ISSN: 2581-3404 (Online)
International Journal of Innovative Research in Technology and Management (IJIRTM), Volume-3, Issue-3, 2019

Feature Based Image Fusion using Hybrid Model

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ABSTRACT

An image can be defined as a frame describing in detail a sample surface. The spatial detail is given by pixels and, in the simplest representation; every pixel is defined by a numerical value. This is the principle of greyscale images, whereby a pixel is defined by a value of gray colour intensity. Such a definition of single image allows a large diversity of image combinations to be recognized as image fusion scenarios. The most straightforward idea linked to image fusion would be the combination of several images coming either from the same analytical platform or from images recorded on the same sample by different analytical platforms. In this dissertation we discussed about the region based image fusion techniques, which are comparatively evaluate the performance for the both approach previous approach and the proposed approach, all the performance parameters are measured by the both approach and here we found that the our proposed approach gives better results than the previous approach.

Keywords: Image Fusion, Swarm Intelligence, Discrete Cosign Transform, Wavelet Transform, Color Model.

INTRODUCTION

An image can be defined as a frame describing in detail a sample surface. The spatial detail is given by pixels and, in the simplest representation; every pixel is defined by a numerical value. This is the principle of greyscale images, whereby a pixel is defined by a value of gray colour intensity. Such a definition of single image allows a large diversity of image combinations to be recognized as image fusion scenarios. The most straightforward idea linked to image fusion would be the combination of several images coming either from the same analytical platform or from images recorded on the same sample by different analytical platforms. Fusion is a method of retrieving relevant data from multiple images into a solitary image. The purpose of fusion techniques is to improve the description of scene more qualitatively. The general formal solution in image fusion is multi-sensor data fusion. To fuse the image, it is required to consider two images and both the images must be similar. They must have relevant information, but the process of image fusion always generates high-resolution images when compared with source images. The high-resolution images are very important in medical field for diagnosis of diseases because the resultant image gathers information from different sources.

Image fusion techniques in the transform domain based image fusion methods; each source image is firstly decomposed into a sequence of images through a particular mathematical transformation. Then, the fused coefficients are obtained through some fusion rules for combination. Finally, the fusion image is obtained by means of a mathematical inverse transform. Thus, the

ISSN: 2581-3404 (Online)
International Journal of Innovative Research in Technology and Management (IJIRTM), Volume-3, Issue-3, 2019

transform domain fusion methods are also known as Multi-scale fusion methods. For spatial domain are usually directly on pixel gray level or colour space from the source multi-focus images for fusion operation. The Multi-scale fusion methods perform very well with both clean and noisy images. But this scheme is complicated and time-consuming. The simplest spatial-based method is to take the average of the input images pixel by pixel. They are as follows:

- **Spatial approach**- In spatial approach, operations are performed directly on original pixels. The main disadvantage of spatial technique is that classification of spectral distortion. Spatial domain includes the fusion methods with pixel, blocks or segmentation based processing such as intensity-hue-saturation (IHS) based fusion, principal component analysis (PCA) based fusion, fusion based on arithmetic combinations, high pass filtering and total probability density fusion.

- **Transform approach**-In the case of transform domain image, first it is morphed into another form, and then different actions are performed on morphed values. In transform domain, different kinds of transform approaches are available such as DCT, DWT, FFT, DFT, and it's inverse. Transform domain fusion approach overcomes the limitation of the spatial domain methods. It reduces the complexity and artifacts effects. In this method images are generally shifted in frequency domain. Multi-scale transform theory is used to perform the fusion in transform domain. It is one of the most widely used approach for the image fusion [8].

The rest of this paper is organized as follows in the first section we describe an introduction of about the image and image fusion. In section II we discuss about the overview of RGB color model, In section III we discussed about the related work regarding the image fusion process, In section IV we mentioned the proposed work and the experimental result study for the image fusion techniques, finally in section V we conclude and discuss the future scope.

II RGB COLOR MODEL

Light is formed of three primary colors: red, green, and blue. RGB is an additive color system for light. The more colors there are, the paler the color becomes. Each color (red, green and blue) has 256 different hues (0-255). The functioning of a computer monitor or other appliance that mediates or filters light, is based on this color system. RGB colors function in an opposite way of an eye. They (create and) reflect red, green and blue light. This color system is used with image processing on the screen, for instance in the Internet, CD ROMs, and on TV.

Fig 1: RGB color model.

III RELATED WORK

[1] In this paper, a simple and competent image fusion algorithm based on standard deviation in wavelet domain is proposed and compared with both transform domain as well as spatial domain techniques. The techniques are evaluated with various databases quantitatively and qualitatively. The simplest spatial domain based method is to

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just take the average, maximum or minimum of the source images pixel by pixel. However, along with its simplicity, this technique causes some side effects such as introducing noise, artifacts and reduced contrast. To overcome the drawbacks of spatial domain approach, transform domain approach is exploited. To improve the quality of fused image with less complexity, they proposed a simple image fusion technique. The proposed technique is compared with both spatial domain and transforms domain techniques. [2] In this paper, the results shown that the proposed methods are given better quality but the problem are to build up a potential image decomposition algorithm to boost up the process. Multi focus is the demanding research field in image fusion era. Multi-focus can be identified as generating useful image from other useless images. In multi-focus, images are more suitable for image processing. In other words, to make more suitable as an effective image, image fusion having an aim to merge various images by other sensors for making an informative grateful image. Sensors of the similar type obtain data from single phase and these are unable to supply expected information. Image fusion method plays an essential contribution in recent application and computer vision. The large source of images for fusion is on different images such as infrared, MRI, PET and CT. [3] In this paper, we have applied a novel image fusion method that is suitable for pan-sharpening of Multi-Spectral (MS) bands which consists the concept of the image related to multi-resolution analysis. The high-resolution analysis Panchromatic (Pan) image by means of the Wavelet and Curvelet transform, which is considered as non-separable MRA and works on basis function at directional edges with progressively increasing resolution and introduce a new methodology based on the Wavelet and Curvelet transform using Neural Network which provides information of edges better than wavelets. Wavelet and Curvelet-based image fusion method provides huge amount of information in the spatial and spectral domains simultaneously.

