ISSN: 2321-7782 (Online)
Impact Factor: 6.047

Volume 4, Issue 7, July 2016

International Journal of Advance Research in Computer Science and Management Studies

Research Article / Survey Paper / Case Study

Available online at: www.ijarcsms.com

# *Multitemporal Image Analysis Using NSCT Fusion and Supervised Classifier for Land Change Detection*

**Pooja Sawant**[1]
D.Y Patil School of Engineering academy ambi
Pune, India

**Dr. S. D. Shirbahadurkar**[2]
D.Y Patil College of Engineering ambi
Pune, India

***Abstract:*** ***The challenge offers alternate detection approach for artificial aperture microwave radar (SAR) pictures primarily based on a image fusion and supervised classifier contraption. The photograph fusion approach are going to be delivered to provide you with a distinction image by exploitation exploitation complementary data from associate degree average-ratio image and a log-ratio image. NSCT (Non- sub sampled contour let transform) fusion rules based on a mean operator and stripped-down native house gradient unit chosen to fuse the contour permit coefficients for a min-frequency band and a highest-frequency band, severally to restrain the background knowledge and increase the info of changed regions within the amalgamate distinction image. For the remote sensing photos, differencing (subtraction operator) and parceling (ratio operator) sq. degree well-known ways for production a distinction picture. In differencing, changes area unit calculate via subtracting the intensity values constituent through constituent among the concept-about number of temporal pictures. In parceling. The challenge offers alternate detection approach for artificial aperture microwave radar (SAR) pictures primarily based on a image fusion and supervised classifier contraption. The photograph fusion approach are going to be delivered to provide you with a distinction image by exploitation exploitation complementary data from associate degree average-ratio image and a log-ratio image. NSCT (Non- sub sampled contour let transform) fusion rules based on a mean operator and stripped-down native house gradient unit chosen to fuse the contour permit coefficients for a min-frequency band and a highest-frequency band, severally to restrain the background knowledge and increase the info of changed regions within the amalgamate distinction image. For the remote sensing photos, differencing (subtraction operator) and parceling (ratio operator) sq. degree well-known ways for production a distinction picture. In differencing, changes area unit calculate via subtracting the intensity values constituent through constituent among the concept-about number of temporal pictures. In parceling, changes area unit obtained by creating use of a pixel-by means that of-pixel relation operator to the concept-approximately number of temporal pics. within the case of SAR pictures, the magnitude relation operator is often utilized in place of the subtraction operator since the picture differencing methodology is not custom to the info of SAR pictures. associate degree artificial neural network sort multilayer belief or once more propagation with feed forward community area unit planning to be projected for classifying modified and unchanged areas within the amalgamate distinction picture. This classifier comes below supervised segmentation this is often labored based on coaching liquid frame substance classification. The outcomes area unit planning to be incontestable that allocation generates higher distinction photograph for modification detection exploitation supervised classifier segmentation approach and potency of this algorithmic application could also be exhibited by exploitation sensitivity and correlation analysis.ges area unit obtained by creating use of a pixel-by means that of-pixel relation operator to the concept-approximately number of temporal pics. within the case of SAR pictures, the magnitude relation operator is often utilized in place of the subtraction operator since the picture differencing methodology is not custom to the info of SAR pictures. associate degree artificial neural network sort multilayer belief or once more propagation with feed forward community area unit planning to be projected for classifying modified and unchanged areas within the amalgamate distinction picture. This classifier comes below supervised***

***segmentation this is often labored based on coaching liquid frame substance classification. The outcomes area unit planning to be incontestable that allocation generates higher distinction photograph for modification detection exploitation supervised classifier segmentation approach and potency of this algorithmic application could also be exhibited by exploitation sensitivity and correlation analysis.***

***Keywords: SAR (Synthetic Aperture Radar), NSCT (Non-sub sampled contour let transform), VHSR (Very High Spatial resolution.***

