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Better Efficiency Curve-let Based Image Fusion

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ABSTRACT - In computer vision, Multi-sensor Image fusion is the process of combining relevant information from two or more images into a single image. The resulting image will be more informative than any of the input images. In remote sensing applications, the increasing availability of space borne sensors gives a motivation for different image fusion algorithms. Most of the available equipment is not capable of providing such data convincingly. Image fusion techniques allow the integration of different information sources. The fused image can have complementary spatial and spectral resolution characteristics. However, the standard image fusion techniques can distort the spectral information of the multispectral data while merging.

Image enhancement techniques have been widely used in many applications of image processing where the subjective quality of images is important for human interpretation. Contrast is an important factor in any subjective evaluation of image quality. Contrast is created by the difference in luminance reflected from two adjacent surfaces. Avoiding discontinuities across a curve curvelet transform is used instead of wavelet transform, it handle curves using only a small number of coefficients. So that we get better efficiency for the fusion of curved shapes.

KEYWORDS: Algorithm , Fusion , Curve , Multi-spectral , Efficiency

I. INTRODUCTION

Image processing has related problems like in painting problem. Generally due to the continuous variation in the lighting conditions and variations in the other factors we acquire the low quality photographs. Due to the changes in the real time lighting conditions instead of high quality photographs we acquire the low quality photographs, further to enhance the quality of low quality images we have to improve the several parameters and factors which are related to the digital image in order to yield the high end high quality images in place of low quality images.

The factors related to digital image to improve the quality are contrast, brightness levels, decreasing the noise impact on image etc. Naturally a question arises why we have to convert the low quality digital image to the high quality digital image or why we have to enhance the quality of digital image. In order to enhance the low quality digital we need opts for the better enhancement techniques which are already exist. In the category of enhancement techniques most successful and highly used enhancement technique is contrast enhancement technique.

The most important thing taken into consideration while enhancing the low quality digital images is the necessary technique must adaptive to the respective relative displays especially the contrast enhancement technique. In literature so many frameworks and algorithms are proposed but most of the algorithms are based on the enhancement. Lot of research has been to improve the digital quality based on not only enhancement techniques but also merely on the power saving also simultaneously.

II. PROPOSED SYSTEM

However, most of wavelet-based methods have a spatial resolution of the fused result less than the Brovey, IHS, and PCA fusion methods. In this paper, we introduce a new method based on the curvelet transform which represents edges better than wavelets. Since edges play a fundamental role in image understanding, one good way to enhance spatial resolution is to enhance the edges. Curvelet-based image fusion method provides richer information in the spatial and spectral domains simultaneously.

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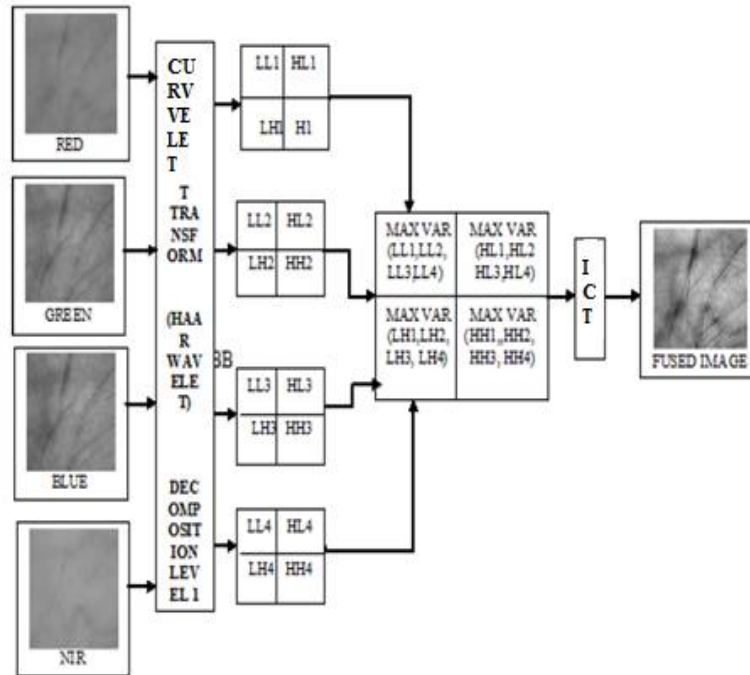


Figure:1. Curvelet based Image Fusion

The fusion of high-spectral but low spatial resolution multispectral and low-spectral but high spatial resolution panchromatic satellite images is a very useful technique in various applications of remote sensing. Recently, some studies showed that curvelet-based image fusion method provides high quality of the spectral content of the fused image.

