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Evaluation of Performance for the Image Fusion Techniques

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ABSTRACT

Digital image processing involves many tasks, such as manipulation, storing, transmission, etc., that may introduce perceivable distortions. Since degradations occur during the processing chain, it is crucial to quantify degradations in order to overcome them. Image fusion techniques can enhance a digital image without spoiling it. The enhancement methods are of two types namely spatial domain methods and frequency domain methods. In this paper we presents the comparative experimental study for the image fusion using previous and proposed techniques, and our proposed techniques shows better results than the previous techniques.

Keywords: Image Reconstruction, Image Fusion, High Resolution, Red Green Blue, Discrete Wavelet Transform, Feature extraction, Multi-resolution.

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INTRODUCTION

Computers have been widely used in our daily lives, since they can handle data and computation more efficiently and more accurately than humans. Therefore, it is natural to further exploit their capabilities for more intelligent tasks, for example, analysis of visual scenes (images or videos) or speeches (audios), which are followed by logical inference and reasoning. For we humans, such tasks are performed hundreds of times every day so easily from subconscious, sometimes even without any awareness.

In computer vision applications, one of the challenging problems is the combining of relevant information from various images of the same scene without introducing artifacts in the resultant image. Since images are captured by the use of different devices which may have different sensors [5]. Because of the different types of sensors used in image capturing devices and their principle of sensing and also, due to the limited depth of focus of optical lenses used in camera, it is possible to get several images of the same scene producing different information.

Image registration is the process of systematically placing separate images in a common frame of reference so that the information they contain can be optimally integrated or compared [9]. This is becoming the central tool for image analysis, understanding, and visualization in both medical and scientific applications. There are many image fusion methods that can be used to produce high-resolution multispectral images from a high-resolution panchromatic image and low-resolution multispectral images.

Starting from the physical principle of image formation, Neural network and fuzzy theory is the two main methods of intelligence, the image fusion system based on these two methods of can

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simulate intelligent human behavior, do not need a lot of background knowledge of research subjects and precise mathematical model, But find the law to resolve complex and uncertainty issues on the basis of input and output data of objects. From these characteristics and the advantages, it can be seen that the use of the approach combined by neural networks and fuzzy theory can better complete the multi-sensor image pervasive fusion. Most of fusion algorithms for multispectral and panchromatic image such as: principal component analysis, contrast pyramid decomposition, IHS method, Brovey method, PCA method, wavelet transformation, Gaussian-Laplace pyramid, and so on [3].

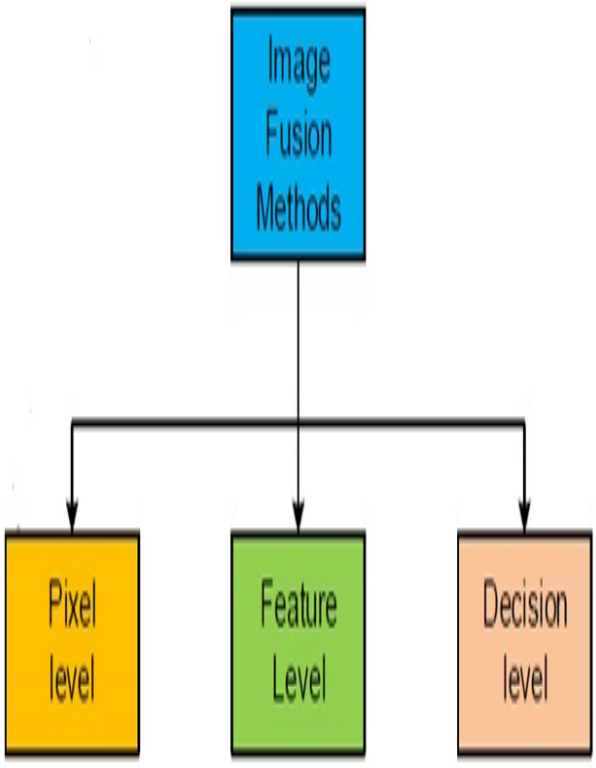

Fig 1: A generic classification of image fusion methods.

The rest of this paper is organized as follows in the first section we describe an introduction of about the image fusion and types of image fusion. In section II we discuss about the image registrarion process overview, In section III we discuss about the experimental result work and their comparative study result study. Finally in section IV we conclude and discuss the future scope.

II IMAGE REGISTRATION

The information provided by individual sensor is incomplete, inconsistent, or imprecise for many applications. Additional sources may provide complementary data, and fusion of different information can produce a better understanding of the observed site, by decreasing the uncertainty related to the single source. Multi-Temporal and multi senor high resolution data are often fused together to acquire complementary information to interpret the objects accurately. Image registration and image normalization are two important preprocessing operations in processing high resolution, multi-temporal or multi-sensor images. Among aspects of image preprocessing for land cover change detection and other Earth observation monitoring applications, there are two outstanding requirements: image registration and image normalization. Image registration and radiometric normalization can transform multi-temporal or multi-sensor data into identical geometric and radiometric bases respectively, and an identical geometric base and a radiometric base are required in processing those images. Without a common geometric base, the derived information from a single remote sensing image cannot be associated with other spatial information, making precise geo-spatial analyses impossible, even comparisons among remote sensing images cannot be implemented if those images do not have the same geometric base.