## I. INTRODUCTION

Structures are of fundamental interest for urban planners and governmental corporations, as they form an main geospatial data layer for exceptional applications. Their detection in very high spatial resolution (VHSR) portraits has recently been the field of broad research, and efforts were made to automate or semi-automate the method. The problematic look of structures in VHSR photos, in conjunction with the truth that the residences of those pix may just fluctuate significantly with the sensor, makes the automatic detection of buildings a intricate venture. Moreover, the automated recognition of semantic know-how is challenging, and the efficiency of present ways tends to fail, as exclusive city types are handled for this reason, these methods still need to be elevated. A usual pattern within the ways for constructing detection is the use of spatial and contextual know-how, additionally to the spectral understanding used by per-pixel photograph analysis that was found to be inadequate to treat the improved interclass heterogeneity of VHSR images. A giant quantity of methods first divides the photograph into spectrally homogeneous regions (segments) and then classify the segments. Thus, exceptional shapes and contextual attributes is also computed for these segments and used to beef up the outcome of the classification. A challenge arises within the areas of constructing boundaries seeing that of the low neighbourhood distinction of VHSR snap shots and combined pixels. To overcome this, Hough develops into and graph concepts have been used to refine the contours of the segments to higher conform to real object boundaries, prior to classification. Xu and Li in comparison the contribution of three invariant moments, namely Hu's moments, Zernike moments, and wavelet moments, combined with spectral knowledge, to the development of object-situated classification. It was located that the three moments enormously improved the total classification accuracy; nonetheless, the segmentation stage used was imperative for the advance. Different methods strengthen detailed algorithms to straight delineate constructing contours and reconstruct constructing areas in a while. Sir maçek and Unsalan used the size invariant feature become (SIFT) algorithm to find key points in all probability based on constructions, and a graph reduce process to check them to previously outlined building templates. In a later work, the equal authors designed a specific set of Gabor filters to extract regional elements and their descriptors (region, orientation, and viable distance to the building center) to be able to in finding edges of otherwise oriented constructions. The snake model, also referred to as the energetic contour mannequin, used to be used by Mayungaet al. To notice building boundaries. To beat one of the crucial boundaries of the snake mannequin, regarding initializing the preliminary contours for the algorithm.

## II. LITERATURE SURVEY

1. **Technique is enforced by embedding series of image instead single image. 1.*A comparison of four algorithms for change detection in an urban environment, Remote Sens. Environ., vol. 63, no. 2, pp. 95–100, Feb. 1998***

   **Author:-**M. K. Ridd and J. Liu,

   **Description**:-Four digital change detection algorithms are applied to 1986 and 1990 Landsat Thematic Mapper (TM) images of a portion of the Salt Lake Valley area to determine the land-cover/land-use changes between the two dates. Image differencing and image regression are used with the six reflective TM bands to create 12 change images. A tassled cap transformation is also used to create three change images (change in brightness, greenness, and wetness). A new method a Chi square transformation is proposed and used with the six reflective bands to create a single band change image. A thresholding strategy is applied to the change images to separate the pixels of change from those of no change. Five hundred eighty-five

samples are selected through a combination of stratified random sampling and systematic sampling procedure. Ground truth information on the sample sites is obtained from the interpretation of color aerial photo slides of the two dates. Three indices are used to assess the accuracies of the sixteen change images for land-cover/land-use change detection. The regression of TM Band 3 is found to be most accurate for detecting change vs. no change in all three indices, while the difference image of TM4 is found to be least accurate. The kind of change in land-cover/land-use is also examined. The results are compared and summarized. Changes involving construction sites and farmlands are found to be accurately detected by several change images. Gadget timed out while loading.

2. **Multi-temporal SAR Image Change Detection Technique Based on Wavelet Transform,**

**Author:-**HUANG Shiqi, LlUDaizhi, Hu Mingxing

Description: A novel change detection method for multi-temporal SAR images using non sub sampled cont our let transform (NSCT) has been proposed. Firstly, we obtain the log-ratio map by comparing two co-registered SAR images with a ratio operator in a logarithmic scale. Secondly, the log-ratio map is decomposed into Multiscale and multidirectional sub-images by NSCT, and the speckle noise in each sub-image is suppressed by scale correlation method. Finally, the changes in every sub-image are detected through a constant false alarm rate (CFAR) detector and the result map is derived according to an adaptive fusion strategy. Experimental results on simulated data and real airborne SAR imagery data both confirm the effectiveness of the proposed method.

