

# SNR Ratio improvement through Image Registration

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**Abstract:** From last decade, image registration technique alives because to capture the requirments of low computation power, less time consuming and good quality images. Image registration is a process of combining two images such that common co-ordinate system belonging them to monitor changes between the two images. Their are lost of registration algorithms purposed. But, One of the best image registration techniques is SIFT(Scale invariance fourier Techniques).Lost of other algorithms also purposed to improve quality of image registration. These techniques are HAAR algorithms, KNN-algorithms, SURF techniques and so on.

**Keyword :**Image registration, co-ordinate systems, SIFT(Scale invarient feature Transform),KNN(K nearest neighbour algorithms).

## Introduction:

Image registration is considered as one of the best technique for extracting information from a given images. Image registration can be obtained from two types of methods:-Intensity based methods and feature based methods. In intensity based methods, intensity is used for obtaining information and in Feature based methods, physical features are used for obtaining information. Physical features like points and lines are obtained by various methods. SIFT is one of the features extraction techniques for image registration. KNN and HAAR transformation is also used in this project. In HAAR transformation, an image is first decompose. In this project, 2-level decomposition take place. This is done to remove blurs. After removal of blurs, decomposed image is again reconstructed. After that, matching is performed. In this

project, optical and SAR images are used for registration.

Image registration can be view in various fields like remote sensing, medical imageing, computer vision etc. Image registration can be classified into three main groups.

- Different view points: Images can be view as different angles.
- Different times: Images can be taken as different real time.
- Different Sensor: Images can be captures using various devices.

Image Regisration can be done in following 3 ways:

- Feature detection: The features which we obtained from Image Registration is called as control points. It collects features which are distinct and salient.
- Feature Matching: Features obtained from reference image is compare with features obtained by refered image.
- Transform model estimation: In this paper, HAAR transformation model used.
- Image resampling and transformation: HAAR transformation model is also used for resampling and transformation.

### **Literature servey:**

Image registration is one of the important image processing procedur es in remote sensing; it has been studied and developed for a long time. However, until

now, it is still rare to find an accurate , robust, and automatic image registration method, and most existing image registration methods are designed for particular application. At present, high resolu tion remote sensing images have made it more convenient for people to study the earth; however, they also bring some challenges for the traditional research methods. In terms of image registration, there are some problems with using current image registration techniques for high resolution images, namely: (a) precisely locating control points is not as simple as with moderate resolution images; (b) manually selecti ng the large number of control points required for precise registration is tedious and time consuming; (c) high data volume will adversely affect the processing speed in the image registration; and (d) local geometric distortion can not be removed very well using traditional image registration methods even with enough control points. Based on these reasons, the need for an image registration approach that will resolve these problems is urgent.

HAAR transform is one of the best methods for using image registration. Haar features are based on Haar wavelets, which are functions that consist of a brief positive impulse followed of a brief negative impulse. In image processing, a Haar feature is the difference of the sums intensities of all pixels in two or more contiguous regions. In HAAR transform, first an image is converted into 1<sup>st</sup> and then 2<sup>nd</sup> level decomposition image and then it is converted into approximate image, diagonal detail, vertical detail, and horizontal detail. Then image reconstruction procedure started. It first convert 2<sup>nd</sup> level decomposed image into 2<sup>nd</sup> level reconstruction image and then into 1<sup>st</sup> level reconstruction

image. Thus an image of more accurate, precise image is formed.

### ***Proposed Work:***

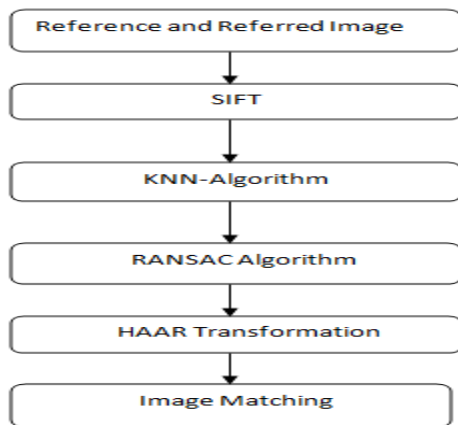


Fig.1 Data Flow

Fig.1 represent system flow diagram of propose work. One optical and SAR image is taken. This images is go under the process of SIFT transformation. SIFT is a technique of getting physical features from an image. Physical features are more promising than intensity features. Intensity features are the features which are obtained from varing intensity of an electromagnetic spectra. These features are less promising. These features are easily corrupted. KNN-algorithm is used for obtaining similar types of features. It uses clustering techniques for getting similar features. Other dissimilar features are removed through this method. . RANSAC algorithms are used for finding outliers.

