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Change Detection In Synthetic Aperture Radar Images Based On Image Fusion And Fuzzy Clustering

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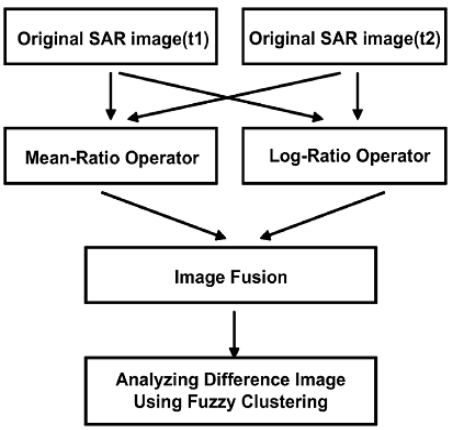
Abstract: Change detection is the process of finding out difference between two images taken at two different times. With the help of remote sensing the . Here we will try to find out the difference of the same image taken at different times. here we use mean ratio and log ratio to find out the difference in the images. Log is use to find background image and fore ground detected by mean ratio. A reformulated fuzzy local-information C-means clustering algorithm is proposed for classifying changed and unchanged regions in the fused difference image. 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 on real SAR images show that the image fusion strategy integrates the advantages of the log-ratio operator and the mean-ratio operator and gains a better performance. The change detection results obtained by the improved fuzzy clustering algorithm exhibited lower error than its preexistences.

I. INTRODUCTION

Change detection is the technique of finding out the difference between the images and the result of change detection mainly concentrates about whether the changes actually occurred or not . In our project we will take the image of same place at two different times and will compare the difference between them with the help of image fusion and fuzzy clustering techniques FLICM and RFLICM .

Image fusion is the process of combining relevant information from two or more images into single image, the resulting image will be more informative than any other input images. Fuzzy clustering is proposed for classifying changed and unchanged regions in the fused difference image. It incorporates the information for the purpose of enhancing the changed information and of reducing the effect of noise. Working of system show in below diagram :



Modules used:

- Ratio Difference image
- Image Fusion Using DWT
- Ground Truth Image using K means Clustering Technique
- Reformulated fuzzy local-information C-means clustering algorithm.

Ratio difference Image

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 removed.

$$X_m = 1 - \min\left(\frac{\mu_1}{\mu_2}, \frac{\mu_2}{\mu_1}\right)$$

$$X_l = \left|\log\frac{X_2}{X_1}\right| = |\log X_2 - \log X_1|$$

Image fusion

Image Fusion allows one to combine images in a variety of ways. An effective image fusion algorithm should integrate all the relevant information as much as possible.

Ground truth image using K means clustering technique

The K-means clustering algorithms are the simplest methods of clustering data. this is a widely-used clustering algorithm, owing to its simple and convenience.

Algorithm description of K-means is as follows:

1) K instances were randomly selected as the initial clustering centers.
2) The process is repeated.
3) The distance of the instance to the clustering center is computed and clusters whose distance is minimal are grouped into one.

4) These centroids of the clusters are updated correctly.
5) The process is repeated until these centroids do not change.

II. RFLICM

With the help of this technique we will find out difference between images, and the result shows that RFLICM is better than any other old systems.

III. RELATED WORK

- Local Fuzzy c means clustering
- Fuzzy c means clustering

IV. DISADVANTAGE OF EXISTING SYSTEM

In particular, a novel fuzzy factor is introduced into the object function of FLICM to enhance the clustering performance. To estimate the fuzzy factor rigorously, the damping extent of the neighboring pixels is supposed to be treated separately. It fails to analyze exhaustively the impact of each neighboring pixel onto the fuzzy factor. In order to overcome the shortcoming mentioned above, in this paper, the local coefficient of variation is adopted to replace the spatial distance.

V. PROPOSED SYSTEM

This project is able to provide an unsupervised distribution-free change detection approach for synthetic aperture radar (SAR) images based on an image fusion strategy and a novel fuzzy clustering Algorithm.
There are many advantages over existing system with the proposed system, the proposed system mainly concentrates on quality of work.

Advantages

- Quality of the output is improved compared to previous techniques in case of speckle noise.
- Time complexity is less compared to previous techniques like FLICM, FCM

VI. CONCLUSION

In this project, we have presented a novel SAR-image change detection approach based on image fusion and an improved fuzzy clustering algorithm, which is quite different from the existing methods. First, for the wavelet fusion approach that we proposed, the key idea is to restrain the background (unchanged areas) information and to enhance the information of changed regions in the greatest extent. On the other hand, the information of background obtained by the log-ratio image is relatively flat on account of the logarithmic transformation. Hence, complementary information from the mean-ratio image and the log-ratio image is utilized to fuse a new difference image. Compared with other existing methods (mean ratio and log ratio), the proposed approach can reflect the real change trend as well as restrain the background (unchanged areas). Second, in contrast with the log-ratio image and the mean-ratio image, the estimation of the probability statistics model for the histogram of the fused difference image may be complicated since it incorporates both the log-ratio and mean-ratio image information at different resolution levels. Here, the RFLICM algorithm that incorporates both local spatial and gray information 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 detail and noise. Compared with the original algorithms, RFLICM is able to incorporate the local information more exactly. The experiment results show that the proposed wavelet fusion strategy can integrate the advantages of the log-ratio operator and the mean-ratio operator and gain a better performance. The change detection results obtained by the RFLICM exhibited less spots than its preexistence (i.e., FLICM) since it is able to incorporate the local information more exactly.

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