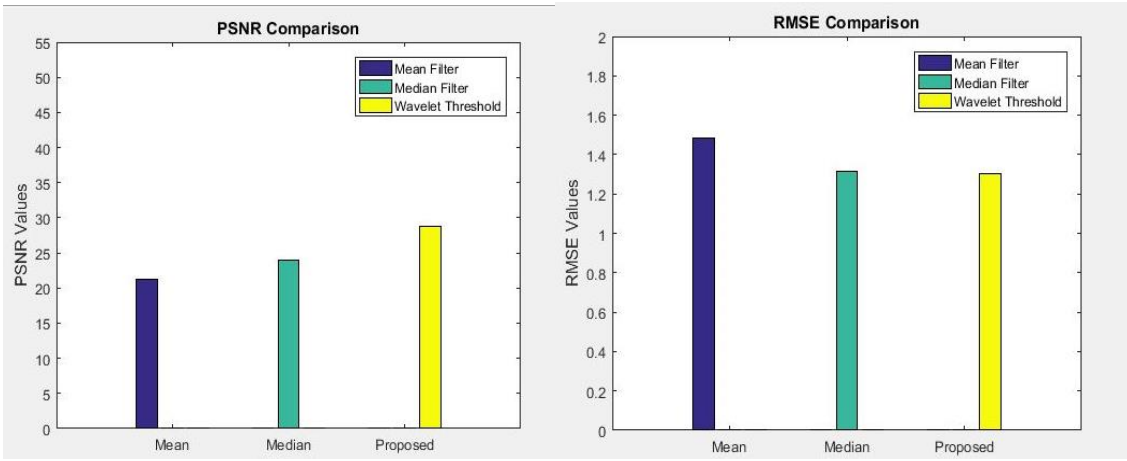

Fig 4.2

The bar graphs presented above in fig 4.2 gives the detils of peak signal to noise ratio(PSNR) and root mean square error(RMSE).These graphs easily helps the user to understand the differences between the original and the proposed systems.

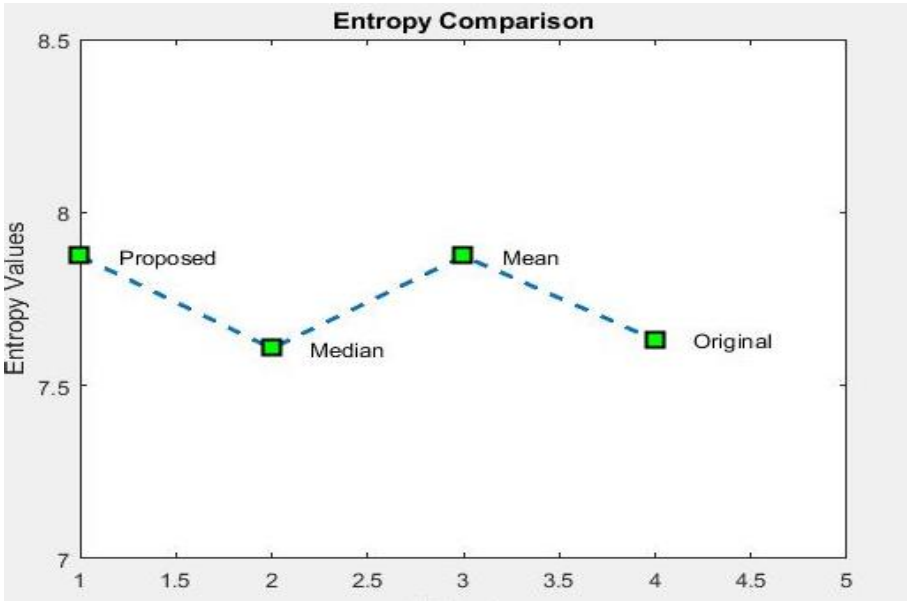

Fig 4.3

The above entropy comparision graph in fig 4.3 gives the absolute values and clear cut idea of the proposed and the original images.One can easily identify the difference between the values plotted using the above graph.

4. CONCLUSIONS

The main application of image processing is to obtain the high frequency sub images using the wavelet transform algorithm. Harr transforms supports the wavelet by extracting high frequency sub images. By this high-frequency information is extracted efficiently. The obtained values are then fed for thresholding where the frequencies within the given range are considered. In the further steps we remove the noise, if present in the input image. The inverse wavelet's and the reconstruction algorithms brings the frequencies back to the matrix format. Once the reconstruction's done, we manage the contrast features with respect to every image. The original image's edge property can be preserved by subtracting the original image with the enhanced one.The series of steps performed above gives the output as expected by the user, that is the high quality images in all aspects are obtained. Finally the performance analysis is done to increase the

understanding ability of the user. The aspects considered regarding the performance in our paper are peak signal to noise ratio(PSNR) and root mean square error(RMSE) values mainly with some other entities.

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