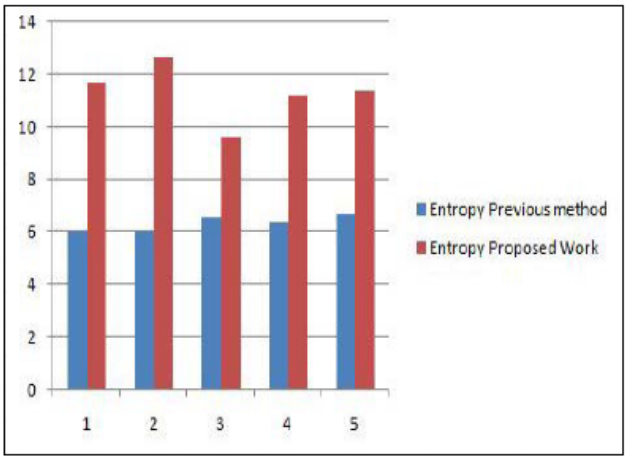

Fig 2: Comparative performance using entropy for previous and proposed method.

IV PROPOSED WORK & RESULT

In this section we discuss for the proposed method and the experimental result analysis with compare the existing techniques. The proposed model gives the basic comparison for the performance evaluation parameter in the between previous approach and the proposed approach, the proposed method which is basically combination of the discrete wavelet transform and the optimization techniques such as the particle swarm optimization.

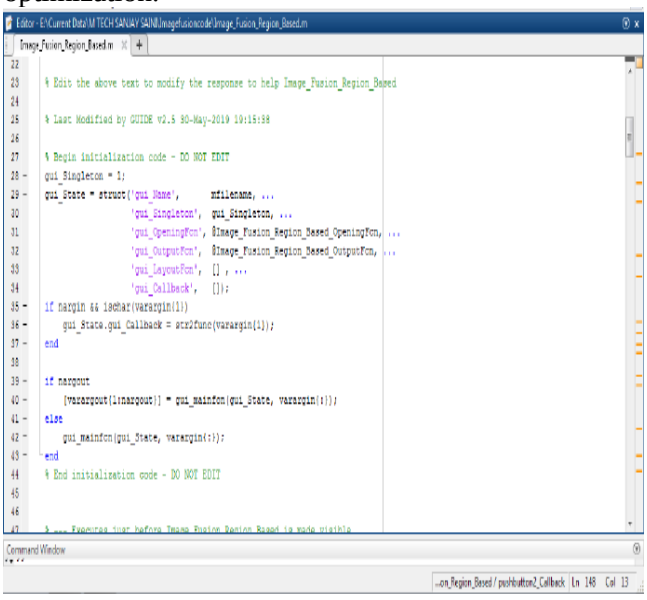

Fig 3: This image shows that the experimental coding window.

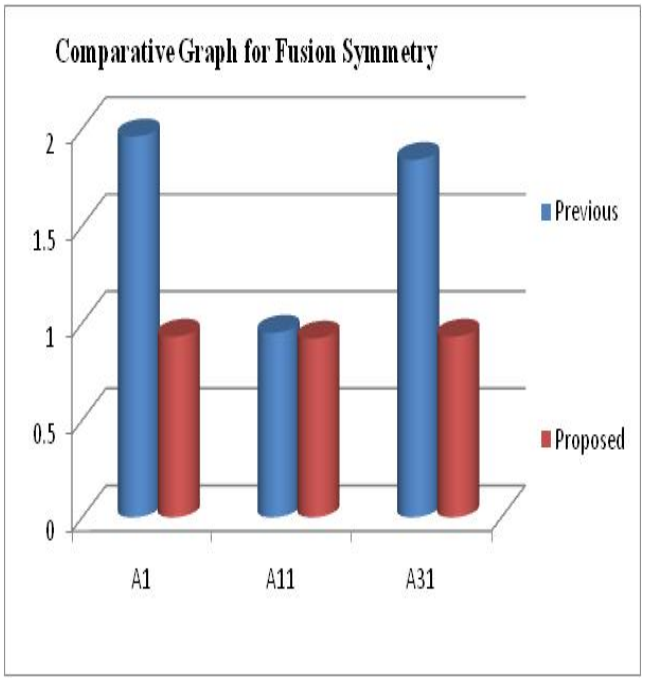

Fig 4: This figure shows that the comparative performance evaluation graph for the Input image A1, A11 and A31, using previous and proposed method.

V CONCLUSIONS AND FUTURE SCOPE

In this dissertation we discussed about the region based image fusion techniques, which are comparatively evaluate the performance for the both approach previous approach and the proposed approach, all the performance parameters are measured by the both approach and here we found that the our proposed approach gives better results than the previous approach. There are different number of parameters such as the peak signal noise ratio, information entropy and standard deviation etc., Our Simulation results gives the better results than the previous method.

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