3. **Earthquake damage assessment of buildings using VHR optical and SAR imagery," IEEE Trans. Geosci. Remote Sens., vol. 48, no. 5, pp. 2403–2420, May 2010.**

**Author:-**D. Brunner, G. Lemoine, and L. Bruzzone,

Description: Rapid damage assessment after natural disasters (e.g., earthquakes) and violent conflicts (e.g., war-related destruction) is crucial for initiating effective emergency response actions. Remote-sensing satellites equipped with very high spatial resolution (VHR) multispectral and synthetic aperture radar (SAR) imaging sensors can provide vital information due to their ability to map the affected areas with high geometric precision and in an uncensored manner. In this paper, we present a novel method that detects buildings destroyed in an earthquake using pre-event VHR optical and post-event detected VHR SAR imagery. The method operates at the level of individual buildings and assumes that they have a rectangular footprint and are isolated. First, the 3-D parameters of a building are estimated from the pre-event optical imagery. Second, the building information and the acquisition parameters of the VHR SAR scene are used to predict the expected signature of the building in the post-event SAR scene assuming that it is not affected by the event. Third, the similarity between the predicted image and the actual SAR image is analyzed. If the similarity is high, the building is likely to be still intact, whereas a low similarity indicates that the building is destroyed. A similarity threshold is used to classify the buildings. We demonstrate the feasibility and the effectiveness of the method for a subset of the town of Yingxiu, China, which was heavily damaged in the Sichuan earthquake of May 12, 2008. For the experiment, we use Quick Bird and WorldView-1 optical imagery, and TerraSAR-X and COSMO-SkyMed SAR data.

4. **Change detection techniques for ERS-1 SAR data," IEEE Trans. Geosci Remote Sens., vol. 31, no. 4, pp. 896–906, Jul. 1993**

**Author:-**E. Rignot and J. van Zyl,

Description:-Several techniques for detecting temporal changes in satellite synthetic-aperture radar (SAR) imagery are compared, using both theoretical predictions and spaceborne SAR data collected by the first European Remote Sensing Satellite, ERS-1. In a first set of techniques, changes are detected based on differences in the magnitude of the signal intensity between two dates. Ratioing of the multidate radar intensities is shown to be better adapted to the statistical characteristics of SAR data

than subtracting, and works best when the number of looks is large. In a second set of techniques, changes are detected based on estimates of the temporal decorrelation of speckle. This method works best with one-look complex amplitude data, but can also be used with intensity data provided that the number of looks is small. The two techniques are compared using actual SAR data collected by ERS-1. The results illustrate the viability as well as the complementary character of these techniques for detecting changes in the structural and dielectric properties of remotely sensed surfaces.

5. **Assessment of very high spatial resolution satellite image segmentations," Photogramm. Eng. Remote Sens., vol. 71, no. 11, pp. 1285–1294, Nov. 2005.**

**Author:-**A. Carleer, O. Debeir, and E. Wolff

**Description:-**Since 1999, very high spatial resolution satellite data represent the surface of the Earth with more detail. However, information extraction by per pixel multispectral classification techniques proves to be very complex owing to the internal variability increase in land-cover units and to the weakness of spectral resolution. Image segmentation before classification was proposed as an alternative approach, but a large variety of segmentation algorithms were developed during the last 20 years, and a comparison of their implementation on very high spatial resolution images is necessary. In this study, four algorithms from the two main groups of segmentation algorithms (boundarybased and region-based) were evaluated and compared. In order to compare the algorithms, an evaluation of each algorithm was carried out with empirical discrepancy evaluation methods. This evaluation is carried out with a visual segmentation of Ikonos panchromatic images. The results show that the choice of parameters is very important and has a great influence on the segmentation results. The selected boundary-based algorithms are sensitive to the noise or texture. Better results are obtained with region based algorithms, but a problem with the transition zones between the contrasted objects can be present.

