STUDY AND PERFORMANCE ANALYSIS OF DE-BLURRING TECHNIQUES FOR DISTORTED MEDICAL IMAGES

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Abstract

Image processing techniques in medical imaging are used to analyze the symptoms of the patients with ease. Medical images often blur during acquisition through electronic equipments, which are spread over the image. Real images are often degraded by blur and this blur can occur during image transmission and digitization. In such situation it is very difficult for doctors to diagnosis the particular disease. Therefore it is necessary to deblur the blurring image. The objective of this method is to detect the different types of blurring in medical images and remove that particular blur from the medical image. The results are analyzed, compared and evaluated through the quality metrics like mean and standard deviation, and these are found most suitable for medical diagnosis for doctors. [1, 4, 6]

Keywords: *Medical imaging, Detecting blur, Deblurring Techniques.*

1. Introduction

Image-processing techniques have been developed for analyzing the output of medical imaging system to get the advantage to analyze the symptoms of the patients with ease. MRI, Cancer and X-ray images often consist of random blurre that does not come from tissues but from other sources in the electronics instrumentation during acquisition. The blurre of an image gives it a gray appearance and mainly the blurre is evenly spread and more uniform. MRI, Cancer and X-ray images are prone to a variety of types of blurre. They are Motion, Gaussion, Prewitt, Log, Laplaction, Average, Unsharp blurre can be introduced into an image, depending on how the image is created. Deblurring is a technique for modifying or enhancing an image. Deblurring is a powerful tool for image processing application. Many researchers have successfully applied the different Deblurring techniques and proved the advantage of the Deblurring. [2, 6] The basic function of Deblurring is to remove the blurre from images for easy analysis. Wiener, Regularized and Lucy-Richardson Deblurring techniques can easily remove the blurre from the MRI, Cancer and X- ray images. [6] The basic objective of this paper is to detect and remove the various types of blurre in medical images. The results, which we have achieved, are more useful for general medical practitioners for easy analysis, which saves the processing time.

The organization of the paper is as follows. Section-2 deals with the methodology to detect and remove the blurre, Section-3 gives experimental analysis & discussion and Section-4 deals with the conclusion followed by the references.

2. Methodology

The following algorithm is proposed for Deblurring of Medical Images.

Step1. Input the image.
Step2. Detect the blurre
Step3. Once the blurre is detected apply the deblurreing techniques.
Step4. If blurre is removes go to Step5 else go to Step3
Step5. Results are to be tabulated.
Step6. End

In the Proposed algorithm the medical images like MRI, Cancer and X-ray are taken as input images for testing. We have detected the blurre. Once the blurre has detected we have applied various deblurrling-filtering techniques for deblurring purpose.

3. Results and Discussion

In this experimental work we have taken medical images like MRI, Cancer, and X-ray. We have applied the above mention algorithm on these images and experimental work is carried out in MATLAB. After adding the **Motion blurre, Gaussian blurre, Prewitt blurre** in MRI, Cancer, X-Ray image the various Deblurring techniques like Wiener, Regularized, and Lucy-Richardson have been applied. [6][7] The standard deviation and mean have been evaluated after finding the Motion Blurre and after removal of the Motion Blurre using various Deblurring techniques which is shown in table 1 & 2. After adding the **Average blur, Unsharp blur, Lpalaction blur** in MRI, Cancer, X-Ray image the various Deblurring techniques like Wiener, Blind Deconvolution, and Lucy-Richardson have been applied. [6][7] The standard deviation and mean have been evaluated after finding the Average Blur and after removal of the Average Blur using various Deblurring techniques which are shown in table 3 & 4

4. Conclusion

This experimental analysis will improve the accuracy of MRI, Cancer & X-ray for easy diagnosis. The results, which we have achieved, are more useful and it will be more helpful for general medical practitioners & orthopedics to analyze the fractures. If the standard deviation is high then the result of Deblurring is better.

From the above experiential work it is observed that the choice of deblurring techniques for the medical images depends upon the types of blurr and type of deblurring techniques, which we have used.

When we added Motion, Gaussion and Prewitt blurr in MRI, Cancer and X-RAY images we have applied different deblurring techniques like Wiener, Regularized filter and Lucy-Richardson It is found that Wiener and Regularized filter techniques are best techniques to remove the blurr from the medical images.

When we added Average, Unsharp and Laplaction blur in MRI, Cancer and X-RAY images we have applied different deblurring techniques like Wiener, Blind Deconvolution and Lucy-Richardson It is found that Wiener filter technique is best technique to remove the blur from the medical images.

Future Work

We want to develop software to detect the blurre present in all types of images and it will automatically remove the blurre through various deblurring techniques. We have to develop such deblurring technique, which will remove the blurr from all types of images.

