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Image Fusion Using Higher Order Singular Value Decomposition

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***Abstract*— Image Fusion means the combining of two or more images into a single image that has the maximum information content without producing details that are not present in the original image. Image fusion method is in two groups –Spatial Domain Fusion and Transform domain fusion. We have used Higher order Singular value decomposition method for mage fusion technique.**

Keywords— Tensor, Higher Order Singular Value Decomposition, Sigmoid.

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. The purpose of image processing is divided into 5 groups. They are:

Visualization:Observe the objects that are not visible.
Image sharpening and restoration:To create a better image.
Image retrieval:Seek for the image of interest.
Measurement of pattern: Measures various objects in an image.
Image Recognition:Distinguish the objects in an image.

II. LITERATURE SURVEY

A measure for objectively assessing pixel level fusion performance is defined by C. S. Xydeas and V. Petrovic in year 2000 [1].In that the proposed metric reflects the quality information obtained from the fusion of input images and can be used to compare the performance of different image fusion algorithms[1]. Damien Letexier and Salah Bourennane presents a new multi-way filtering method for multidimensional images corrupted by white Gaussian noise[2]. Damien Letexier and Salah Bourennane presented filtering method based on multilinear algebra principles and it improves the multi-way Wiener filtering [2]. H. Li, S. Manjunath, and S. Mitra combined Wavelet transformation of
the input images, and they obtained the image by taking the inverse wavelet transform of the fused wavelet coefficients[3]. Jinshan Tang studies image fusion technique in the discrete cosine transform (DCT) domain[4]. G. Bergqvist and E. G. Larsson stated thatTensor modeling and algorithms for computing various tensor constitute a very active research area in mathematics[5]. R. Costantini, L. Sbaiz, and S. Susstrunk implemented the technique which is well suited to dynamic texture synthesis on devices limited by memory and computational power such as PDAs or mobile phones[6].A quad tree partitioning is adapted by D. Letexier and S. Bourennane in order to split tensors into homogeneous subtensors to keep local characteristics[7] Proposed method is based on the estimation of main directions in multidimensional data. For this purpose, they extend the straight line detection algorithm. Multidimensional filtering method HOSVD - (K1,..., KN) is applied along the estimated directions[7].Z.Wang and A. Bovik propose new universal objective image quality index,which is easy to calculate and applicable to various image[8].

III EXISTING SYSTEM

In Existing system , Discrete Wavelet Transform technique is used. In this case of fusion by wavelet transform,fusion rule is used to combine all respective wavelet coefficients from the input images .As wavelet coefficients have large absolute values, they contain information about salient features of the images incorporating edges and lines[10].In Discrete Wavelet Transform, Principal component analysis (PCA) method wasSystem architecture used. But these method leads to some drawbacks in terms of functionality. Also Principal component analysis method has the effect of blurring the textures of images. This may result in possible loss of image information in edge.

IV SYSTEM ARCHITECTURE

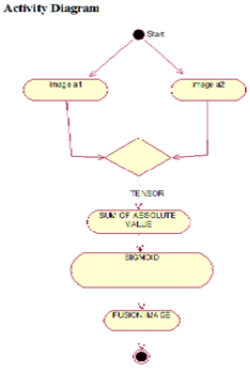


Fig.(a)

Activity diagram for showing the activities of the project object flow. Image-a1 and image- a2 are taken and the part which has Frequency will be calculated from the images by Tensor for matrix calculation. By using tensor the absolute high frequency values of the two image is identified . If we have the high resolution part of the specific image mean we can fusion by sigmoid technique from the Higher Order Singular value Decomposition.

System Modules

1. Initialization
2. Implementing MDBUTMF approaches
3. Obtain the Tensor
4. Discussion of the sigmoid function
5. Result

Module Description:

1. Initialization:

   In this we are going to take two images the first one far focused image and second is near focused image and we are going to concatenate the two images and after that we are going to construct in to form of tensor with (M x N x 2) by using tensor tool box with is special tool box available for tensor based application to avoid the discontinuous gaps above, the consecutive sub tensors are partly share data by applying a sliding window technique is applied here to divide the tensor into dimensional sub tensors with moving step size P.