After RANSAC, HAAR algorithms is used for improving matching performance. HAAR algorithm is used for getting approximate image, horizontal details, vertical details and diagonal details. From the mention methods, noise is removed and after reconstruction, improved image is obtained.

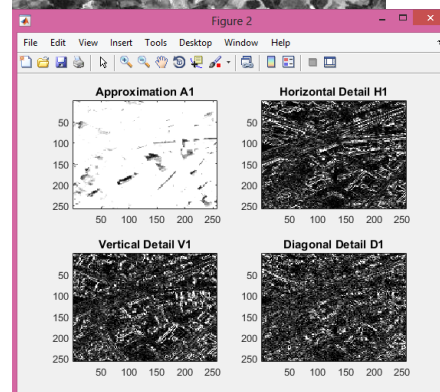


Fig.2 Optical, SAR and Decomposed Image

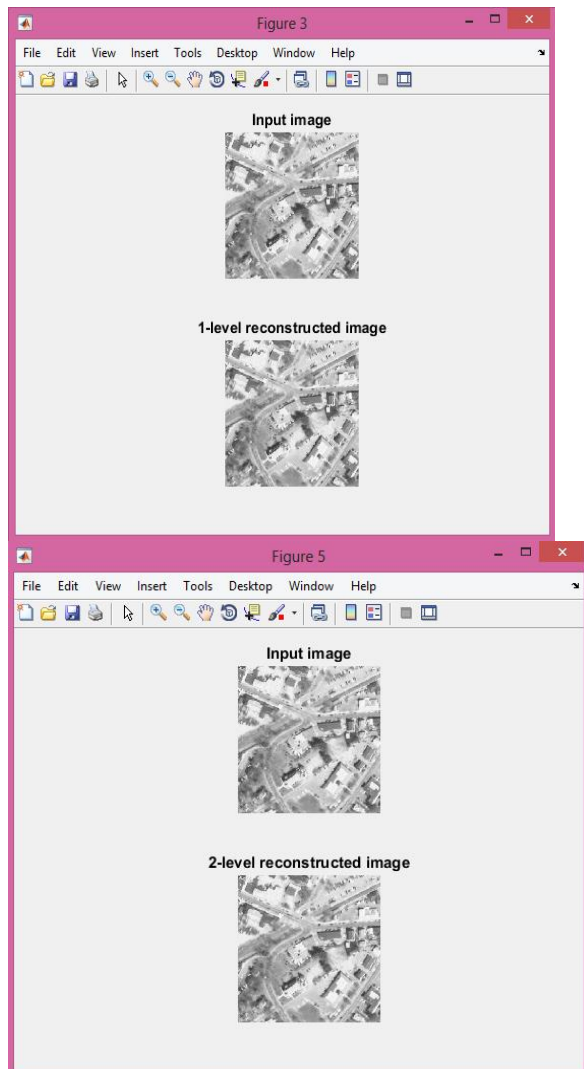


Fig.3 Reconsturcted Image level 1

Fig.4 Reconverted Image level 2

## Result and Analysis:

### SNR of an Optical and SAR image

In sample set, 6 images are taken, 3 for optical and 3 for SAR images. Then apply SNR formula for calculating Optical and SAR image values. X- Axis is taken as number of images and Y-axis named as SNR values.