5. References.

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Table1. Shows the Standard Deviation and Mean for Blurre Image

Image	Motion Blurre		Gaussian Blurre		Prewitt Blurre	
	Mean	Std	Mean	Std	Mean	Std
MRI	193.94	42.2307	193.9405	54.7446	36.9385	66.4664
Cancer	64.2466	25.4153	64.2426	34.7101	29.8796	55.9438
X-ray	151.582	44.7177	151.5831	58.5817	27.5304	43.86

Table2. Shows the Standard Deviation and Mean for filtered Image

Image	Blurre Type	Wiener Filter		Regularized Fitter		Lucy-Richardson	
		Mean	Std	Mean	Std	Mean	Std
MRI	Motion	192.7238	61.1944	192.561	63.123	192.7358	50.9921
Cancer		64.8914	49.2245	64.8917	49.2235	64.2505	32.8402
X-ray		151.2555	65.4983	151.256	65.4977	151.5517	57.8596
MRI	Gaussian	193.0385	63.4018	193.0389	63.4019	193.5869	60.698
Cancer		64.565	48.9845	64.5647	48.9823	64.2353	43.9809
X-ray		151.3782	65.2427	151.3785	65.2416	151.5705	62.2866
MRI	Prewitt	55.3181	79.7195	55.2737	79.6557	0.0604	3.9232
Cancer		38.383	57.7056	38.3606	57.6736	0.1568	6.3216
X-ray		42.0812	59.8621	42.0675	59.8446	0.2176	7.4466

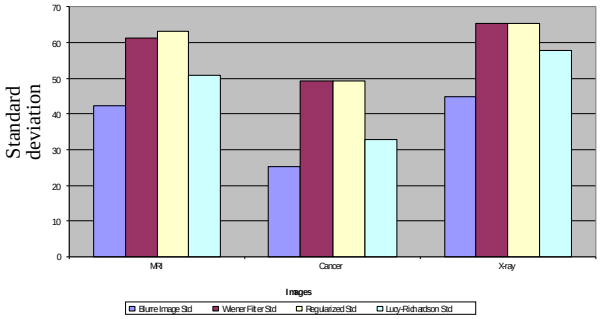
Table3. Shows the Standard Deviation and Mean for Blur Image

Image	Average Blur		Unsharp Blur		Laplaction Blur	
	Mean	Std Dev	Mean Dev	Std Dev	Mean	Std Dev
MRI	193.94	54.7208	190.5728	80.9154	17.1957	34.1836
Cancer	64.244	34.6847	69.5454	72.6057	20.171	32.3642
X-ray	151.585	58.5704	148.2555	82.2419	21.3516	35.0263

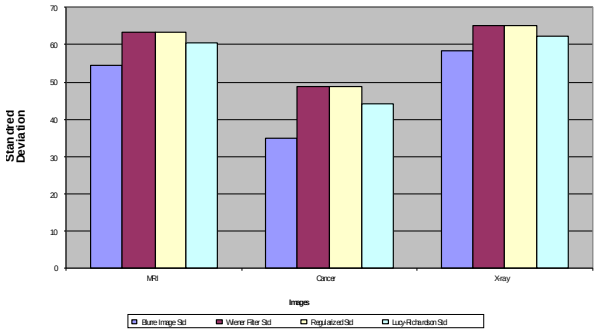
Table4. Shows the Standard Deviation and Mean for Deblurred Image

Image	Blur Type	Wiener Filter		Blind Deconvolution		Lucy-Richardson	
		Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
MRI	Average	193.0697	63.4857	193.587	60.6563	193.58	60.6843
Cancer		64.5732	48.9099	64.2451	43.8353	64.2429	43.9905
X-ray		151.3614	65.2539	151.5789	62.2868	151.578	62.2972
MRI	Unsharp	190.5758	57.6662	190.5728	80.9154	70.3339	113.3124
Cancer		69.5412	42.6943	69.5454	72.6057	44.5667	87.8336
X-ray		148.2529	57.0183	148.2555	82.2419	68.5354	111.0089
MRI	Laplaction	112.9354	125.426	0	0	0.1207	5.5476
Cancer		127.6222	121.1304	0	0	0.1307	5.7711
X-ray		119.6449	119.8494	0	0	1.6866	20.6707

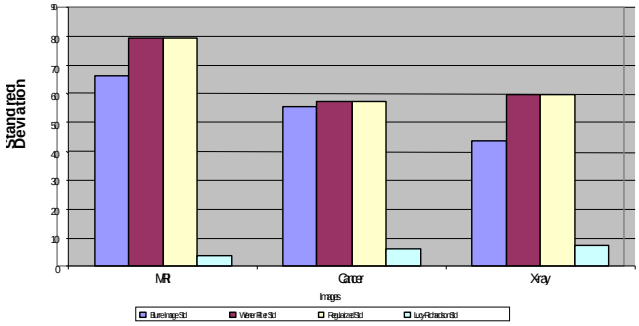
Graph for Motion Blurr and Various Deblurring techniques



