



High Resolution Image Based on Image Fusion and Fuzzy Clustering Algorithm

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ABSTRACT: The main goal of proposed system is classifying changed and unchanged regions in the fused different image and analyse fuzzy clustering algorithm and to produce high contrast image. The goal of image fusion is to minimize artifacts or distortion in the composite image as a result of fusion. With the rapid growth of advance image processing methodology and availability of variety of sensors, the idea of combining images has become important and has emerged as a new promising research area. The ratio difference image is usually expressed in a logarithmic or a mean scale because of the presence of speckle noise. With the log-ratio operator, the multiplicative speckle noise can be transformed in an additive noise component. Furthermore, the range of variation of the ratio image will be compressed and thereby enhances the low-intensity pixels, This detector assumes that a change in the scene will appear as a modification of the local mean value of the image. By using this methods which yields effective results for the change detection

KEYWORDS: Clustering, Image fusion, Image change detection, Synthetic aperture radar.

I. INTRODUCTION

The ratio difference image is usually expressed in a logarithmic or a mean scale because of the presence of speckle noise. With the log-ratio operator, the multiplicative speckle noise [3,4,7] can be transformed in an additive noise component. Furthermore, the range of variation of the ratio image will be compressed and thereby enhances the low-intensity pixels, This detector assumes that a change in the scene will appear as a modification of the local mean value [1,5,6] of the image. Both methods have yielded effective results for the change detection in SAR imagery but still have some disadvantages: The logarithmic scale is characterized by enhancing the low-intensity pixels while weakening the pixels in the areas of high intensity; therefore, the distribution of two classes (changed and unchanged) could be made more symmetrical. However, the information of changed regions [8,10] that is obtained by the log-ratio image may not be able to reflect the real changed trends in the maximum extent because of the weakening in the areas of high-intensity pixels. As for the RMD, the background (unchanged regions) of mean-ratio image is quite rough, for the ratio technique may emphasize the differences in the low intensities of the temporal images (e.g., and). In general, the underlying idea of the optimal difference image [13,15] is that unchanged pixels exhibit small values, whereas changed areas exhibit larger values. That is to say that the optimal difference image should restrain the background (unchanged areas) information and should enhance the information of changed regions in the greatest extent. In order to address this problem, an image fusion technique is introduced to generate the difference image by using complementary information from the mean-ratio image and the log-ratio image. The two source images used for fusion are obtained from the mean-ratio operator and the log-ratio operator, respectively, which are commonly given by

$$X_m = 1 - \min(\mu_1/\mu_2, \mu_2/\mu_1)$$
$$X_t = |\log X_2/X_1| = |\log X_2 - \log X_1|$$

where μ_1 and μ_2 represent the local mean values of multitemporal SAR images X_1 and X_2 respectively.

II. EXISTING SYSTEM

Fuzzy c-means (FCM) clustering is an unsupervised technique [6,7,9] that has been successfully applied to quality analysis, clustering, and classifier designs in fields such as astronomy, geology, medical imaging, target acceptance and image segmentation. An image can be represented in various quality spaces, and the FCM algorithm classifies the image by grouping similar data points in the feature space into clusters. This clustering is accomplished by iteratively minimizing a cost function that is dependent on the distance of the pixels to the cluster centers in the feature domain.



The pixels on an image are highly associated, i.e. the pixels in the immediate neighborhood possess nearly the same quality data. Therefore, the spatial relationship of neighboring pixels [15,17] is an important characteristic that can be of great aid in imaging segmentation. General boundary- detection address have taken advantage of this spatial information for image segmentation. Anyhow, the conven- tional FCM algorithm does not fully utilize this spatial information. Pedrycz and Waletzky [17,20] took advantage of the available classified information and actively applied it as part of their optimization procedures. Ahmed et al. modified the objective function of the standard FCM algorithm to allow the labels in the immediate neighborhood of a pixel to influence its labeling. The modified FCM algorithm enhanced the results of conventional FCM methods on noisy images. Anyhow, the way in which they incorporate the neighboring information limits their application to single-feature inputs.

The image is analyzed by fuzzy local information algorithm FCM clustering [13,14,20] is an unsupervised clustering technique applied to segment images into clusters with similar spectral properties. It applies the distance between pixels and cluster centers in the spectral domain to compute the membership function. The pixels on an image are highly associated, and this spatial information is an important characteristic that can be used to aid their labeling. However, the spatial relationship between pixels is seldom utilized in FCM.

In my project, to detect the changes in an images using Reformulated Fuzzy Local Information Algorithm [19,13]. In FCM focused only Spatial information but this RFLICM focused both the spatial information and the gray level information. So this RFLICM algorithm produce high resolution images compared with FCM algorithm.

III. PROPOSED SYSTEM

3.1 INTRODUCTION

Proposed system is to detect the changes of an image. Image fusion technique is used to detect the changes and fuzzy based algorithm used to analyze and reducing the effect of [3,5,6] speckle noise.

