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MULTI FOCUS IMAGE FUSION USING MULTI SPECTRAL AND PAN IMAGES

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Abstract: The main objective is to bring up a highly informative image as result using image fusion. In this paper, the techniques called Multiplicative algorithm pixel based multiplication, Morphological reconstruction, Wavelet Transform is used to get the fused high quality image as a resut. Image fusion is the process that combines information from multiple images of the same scene. The result of image fusion is a new image that retains the most desirable information and characteristics of each input image. The main application of image fusion is merging the gray-level high-resolution panchromatic image and the colored low-resolution multispectral image. It has been found that the standard fusion methods perform well spatially but usually introduce spectral distortion. To overcome this problem, transformation based fusion scheme have been proposed.

Index Terms- Multiplicative algorithm, Morphological reconstruction, Wavelet transform.

I.INTRODUCTION

Image fusion is an image processing technique that can combine multiple images of the same scene with complementary or redundant information to generate a new composite image with better quality and more features which can provide a better interpretation of the scene than each of the single sensor image can do. In today's world we deal everywhere with images, specially in remote sensing application. In remote sensing application there are two kinds of images available [1]. Panchromatic [2]. Monochromatic. The panchromatic image acquired by satellites is transmitted with the maximum resolution available and the multispectral data are transmitted with coarser resolution. This will usually be two or four times lower. At the receiver station, the panchromatic image is merged with the multispectral data to convey more information.

In remote sensing applications, the increasing availability of space borne sensors gives a motivation for different image fusion algorithms. Several situations in image processing require high spatial and high spectral resolution in a single image. 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. 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 .Many methods exist to perform image fusion. The very basic one is the high pass filtering technique. Later techniques are based on Discrete Wavelet Transform, uniform rational filter bank, and Laplacian pyramid.Image fusion provides an effective method for comparison and analysis of such data. The ability to combine complementary information from different sources can be used to provide enhanced performance for visualization, detection or classification tasks. In recent years, multisensor image fusion has received significant attention in defense systems, geosciences, medical imaging, robotics and industry engineering, etc. In this paper, Multiplicative Method and Morphological Reconstruction has been introduced using Wavelet transform.

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II.MULTIPLICATIVE METHOD

The Multiplication model combines two data sets by multiplying each pixel in each band of the MS data by the corresponding pixel of the Pan data.

Red = (Low Resolution Band1 ∗ High Resolution Band1)
Green = (Low Resolution Band2 ∗ High Resolution Band2)
Blue = (Low Resolution Band3 ∗ High Resolution Band3)

The advantage of the algorithm is that it is straightforward and simple. By multiplying the same information into all bands. However, it creates spectral bands of a higher correlation which eans that it does alter the spectral characteristics of the riginal image data.

III.MORPHOLOGICAL RECONSTRUCTION

Reconstruction is a morphological transformation involving two images and a structuring element (instead of a single image and structuring element). One image, the *marker*, is the starting point for the transformation. The other image, the *mask*, constrains the transformation. The structuring element used defines connectivity. In this section we use 8-connectivity (the default), which implies that *B* in the following discussion is a 3 * 3 matrix of 1s, with the center defined at coordinates (2, 2).Usong this technique the multiplied images get converted to original images.

IV.WAVELET TRANSFORM

Wavelets are finite duration oscillatory functions with zero average value. The irregularity and good localization properties make them better basis for analysis of signals with discontinuities[1].Wavelets can be described by using two functions viz. the scaling function f (t), also known as 'father wavelet' and the wavelet function or 'mother wavelet'. Wavelets are mathematical functions that cut up data into different frequency components, and then study each component with a resolution matched to its scale. They have advantages over traditional Fourier methods in analyzing physical situations where the signal contains discontinuities and sharp spikes. Wavelets were developed independently in the fields of mathematics, quantum physics, electrical engineering, and seismic geology. Wavelet algorithms process data at different scales or resolutions. Image fusion is the processing of images about a given region obtained from different sensors by a specific algorithm, so that the resultant image is more reliable, clear and more intelligible. The 2-D sub band decomposition is just an extension of 1-D sub band decomposition. The entire process is carried out by executing 1-D sub band decomposition twice, first in one direction (horizontal), then in the orthogonal (vertical) direction. For example, the low-pass sub bands (Li) resulting from the horizontal direction is further decomposed in the vertical direction, leading to LL and LH sub bands [3]. To obtain a two dimensional wavelet transform, the one-dimensional transform is applied first along the rows and then along the columns to produce four sub bands: low-resolution, horizontal, vertical, and diagonal DWT is first performed on each source images, then a fusion decision map is generated based on a set of fusion rules [4]. The fused wavelet coefficient map can be constructed from the wavelet coefficients of the source images according to the fusion decision map. Finally the fused image is obtained by performing the inverse wavelet transform.

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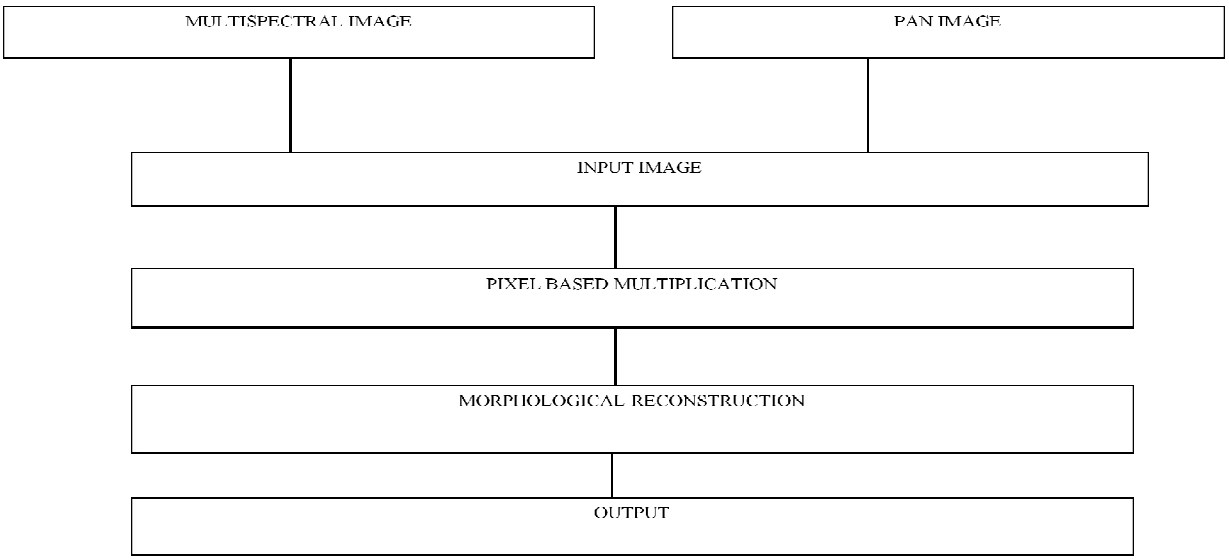
LL1	LH1
HL1	HH1

LL1	LH1	LH2	LH3
HL1	HH1		
HL2		HH2	
HL3			HH3

Figure 1: Wavelet transform

V.ARCHITECTURE OF THE SYSTEM FOR IMAGE FUSION

Input images multispectral and PAN images are given as input images,after that multiplication method based on pixel had performed and to get back the original image morphological reconstruction was done to get the fused image.



VI .CONCLUSION

A original model for image fusion using joint Multiplicative method,Morphological reconstruction and Wavelet based technique was discussed.The limitation of this system has generate only tha gray scale image.

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