# Design Of An Efficient Image Enhancement Algorithms Using Hybrid Technique

Mohammad Abdul Ramiz Research Scholar (M.Tech), Dept. of ECE Anjuman College of Engineering and Technology Nagpur, India *mohdramiz92@gmail.com*  Prof. Ruhina Quazi Assistant Professor, Dept. of ECE Anjuman College of Engineering and Technology Nagpur, India quazi\_ruhina@yahoo.co.in

*Abstract*— Fundamental purpose of the image enhancement is to process the image in such a way so as to produce an image that is better in some or the other aspect than the original one for a specific purpose. It makes it easier for human viewers and machines to extract, interpret, and wherever necessary perform further processing on the information contained of the images. Image Enhancement is one of the important requirements in Digital Image Processing which is essential in making an image useful for various applications which can be seen in the various areas of Digital photography, Medicine, Geographic Information System, Industrial Inspection, Law Enforcement etc. Image Enhancement is used to improve the poor visual quality of the images. The proposed method is a hybrid method which is very effective in enhancing the images. Initially, frequency domain analysis is done followed by spatial domain procedures. The performance of the proposed method is assessed on the basis of two parameters i.e. Mean Square Error (MSE) and Peak Signal to noise ratio (PSNR).

Keywords-Frequency domain techniques, Hybrid techniques, Image Enhancement, Spatial domain techniques.

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## I. INTRODUCTION

Imageenhancement is a technique to transform the image from its original views to an improved view. The term image enhancement means that the improvement of an image appearance by increasing dominance of some features or by decreasing ambiguity between different regions of the image. When images are enhanced for human viewers, as in television, the main objective is to improve perceptual aspects: image quality, intelligibility, or visual appearance. In other applications, such as object identification by machine, an image may be pre-processed to aid machine performance. Because the objective of image enhancement is dependent on the application context and the criteria for enhancement are often subjective or too complex to be easily converted to useful objective measures, image enhancement algorithms tend to be simple, qualitative and disambiguation. The enhancement methods can be broadly categorized into following two methods:

- 1. Spatial Domain Method
- 2. Frequency Domain Method

## Spatial Domain: -

The spatial domain [21] techniques, directly operates on pixels of an image. The pixel values are manipulated to achieve desired enhancement. The gain of the spatial domain based technique is that, they are conceptually simple to understand and the complexity of these techniques is low. But these techniques [22] have difficult to providing sufficient robustness and imperceptibility requirements. Frequency Domain: -

In frequency domain methods, the image is transferred into frequency domain. It means that, the Fourier transform of theimage is computed first. The result of Fourier transform is multiplied with a filter transfer function. And then the inverse Fourier transform is performed to get the resultant image. Frequency domain image enhancement is used to describe the analysis of mathematical functions and signals with respect to frequency and operate directly on the transform coefficients of the image, such as Fourier transform, discrete wavelet transform (DWT) and discrete cosine transform (DCT). The disadvantage of frequency domain procedure is that it cannot simultaneously enhance all parts of image in good manner and it is also difficult to automate the image enhancement procedure.

## Hybrid Techniques: -

The word hybrid means combination of two elements. Here it is a combination of both the features of Spatial and frequency domain enhancement techniques that enhances an image by adjusting its contrast by smoothing the outline information.

## II. PROBLEM DEFINATION

Manyresearchers and scholars have carried out work using spatial domain and frequency domain techniques. However the results obtained using these techniques are not up to the mark. So we are using hybrid technique to overcome this problem.

### III. PROPOSED SYSTEM



Fig: 1 Flowchart of proposed technique

The flowchart and the block diagram of the proposed technique are as shown in fig.1 and fig.2 respectively. Initially a digitized image is taken on which the proposed technique has to be applied. Then the orthogonal transform of the digitized image is taken to transform the image into frequency domain. The standard transforms are discrete wavelet transform, discrete cosine transform, Fourier transform, etc. Out of these available transforms, discrete cosine transform is used in this paper for illustration purpose.

In the next step the magnitude part and the phase part of the frequency transform coefficients are separated. After that the magnitude part is enhanced using the alpha rooting technique. Then the recombination of the phase part with the magnitude part is done followed by inverse orthogonal transform to bring back the digitized image into the spatial

domain from frequency domain. The result obtained is not up to the mark because of the lack of brightness and the graying effect. So to overcome this problem the spatial domain techniques are applied on the image. Here the log transform and the power law transform are used which enhances the quality of the image.

#### IV. BLOCK DIAGRAM



FIG: 2 BLOCK DIAGRAM OF PROPOSED TECHNIQUE



log image powerlaw image







TABLE 1:- MSE AND PSNR VALUES FOR DIFFERENT IMAGES

Technique Name	Image 1		Image 2		Image 3	
	MSE	PSNR	MSE	PSNR	MSE	PSNR
DCT	0.41	52.02	0.78	49.21	0.67	49.87
DCT+Powerlaw	0.33	52.92	0.55	50.75	0.33	52.92
DCT+Log	0.13	56.79	0.26	53.99	0.18	55.47

## VI. CONCLUSIONS

The results of hybrid technique is as shown in table above giving better peak signal to noise ratio and mean square error.

## VII. FUTURE SCOPE

Here, a DCT algorithm is used in combination with various spatial domain techniques. More hybrid methods can be designed using DWT and fourier transform procedure. Even in depth analysis can be done by considering more performance evaluation parameters such as Normalized absolute error, Absolute Contrast Error and Entropy.

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