In wavelet transform the features gets affected for limited number of coefficients. The discontinuities across a simple curve affect all the wavelet coefficients on the curve. The advantage of the Curvelet transform is to handle curves using only a small number of coefficients. We can obtain the better fusion efficiency for the fusion of curved shapes using Curvelet transform. Fusion results were evaluated and compared according to different measures of performance. These performance measures show that curvelet based image fusion algorithm provides better fused images than wavelet.

The block diagram of Curvelet transform is same as block diagram of Wavelet transform method except instead of calculating wavelet components here we calculate curvelet components and instead of taking IDWT here we take inverse curvelet transform. So that we will get the better fused image.

III. METHOD OF IMPLEMENTATION

Frequency domain method operates on the Fourier transform of an image. Image enhancement in the frequency domain is straightforward. We simply compute the Fourier transform of the image to be enhanced, multiply the result by a filter and take the inverse transform to produce the enhanced image. In frequency domain methods, the image is first transferred in to frequency domain. It means that, the Fourier Transform of the image is computed first. All the enhancement operations are performed on the Fourier transform of the image and then the Inverse Fourier transform is performed to get the resultant image. These enhancement operations

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are performed in order to modify the image brightness, contrast or the distribution of the grey levels. As a consequence the pixel value of the output image will be modified according to the transformation function applied on the input values [6]. The convolution theorem is the foundation of frequency domain techniques. Consider

the following spatial domain operation:

$$g(x,y)=h(x,y)*f(x,y)$$

The following frequency domain relationship given by the convolution theorem

$$G(u,v) = H(u,v) F(U,v)$$

Where g , f and h having Fourier transform G , H and F respectively. H is known as the transfer function of the process. Many image enhancement problems can be viewed in the form of the above equation. The main aim is to select a transfer function that changes the image in such a way that certain features of an image are enhanced. Examples edge detection, noise removal.

$h(x,y) \longrightarrow$ Spatial convolution mask

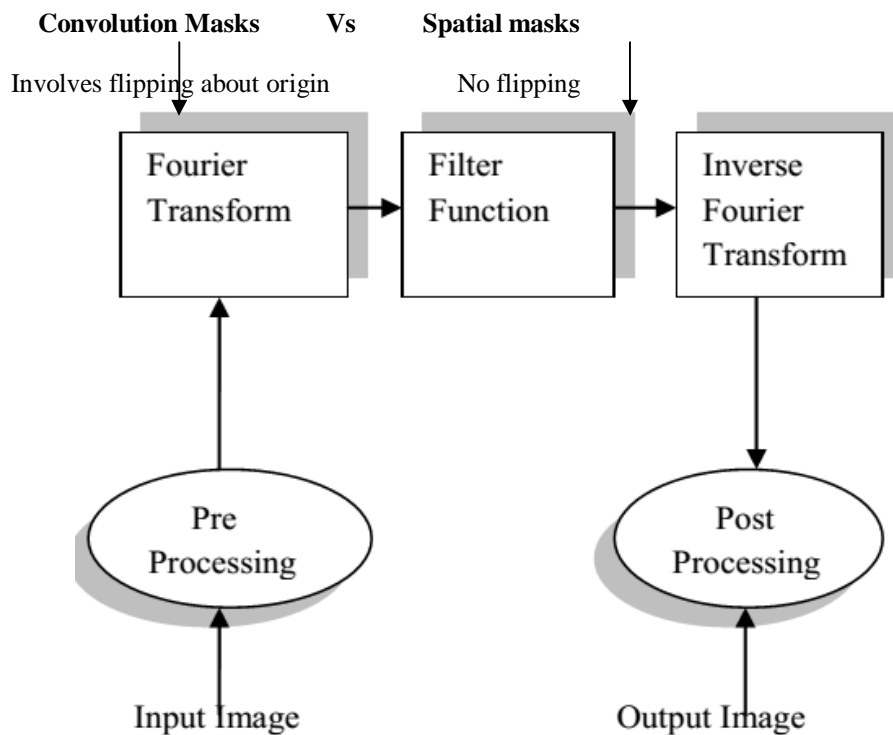


Figure.2. Process of Image Enhancement

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IV. PERFORMANCE COMPARISON

Select Input Image



Figure 3. Input Image

Output Images:

1. Negative Image of selected input



Figure 4. Negative Image

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1. Distance Transform of input image