## III. Detailed System Description

The methodology consists of applying the POHMT to multispectral pictures to notice potential building locations. the scale of the structuring part (SE) was outlined through the morphological top-hat by reconstruction rework. to get rid of orthogonal locations, vegetation areas were disguised exploitation the normalized distinction vegetation index (NDVI), and therefore the detected locations Multi temporal artificial aperture measuring instrument image analysis for land cowl amendment detection primarily based on NSCT based image fusion approach and Artificial neural network with feed forward back propagation model

*Block Diagram:*

1. **Change detection**

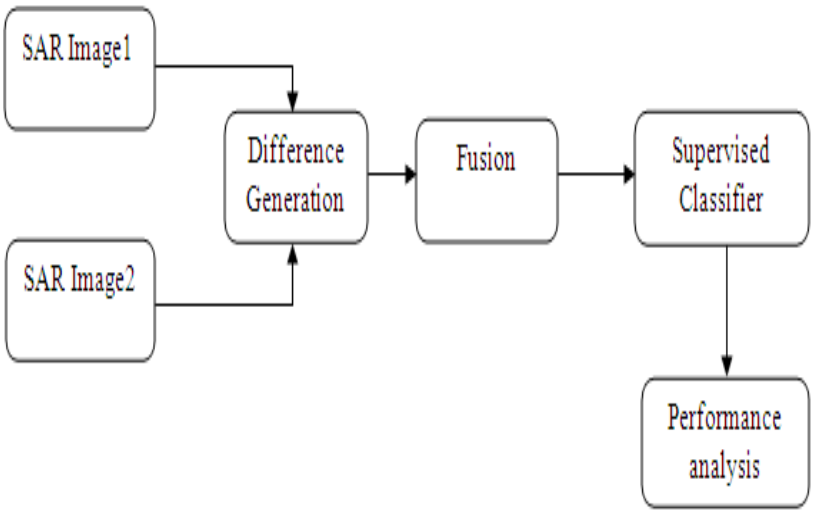



Fig.1 Change detection

**2. Fusion Design model**

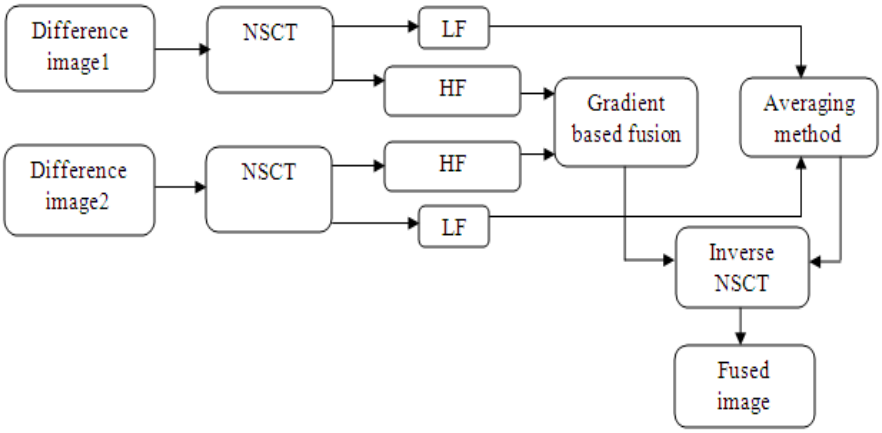
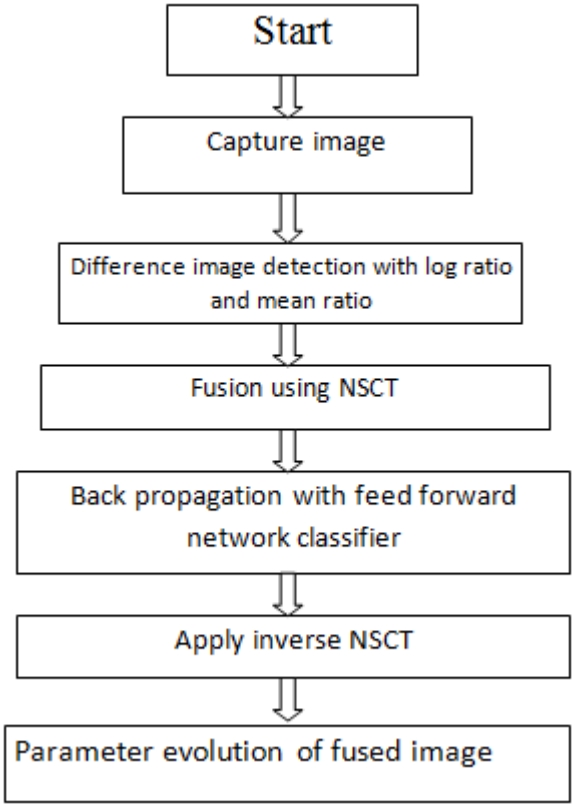