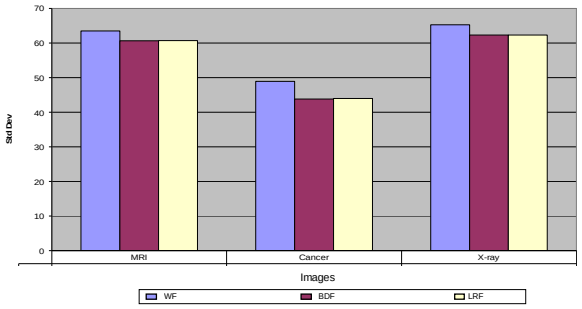
Graph for Gaussion Blurr and Various Deblurring techniques



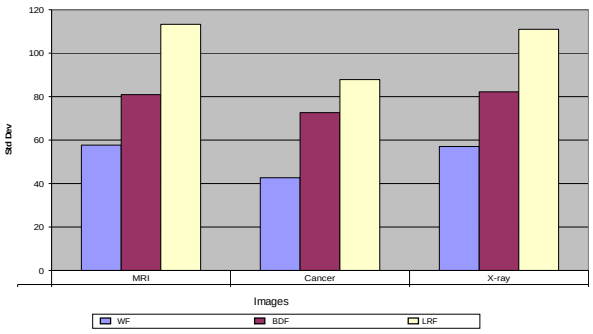
Graph for Prewitt Blurr and Various Deblurring techniques



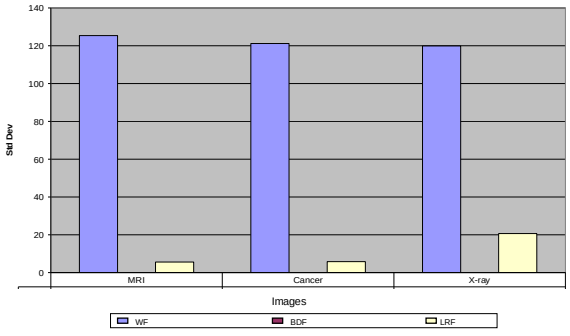
Graph for Average Blurr and Various Deblurring techniques

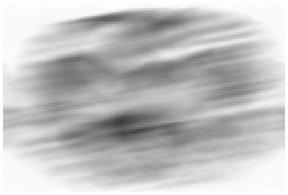


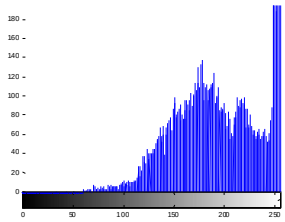
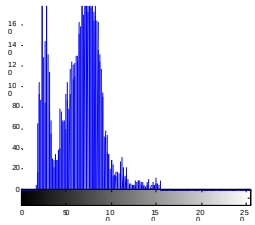
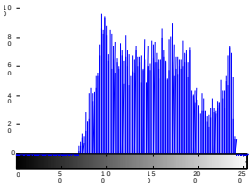
Graph for Unsharp Blurr and Various Deblurring techniques



Graph for Laplaction Blurr and Various Deblurring techniques



Blurred with Motion	Blurred with Motion	Blurred with Motion
		
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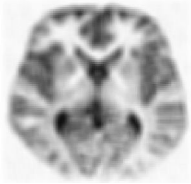	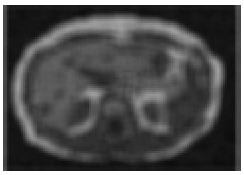	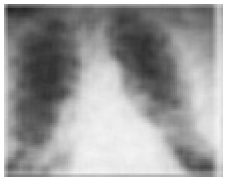
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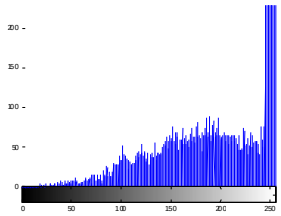	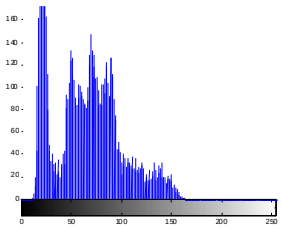	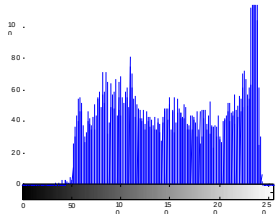
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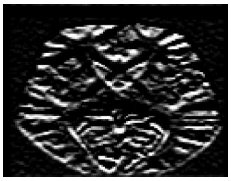
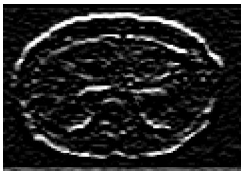
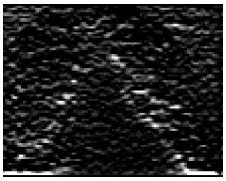
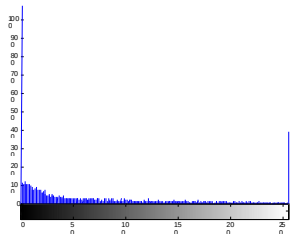
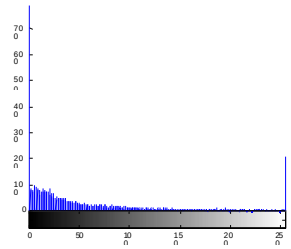
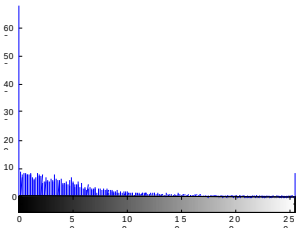
		