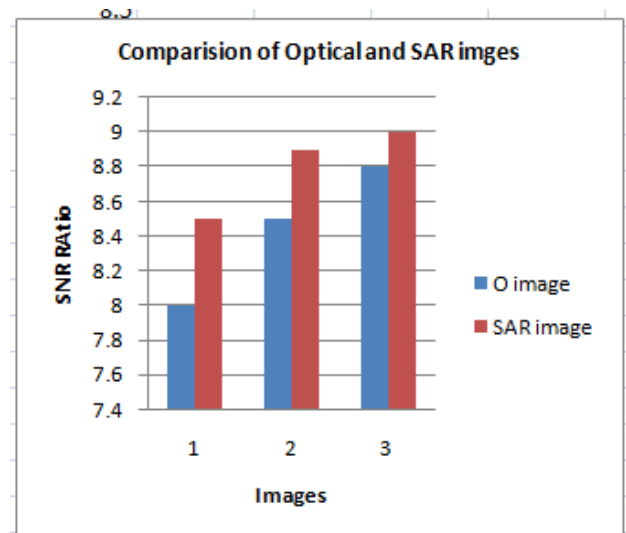


Fig.5 SNR of optical and SAR Image

#### 6.4.2 Matching By HAAR Transform:



Fig.8 Two images are matched by HAAR Transform

#### Conclusion:

In this papers, detailed explanation of HAAR algorithm is explained. Thus, from result, we say that, HAAR algorithm improves signal-to-noise ratio as mention from graph. Thus, using HAAR, we can get better quality of image matching. By purposed method, sharp feature points is obtained using SIFT method, These physical features are required for detection of noise. We can get 2-level reconstruction images of an input image in HAAR transform.

#### References:

- D. Mistry, A. Banerjee, “Discrete Wavelet Transform using MATLAB”, International Journal of Graphics & Image Processing, Vol. 2, issue. 1, February, 2012, pp. 252 - 259.
- S.Govindarajulu, K.Nihar Kuma r Reddy, “Image Registration on satellite Images,” IOSR - JECE, ISSN: 2278 - 2834, ISBN: 2278-8735. Volume 3, Sep - Oct, 2012.
- Hernani Gonçalves, Luís Corte - Real, Member, IEEE, and Jose A. Gonçalves,” Automatic Image Registration through Image Segmentation and SIFT,” IEEE Transactions on geo science and remote sensing, vol. 49, no. 7, July 2011
- Rachna P. Gajre, Dr. Leena Ragha, “Comparison of Image Registration methods for Satellite Images,” International Journal of Scientific and Research Publications, ISSN 2250 - 3153, Volume 3, November , 2013.

- Shiv BhagwanOjha, D.V Ravi Kumar, "Automatic Image Registration through Histogram - Based Image Segmentation," IJERA, ISSN: 2248 - 9622, Vol. 2, May -Jun 2012.
- Mr. D.P.Khunt, 2 PROF. Y.N.Makwana, "Image Registration Using Intensity Based Technique," Journal of information, knowledge and research, ISSN: 0975 – 6779, VOLUME – 02, Nov 12 TO Oct 13 .
- R.V.Prasad CH, S.Suresh," A Comprehensive Image Segmentation Approach For Image Registration," International Journal of Computer Trends and Technology - volume3 Issue4 – 2012
- Jianglin Ma, Jonathan Cheung - Wai Chan, and Frank Canters," Fully Automatic Subpixel Image Registration of Multiangle CHRIS/Proba Data," IEEE Transactions On Geoscience And Remote Sensing, VOL. 48, NO. 7, JULY 2010.
- Bin Fan, Chunlei Huo, Chunhong Pan, and Qingqun Kong," Registration of Optical and SAR Satellite Images by Exploring the Spatial Relationship of the Improved SIFT," Ieee Geoscience And Remote Sensing Letters, VOL. 10, NO. 4, JULY 2013
- Goncalves H, Goncalves J A, Corte-Real L. HAIRIS: A method for automatic image registration through histogram-based image segmentation. IEEE Transaction Image Processing. 2011 Mar; 20(3):776–89.
- Ma J, Chan J C, Canters F. Fully automatic subpixel image registration of multiangle CHRIS/Proba data. IEEE Transaction Geoscience and Remote Sensing. 2010 Jul; 48(7):2829 –39
- Gong M, Zhao S, Jiao. L. A novel coarse-to-fine scheme for automatic image registration based on SIFT and mutual information. IEEE Transaction of Geoscience Remote Sensing. 2014 Jul; 52(7):4328–38.
- Song Z, Zhou S, Gaun J. A novel image registration algorithm for remote sensing under affine transformation. IEEE Trans Geosci Remote Sens. 2014 Aug; 52(8):4895– 338–912.
- Wong A, Clausi D, ARRSI: Automatic registration of remote sensing images. IEEE Transaction Geoscience Remote Sensing. 2007 May; 45(5):1483 –93.