Fig.2 Fusion Design model

Methodology

- Difference image detection with log-ratio and mean-ratio operator
- Fusion using NSCT
- Back propagation with feed forward network classifier
- Parameters Evaluation(Cluster efficiency, Sensitivity and Correlation)

## IV. FLOW CHART



## V. RESULTS AND ANALYSIS

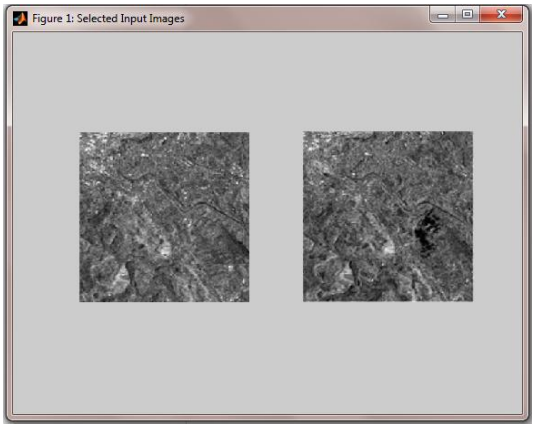



Image1

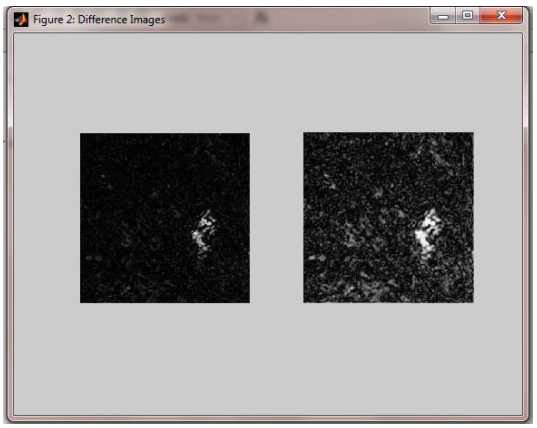



Image 2

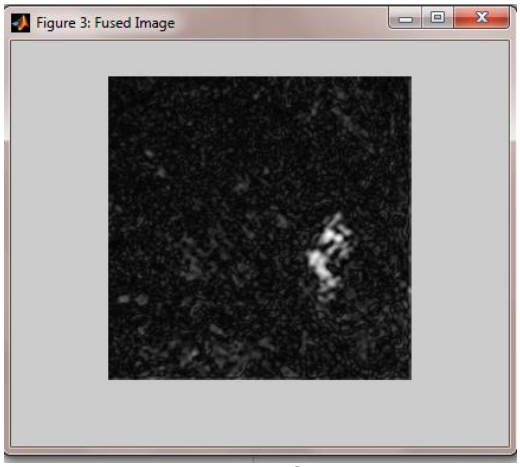



Image3

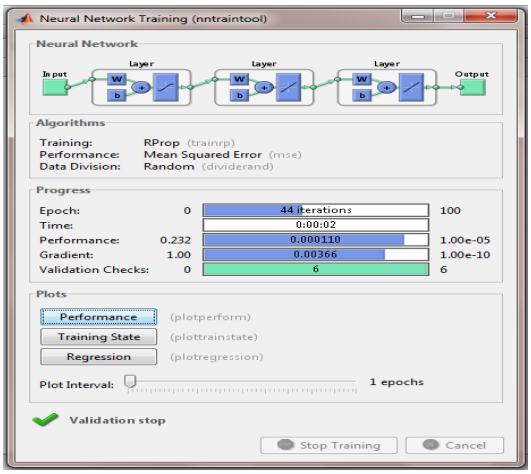
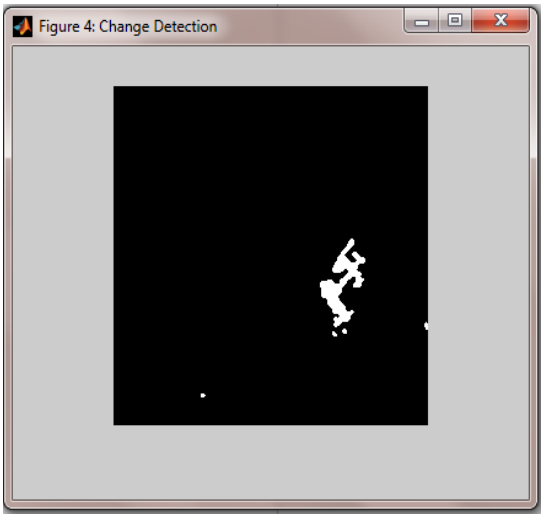



Image 4




## VI. CONCLUSION

We awarded a novel method for the detection of buildings in VHSR portraits. It consisted of finding competencies constructing areas making use of a vector-headquartered POHMT, disposing of inappropriate places utilizing a vegetation masks, and verifying building places using shadow knowledge. The process used spectral, contextual, and geometrical (involving the dimensions of structures)knowledge.

The predominant originality of our process was the proposed vector based process to use POHMT on multispectral portraits, which when compared the spectral residences of the thing to these of its neighbor hood, whereas maintaining the correlations between spectral bands in VHSR photographs. Also, in our opinion, and common procedure to outline the size of

SE used to be proposed, which may be utilized by other morphological operators. The experimental results had been promising and we feel that the system has the talents to handle more complex urban structures.