2. Implementing MDBUTMF approaches:

   Each and every pixel of the image is checked for the presence of salt and pepper noise. If the processing pixel is not noisy pixel and its value lies between 0 and 255. If the selected window contains salt/pepper noise as processing pixel. We apply these approaches to remove the noisy area which is occurred in the Selected image. Now eliminate the salt and pepper noise from the selected window. That is, elimination of 0 s and 255 s. After elimination of 0 s and 255 s the pixel values in the selected window. Replace the processing pixel by median value.

3. Obtain the Tensor:

   In this module we taken the two images , one is the fair focus image and second image near focus image . In it fair focus image the background area of the image is look like such clarity while compared the object , the near focus image is look like such clarity while compare the background. we need both same like clarity .we applying tensor, tensor is the matrix calculation of calculating the images frequency. We get high frequency using tensor and applying the SAVC.

4. Discussion of the sigmoid function:

   1)As k increase Approaches Where sgn(.) the sign function .in particular, then k = +^a

   2)When K = 0, the proposed algorithm is equivalent to the average fusion method.

   3)For the same (e (1) / e (2)): if larger k is applied, the coe_cient combining strategy plays the selection role. However, if smaller k is applied, the coefficient combining scheme plays the average or smoothing function.

   4)The same k: We e (1)1 is even larger or smaller then e(2) ,the coefficient a combining scheme plays the selection role .How ever when e (1) is closer to e (2), the coefficient a combining strategy plays the weighted average role.

5. Result:

   In final we are going to verify the proposed method, it is tested on computer vision ,medical and remote sensing images finally, experimental results shows that the proposed transform domain algorithm is an alternative image

IMPLEMENTATION DETAILS

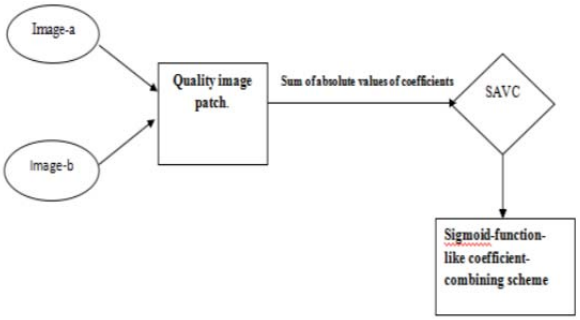
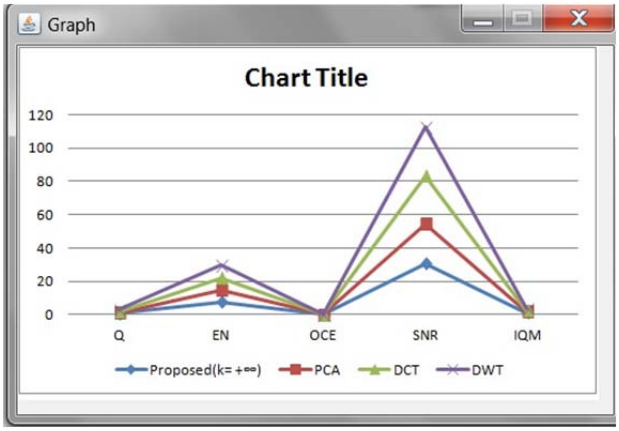


Fig.(h)[Original image]

Fig.(i)[Processed image]

Fig.(i)[Result image]



CONCLUSION

A Novel HOSVD-based Image Fusion algorithm has been proposed. It constructed multiple input images as a tensor and can evaluate the quality of image patches using HOSVD of subtensors. Then, it employed a novel sigmoid-function-like coefficient-combining scheme to obtain the fused result. Finally, experimental results show that the proposed transform domain algorithm is an Alternative image fusion approach.

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