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Abstract: -Now a day's internet application is growing very fastly. The rich data increasing day by day includes audio, video, images. Image processing acts as wider applications. Processing the image efficiently to update the various software is required. Aim of image fusion is to commingle important visual information from multiple input images so that we get more accurate and complete information in resultant image. In this paper we provide an implementation of image fusion using MATLAB and SCILAB tools. MATLAB and SCILAB tools are starts with basic filtering of image and provide a novel approach to the image processing techniques. MATLAB is a proprietary based software tool but it is widely used in commercial packages. SCILAB is an open source tool and provide an efficient methodology to image processing techniques.

Keywords-image fusion, spatial information, spectral information, PSNR

(1) I. Introduction

There are two types of vision are classified. One is human vision and another is computer vision. In computer vision, Multisensory image fusion is the process of combining information from two or more images into single image. Image fusion produces a single image from a set of input images in which are assumed to be registered. The fused image should have more complete information which is more useful for human and machine perception. Input image could be multisensory, multi-model, multifocal or multi temporal. Multisensory data fusion has become a discipline which demands more general formal solution to number applications cases. In remote sensing, image processing requires both high spatial and high spectral information in one image. There is some important requirement for image fusion process: fused image should conserve all relevant information from the input images, image fusion should not introduce artifacts which can leads to wrong diagnosis and image fusion should not fling any information contained in any input image. Image fusion technique can improve the quality and increase the applications in area including medical imaging, remote sensing, microscopic imaging, robotics and computervision. Image fusion technique can be classified into four categories depending on the stage at which fusion take places. It is often divided into four levels: Signal Level, Pixel Level, Feature Level and Decision Level. Various advantages of image fusion such as improve reliability by redundant information and improve capability by complementary information. Image fusion methods are as follows:-

- I. Intensity Hue Saturation- allows spectral and spatial landscape information to combine into a single dataset.
 - II. Brovey Transform- to normalize the three multispectral bands used for RGB display and to multiply the result by any other desire number to improve intensity and brightness component of an image.
 - III. Principal Component Analysis- to reduce the dimensionality of multivariate data while preserving relevant information.
 - IV. Multiresolution Analysis- provides natural framework for wavelet and pyramid transform.
 - V. Empirical Mode Decomposition- to separate spatial frequencies in an adaptive way.
- The rest of this paper systematized as follows: section II gives related work of image fusion. Section III gives problem definition of the image fusion. Section IV gives proposed solution for image fusion and V shadows conclusion and future work.

(2) II. RELATED WORK

Jyothi [1] provide a comparative study of MATLAB and SCILAB tools for image fusion applications. They start with an introduction of image filtering process of the image and with some enhancement using MATLAB and SCILAB tools. Suthkar R. Johnson [2] provides a survey of image fusions. In which image fusion combined the input image to a single output image which provide better descriptions of scene. The descriptions of image provide useful information for human vision perceptions, object recognition and feature extraction. D. vora Priya [3] provides a image fusion techniques and parameters for the image processing. Kusum rani [4] gives a different image fusion algorithm like simple maximum, simple minimum, simple average and PCA algorithms. Zhu Xiang [5] provides a image fusion algorithm with Pan-Sharpener applications. It provides higher resolution of images, less distortion spectral with traditional methods. Yuan Tian [6] provides a automatic defect detections of X-Ray images with the image fusion

(3) III. PROBLEM DEFINITION

Image processing is the study of manipulation of pictorial information and representation of image. Images are performed on the digital computers as matrices of numbers. This paper mainly focuses on the study of MATLAB and SCILAB in image processing. These tools are easy to install and fusion of image provide very efficiently.

(4) IV. PROPOSED WORK

Image fusion is a method to combine all important visual information from multiple input images to we get more accurate and complete information in resultant image. Performance can be calculated using PSNR. PSNR (Peak Signal to Noise Ratio) - determines the similarity between reference image and fused image.

$$PSNR = 10 \times \log_{10} \left(\frac{255}{MSE} \right)$$

MSE- Mean Square Error of reference and fused image. For better performance PSNR must be high. Steps to implement image fusion in MATLAB:

1. Select two input images of same size.
2. Apply discrete wavelet transform on both the images using wavelet method db2 at any level.
3. Fuse the both resultant images from previous steps using approximation and details methods.
4. Apply inverse discrete wavelet transform on the resultant image from previous step.

