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Survey on Fusion of Image using Discrete Wavelet Transform

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Abstract: **This paper proposes to enhances the quality of image after fusion process using Discrete Wavelet Transform(DWT). It is used to reduce the problems like blocking, ringing artifacts. Finally, fused two different frequency subbands are inverse transformed to reconstruct fused image.**

Keywords: Discrete Wavelet Transform, Subbands

I.INTRODUCTION:

Image processing is a method to convert an image into digital form and perform some operations on it, in order to get an enhanced image or to extract some useful information from it. It is a type of signal dispensation in which input is image, like video frame or photograph and output may be image or characteristics associated with that image. Usually image Processing system includes treating images as two dimensional signals while applying already set signal processing methods to them. Applications of image processing are Image Sharpening and restoration, Medical field, remote sensing, Transmission and encoding, machine/robot vision, color processing, pattern recognition, video processing, Microscopic imaging, etc. The two types of methods used for Image Processing are Analog and Digital Image Processing . i) Analog image processing is done on analog signals. It includes processing on two dimensional analog signals. In this type of processing, the images are manipulated by electrical means by varying the electrical signal. ii) The digital image processing deals with developing a digital system that performs operations on an digital image. Domains in image processing are:

i)Frequency: Whereas in frequency domain, we deal with the rate at which the pixel values are changing in spatial domain.

ii)Gradient Domain: Gradient domain image processing is a relatively new type of digital image processing that operates on the differences between neighboring pixels, rather than on the pixel values directly.

Application:Gradientshop.

iii)Spatial: In spatial domain, we deal with images as it is. The value of the pixels of the image change with respect to scene.

II. LITERATURE SURVEY:

The paper called A Universal Image Quality Index proposed a new universal objective image quality index[1], which is easy to calculate and applicable to various image processing applications.

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(a).original image,(b).salt-pepper noise contaminated image,(c).Gaussian noise contaminated image, and (d).speckle noise contaminated image.

Instead of using traditional error summation methods, the proposed index is designed by modeling any image distortion as a combination of three factors: loss of correlation, luminance distortion, and contrast distortion. Although the new index is mathematically defined and no human visual system model is explicitly employed, our experiments on various image distortion types indicate that it performs significantly better than the widely used distortion metric mean squared error.

In this paper Image Quality Assessment: From Error Visibility to Structural Similarity[2],have summarized the traditional approach to image quality assessment based on error-sensitivity, and have enumerated its limitations.

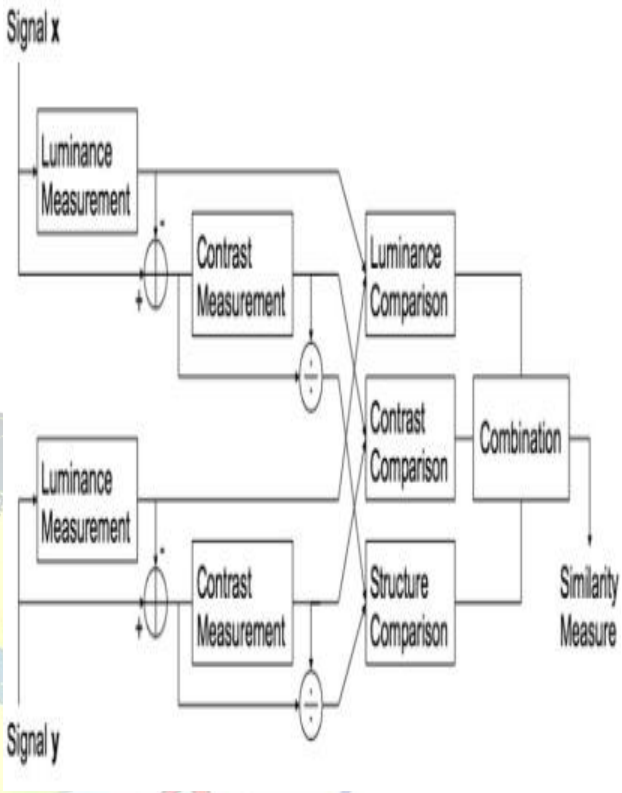

Diagram of the structural similarity (SSIM) measurement system.

We have proposed the use of structural similarity as an alternative motivating principle for the design of image quality measures. To demonstrate our structural similarity concept, we developed an SSIM index and showed that it compares favorably with other methods in accounting for our experimental measurements of subjective quality of 344 JPEG and JPEG2000 compressed images.

Fusing Images with different focuses using support vector machines[3] is a paper which improved the fusion procedure by applying the discrete wavelet frame transform (DWFT) and the support vector machines (SVM). Unlike DWT, DWFT yields a translation-invariant signal representation.