Distance transform



Figure5. Distance Transform

2. Registered Palm

Registered Plam Print

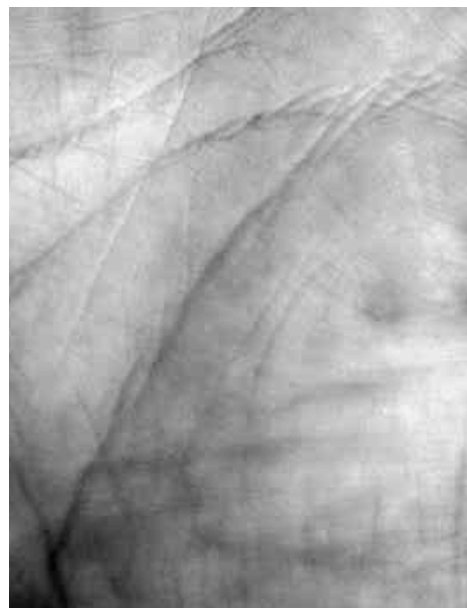


Figure6. Registered palm Print

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3. Four Quadrant output of Red, Green, Blue and INR Images

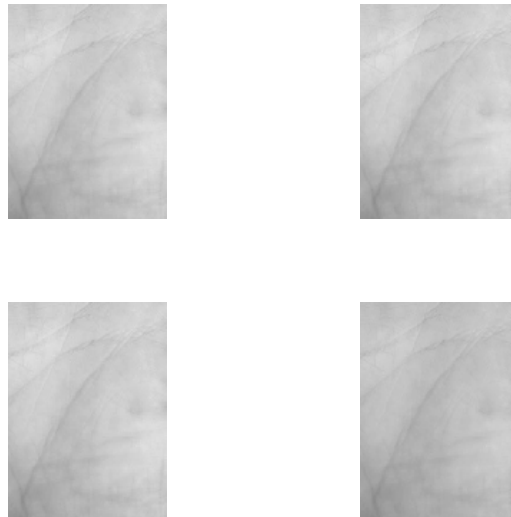


Figure7. Four Quadrant output

5. Fused Image

fused image

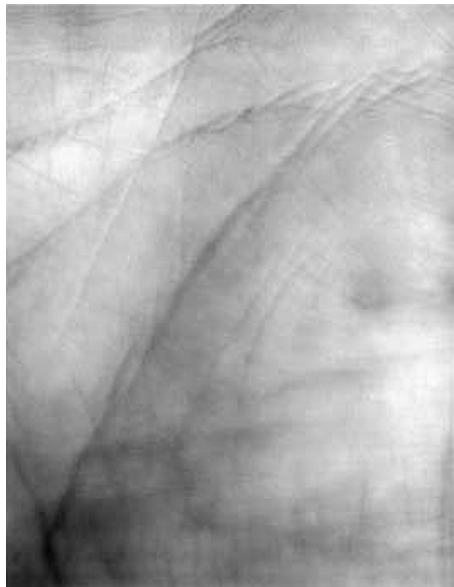


Figure8. Fused Image

A novel palm print feature extraction approach is used. The novelty lies in extracting two intra modal discriminative features lines like principal lines using the same wavelet decomposition of the palm print ROI. Integrating information deep inside skin with appearance in the context of hand biometrics is considered. The advantages of feature level fusion are appearance as well as inner information of hand is combined to form one solo representation, enforcing the security of the whole system. Multispectral palm The work focused on two important methods of Image fusion namely wavelet transform and Curvelet transform. The POLYU database is used for

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experimentation. The different Red, Green, Blue and NIR images of palm are used for fusion. This work presents the idea of multispectral palm image enhancement using image fusion for biometric application.

Print capture device was designed to offer illuminations of Red, Green, Blue and Infrared channels. By using an image fusion in multispectral palm images we get more discriminating features which have finally improved accuracy of the method.

V. CONCLUSION

Curvelet transform is used for better efficiency Image Fusion. In extracting edge information it is better to use Curvelet based fusion. It also improves the contrast of the fused image. Curvelet transform efficiently handles the curves and clearly indicates the different parameters like edge intensity, SD, etc. Instead of wavelet transforms, Curvelet transform gives clear curve portions and curved edges

VI. FUTURE SCOPE

Main focus should be on effective fusion strategy. Multi wavelets based image fusion can be performed to achieve a better image fusion quality. Multi wavelet is an expansion of traditional wavelet and has more advantages. It is most important that a multi wavelets system can simultaneously have these characteristics that are preserving length (orthogonality), good performance at the boundaries because of linear phase symmetry, and a high order of approximation named vanishing moments. Due to lack of reference image sets efficiency of the fusion cannot be better assessed. A learning algorithm like neural networks and more specifically Support Vector Machine could be devised in assigning weights to the image quality metrics so as to assess them.

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