Blurred with Prewitt.	Blurred with Prewitt.	Blurring with Prewitt.
		
Histogram for Blurring using Prewitt.	Histogram for Blurring using Prewitt.	Histogram for Blurring using Prewitt.

Figure1. Show the Blurred images.

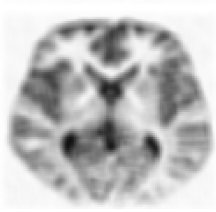
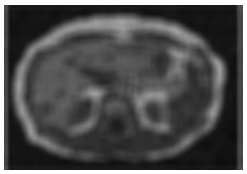
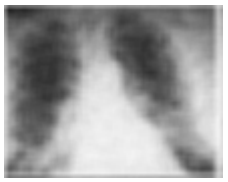
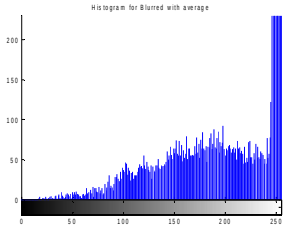
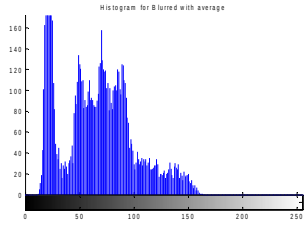
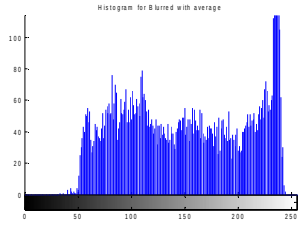
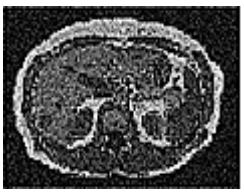
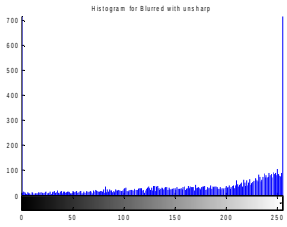
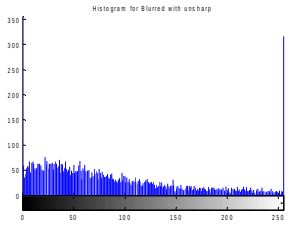
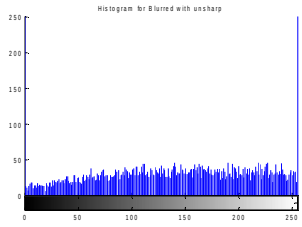
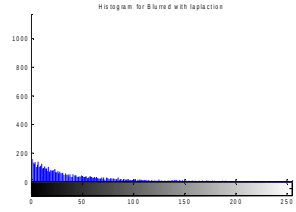
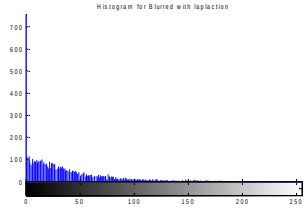
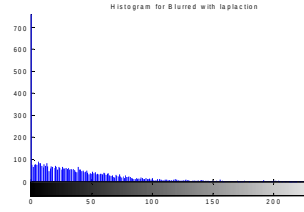
		
Blurred with Average	**Blurred with Average**	**Blurred with Average**
		
Histogram for Blurred with Average	**Histogram for Blurred with Average**	**Histogram for Blurred with Average**
		
Blurred with Unsharp	**Blurred with Unsharp**	**Blurred with Unsharp**
		
Histogram for Blurred with Unsharp	**Histogram for Blurred with Unsharp**	**Histogram for Blurred with Unsharp**
		
Blurred with Laplaction	**Blurred with Laplaction**	**Blurred with Laplaction**
		
Histogram for Blurred with Laplaction	**Histogram for Blurred with Laplaction**	**Histogram for Blurred with Laplaction**

Figure2. Show the Blurred images.