3.2 IMAGE FUSION

Image fusion method uses two difference Radar image. The original Radar images convert into gray scale images. To generate the source images, two co-registered images [18,19,10] are compared pixel by pixel. Differencing and rationing are well known techniques for producing the source images. In differencing, changes are measured by subtracting the intensity values pixel by pixel between the considered couple of temporal images. In rationing, changes are obtained by applying a pixel-by-pixel ratio operator [2,6,8] to the considered couple of temporal images. The ratio operator is typically used instead of the subtraction operator the image differencing technique is not adapted to the statistics of SAR images and non robust to calibration errors because the multiplicative nature of speckles, the ratio image is usually expressed in a logarithmic or a mean scale. The mean ratio and log ratio operator is used to compare the images pixel by pixel to generate the difference image. Mean ratio is used to find mean value and log ratio is used to find the common changes of source images. The source images are fused by mean-ratio and log-ratio. The corresponding mean ratio and log ratio operators are,

$$X_m = 1 - \min(\mu_1/\mu_2, \mu_2/\mu_1)$$

$$X_t = |\log X_2/X_1| = |\log X_2 - \log X_1|$$

Where μ_1 and μ_2 represent the local mean values of multitemporal SAR images X_1 and X_2 respectively. Image fusion technique is used to discrete wavelet transform .Discrete wavelet transform used to divide the source images in different frequency sub bands. The high frequency sub bands are combined and use Inverse discrete wavelet transform to produce fusion image.

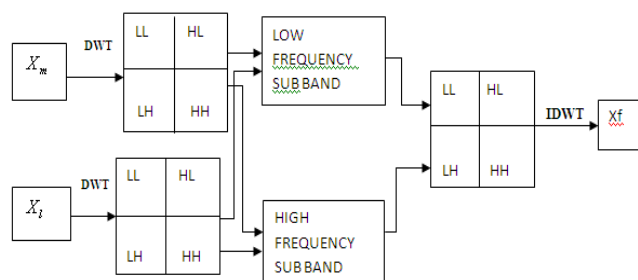


Fig1.1. Block diagram of image fusion based DWT



Fig1.1 X_m and X_l represent the mean-ratio image and the log-ratio image. H and L represent the high-pass and low-pass filters, LL represents the approximate portion of the image, and LH, HL, and HH denotes the horizontal, vertical, and diagonal direction portions, respectively X_F denotes the fused image. DWT of each of the two source images and obtain the multiresolution decomposition of each source image. The wavelet coefficients are fused using different fusion rules for a low-frequency band and a high-frequency band. Finally, the inverse DWT is applied to the fused multiresolution [1,3,5,7] representation to obtain the fused result image.

3.3 FUZZY BASED CLUSTERING ALGORITHM

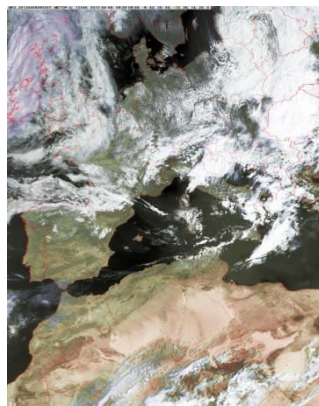
Fusion image is to be analyzing by using fuzzy based clustering algorithm. Clustering is a process for classifying objects or patterns in such a way that samples of the same cluster are more similar to one another than samples belonging to different clusters. Fuzzy based clustering algorithm to enhance the clustering performance.

3.3.1 REFORMULATED FUZZY BASED CLUSTERING ALGORITHM

Reformulated fuzzy local information clustering (RFLICM) algorithm that incorporates both local spatial and gray information [12,15,17] is proposed, which is relatively insensitive to probability statistics model. The RFLICM algorithm introduces the reformulated factor as a local similarity measure to make a tradeoff between image and noise. Compared with the original algorithms, RFLICM is able to incorporate the local information more exactly. The experiment results [13,5,7] show that the proposed wavelet fusions strategy can integrate the advantages of the log-ratio operator and the mean-ratio operator and gain a better performance.

IV. EXPERIMENTAL RESULTS AND DISCUSSION

4.1 ORIGINAL RADAR IMAGE 1



4.2 ORIGINAL RADAR IMAGE 2



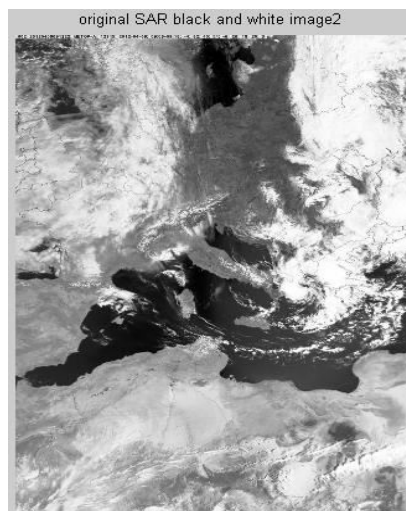
BLACK AND WHITE IMAGE



4.3 RADAR IMAGE 1



4.4 RADAR IMAGE 2



4.5 MEAN RATIO OPERATOR



4.6 LOG RATIO OPERATOR



4.7 DWT BASED FUSED IMAGE



V. CONCLUSION AND DISCUSSION

The proposed method to detect the changes of an images and remove speckle noise. For this technique consider two difference SAR images. By using mean ratio and log ratio operator the SAR images will be compared pixel by pixel. With that compared image use discrete wavelet transform to fusion the image and analyse fuzzy based clustering algorithm to produce better performance of the image.

RFLICM can overcome the disadvantages of the known fuzzy c-means algorithms and at the same time enhances the clustering performance. It incorporates the information about spatial context in a novel fuzzy way for the purpose of enhancing the changed information and of reducing the effect of speckle noise. Experiments performed on synthetic and real-world images show that RFLICM algorithm is effective and efficient.

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