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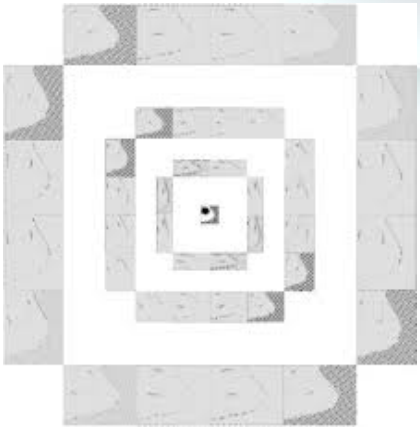
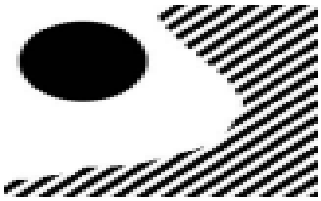
i). balloons, ii).focus on the right, iii).focus on the left, iv).clock, v).focus on the left clock and vi).focus on the right clock.

Using features extracted from the DWFT coefficients, a SVM is trained to select the source image that has the best focus at each pixel location, and the corresponding DWFT coefficients are then incorporated into the composite wavelet representation.

The proposal of Extending the depth of field in microscopy through curvelet-based frequency –adaptive image fusion[4] had given a curvelet-based image fusion method that is frequency-adaptive.

(a) Curvlet decomposition

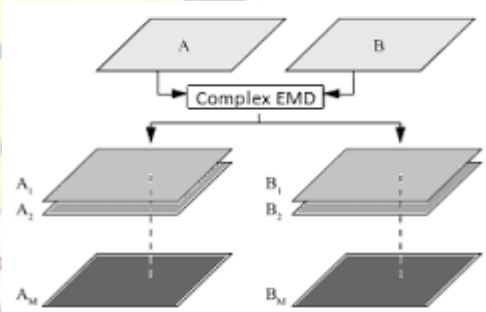




(b).Test image

Because of the high directional sensitivity of the curvelet transform (and consequentially, its extreme sparseness), the average performance gain of the new method over state-of-the-art methods is high.

Using recent complex extensions of EMD which guarantees the same number of decomposition levels, that is the uniqueness of the scales.



Framework for the simultaneous decomposition of two images.

The methodology is used to address multifocus image fusion, whereby two or more partially defocused images are combined in automatic fashion so as to create all in focused image have been proposed in Multiscale Image Fusion Using Complex Extensions of EMD[5].

In A Total Variation-Based Algorithm for Pixel-Level Image Fusion[6] paper, a total variation (TV) based approach is proposed for pixel-level fusion to fuse images acquired using multiple sensors. In this approach, fusion is posed as an inverse problem and a locally affine model is used as the forward model. A TV seminorm based approach in conjunction with principal component analysis is used iteratively to estimate the fused image.

This paper gives an approach of which combines image with diverse focuses by decomposing the image of source into blocks first and after that combining them with the help of the spatial frequency. The algorithm is simple and

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will be performed in real-time applications. Wide experiments on studying the performance of fusion with different block size and threshold need to be made have been proposed in Combination of images with diverse focuses using the spatial frequency[7].

The resultant image in Multifocus image fusion using region segmentation and spatial frequency[8] consists of more precise description of the scene than the other individual image. A new region proposed was based on the multi-focused image fusion method. The method proposed exists in the fact in which the region-based image fusion method will be more meaningful than the pixel-based fusion method. The combining groups of pixels forms an image region was based on the fusion rules .

The proposed JPEG still picture compression standard[9] for JPEG was generic, to support a wide variety of applications for continuous-tone images.

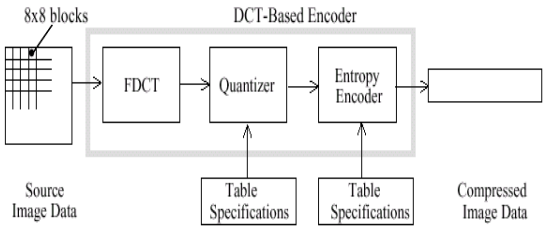

Figure 1. DCT-Based Encoder Processing Steps

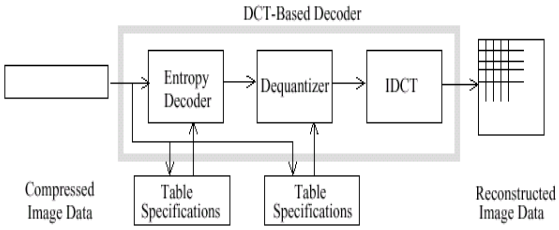

Figure 2. DCT-Based Decoder Processing Steps

The emerging JPEG continuous-tone image compression standard solves the myriad issues must be addressed before.

In this paper, an approach for the multi-focused images fusion based on the calculation of the variance in the DCT domain is presented. The merit of this proposed technique was efficiency which was improved in both output quality and complexity reduction on comparison with the recently proposed technique. The Utilization of the variance in the proposed algorithm gives the better quality of the fused image. Various experiments was done to calculate the fusion performance and the results proves that it outperforms the previous DCT based methods on both quality and complexity reduction have been mentioned in Multimodal image fusion in visual sensor networks[10] .

III.CONCLUSION:

Image fusion is the process of combining relevant information from minimum two images into a solo image.The aim of this algorithm is that the resulting image will be more informative than the input image.From the above papers surveyed ,most of the papers focuses on improving the quality of the resultant image.

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