Steps to implement image fusion in SCILAB:

1. Read two images I1 and I2 using imread() function.

2. Apply imphasecorr (I1, I2) methods to detect rotation, scaling and translation and to automatic register the I2 image.
3. Use imfuse(I1,RI,method) to get fused images where RI is registered image.

The output of above presented point in figure 1 image fusion using MATLAB and in figure 2 image fusion using SCILAB.

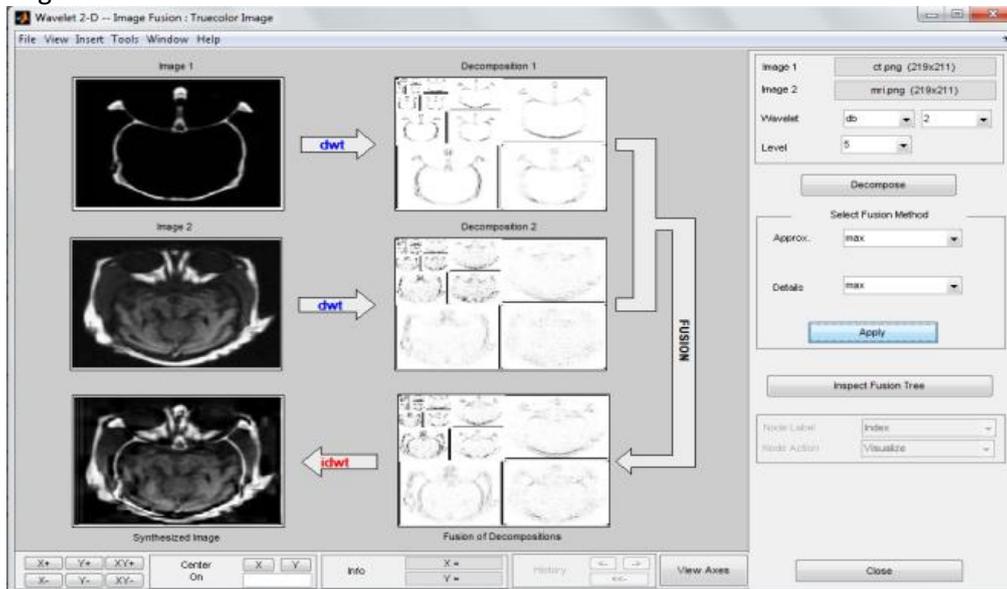


Figure 1: image fusion using MATLAB



Figure 2: image fusion using SCILAB

(5) V. CONCLUSION AND FUTURE WORK

In this paper we have implement image fusion method using MATLAB and SCILAB. Image fusion can be implemented in spatial and transform domain. Performance of Image Fusion method can be calculated using MSR and PSNR. The future work is to implement a technique that provides better performance.

REFERENCES

- [1] Jothi. M, " A Comparative Study on Mat lab And Its Open Source Alternative Scilab for Image Fusion Application", International Journal of Innovative Research in Science, Engineering and Technology, pp. 2081-2086, Volume 3, Special Issue 3, March 2014.
- [2] R.JohnsonSuthakar, "Study of Image Fusion- Techniques, Method and Applications", Journal of Computer Science and Information Technology, pp. 469-476, Vol. 3, Issue. 11, November 2014.
- [3] Priya D. Vora, "Different Image Fusion Techniques and Parameters: A Review", International Journal of Computer Science and Information Technologies, pp. 889-892, Vol. 6 (1), 2015.
- [4] Kusum Rani, "Study of Different Image fusion Algorithm", International Journal of Emerging Technology and Advanced Engineering, pp. 288-291, Volume 3, Issue 5, May 2013.
- [5] Xiao Xiang Zhu, "A Sparse Image Fusion Algorithm With Application to Pan-Sharpener", IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING, pp. 2827-2836, VOL. 51, NO. 5, MAY 2013.
- [6] TIAN Yuan, "Automatic Defect Detection in X-Ray Images Using Image Data Fusion", TSINGHUA SCIENCE AND TECHNOLOGY, pp. 720-724, Volume 11, Number 6, December 2006.
- [7] Foreword to the Special Issue on Hyperspectral Image and Signal Processing, IEEE JOURNAL OF SELECTED TOPICS IN APPLIED EARTH OBSERVATIONS AND REMOTE SENSING, pp. 347-353, VOL. 5, NO. 2, APRIL 2012.

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