III EXPERIMENTAL WORK

Image fusion is the process that combines information in multiple images of the same scene. These images may be captured from different sensors, acquired at different times, or having different spatial and spectral characteristics. The object of the image fusion is to retain the most desirable characteristics of each image. With the availability of multi-sensor data in many fields, image fusion has been receiving increasing attention in the researches for a wide spectrum of

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applications [5]. Image fusion is the process of enhancing the perception of a scene by combining information captured by different modality sensors. Image fusion reduces uncertainty and also minimizes redundancy in the output, thus maximizing relevant information from two or more images of a scene. Image fusion produces high quality fused image with both spatial and spectral information [1].

Feature based image fusion technique is important researcher area in current image restoration and image registration section. The restorations of image improve the quality of image for the processing of image. Features are important component of image. Feature contains three primary visual contains such as color, texture and shape and size. The texture and color feature of image are very important component of processing of image fusion technique. The processing of color features improves the visual perception of image. The texture features improve the transparency and quality of image in concern of image quality index parameter.

Wavelet transform is widely used in machine vision as an image processing technique for object detection and classification. Wavelets have been applied in the past to analyze images and are used in many applications in remote sensing, such as removing speckle noise from radar images merging high spectral resolution images with high spatial resolution images, and texture analysis and classification. Wavelet transform has been used to classify EEG signal with integration of expert model. The concept of wavelet is closely related to multi-scale and multi- resolution application and it has been used in to image fusion technique. Implementation of Discrete Wavelet Transform (DWT) as an image processing technique produces the transformation values called wavelet coefficient.

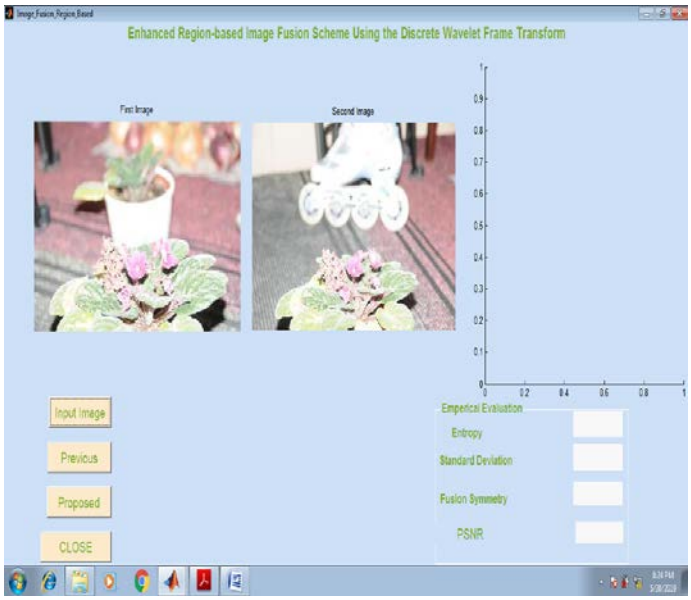

Fig 2: This image shows that the experimental simulation initially window for experimental works and upload the second image.

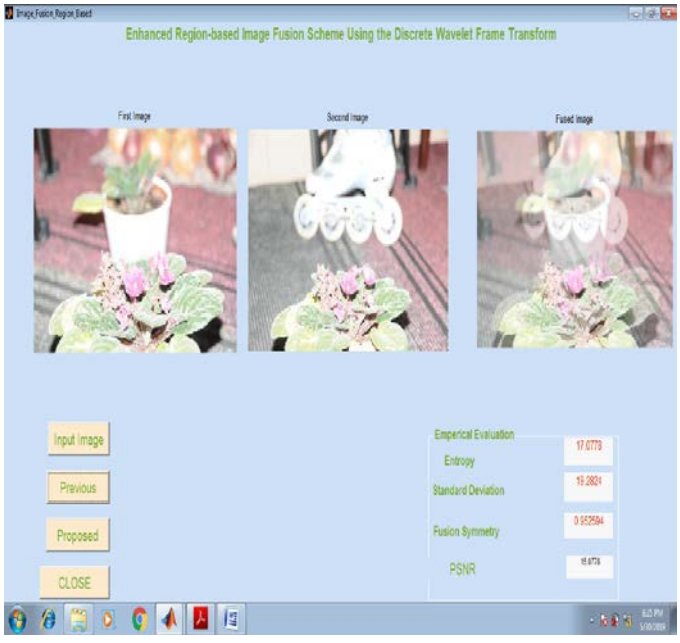

Fig 3: This image shows that the experimental results window for the previous methods and shows the fused image with combination of input image.

IV CONCLUSION AND FUTURE SCOPE

Image fusion is the process of to combine relevant information from two or more images into a single image. The resulting image will contain all the important information as compare to input images. The new image will extracts all the information from source images. Image fusion is a useful technique for merging single sensor and multi-sensor images to enhance the information. The objective of image fusion is to combine information from multiple images in order to produce an image that deliver only the useful information. In this paper we present the comparative performance analysis for image fusion and our proposed methods shows better results than the previous method, here the simulation tools for the experimental work used is matlab.

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