**ACKNOWLEDGEMENT**

We might want to thank the analysts and also distributers for making their assets accessible. We additionally appreciative to commentator for their significant recommendations furthermore thank the school powers for giving the obliged base and backing.

## References

1. M. K. Ridd and J. Liu, "A comparison of four algorithms for change detection in an urban environment," Remote Sens. Environ., vol. 63, no. 2, pp. 95–100, Feb. 1998.
2. Francesca Bovolo, Lorenzo Bruzzone, "A Wavelet-Based Change Detection Technique for Multitemporal SAR Image," IEEE International Geoscience and Remote Sensing Sympos, pp. 85-89, 2005.
3. HUANG Shiqi, LlUDaizhi, Hu Mingxing, "Multi-temporal SAR Image Change Detection Technique Based on Wavelet Transform," ActaGeodaeticaetCartographicaSinica, Vo1.32, NO.2, pp.180-185, 2010.
4. D. Brunner, G. Lemoine, and L. Bruzzone, "Earthquake damage assessment of buildings using VHR optical and SAR imagery," IEEE Trans. Geosci. Remote Sens., vol. 48, no. 5, pp. 2403–2420, May 2010.
5. E. Rignot and J. van Zyl, "Change detection techniques for ERS-1 SAR data," IEEE Trans. Geosci Remote Sens., vol. 31, no. 4, pp. 896–906, Jul. 1993.
6. A. Carleer, O. Debeir, and E. Wolff, "Assessment of very high spatial resolution satellite image segmentations," Photogramm. Eng. Remote Sens., vol. 71, no. 11, pp. 1285–1294, Nov. 2005.