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3D-Block Matching algorithm for satellite data Classification 1V.Venkata Sai Krishna, and 2G.C.Narsimhulu 1 M.Tech., URS Dept., IIRS, Dehradun, Uttarakhand. 2Assistant Professor, Government Polytechnic College for woman, Kadapa, AP, India.

Abstract: In this Paper, We Proposed a de-speckling method on Indian Synthetic-aperture radar (SAR) image with block matching 3D transformation. And it has been used for ALOS data.

This block- matching 3D algorithm clearly explained how to generate de-speckling of SAR image for classification. In this technique has been tested on RISAT-1 SAR image data set and practical results exhibit that this technique is the better in terms of despeckling quality image factors. Key Words: Synthetic-aperture radar, de-speckling, block matching 3D algorithm. 1. INTRODUCTION RISAT-1 is our national microwave imagery sensor [1-2].

Microwave remote sensing has obtained a lot in importance over the last decades with the usage and utility of active microwave or radar imaging systems for a wide range of scientific applications. Synthetic-aperture radar images are affected by the speckling noise at the time acquisition process. Due to this effect, the images are not clearly seen and interpretation of images is very difficult.

It is compulsory to eliminate the speckle noise as much as possible to get maximum information from the image. So many techniques like filter based and transform domain based models have been proved in their quality parameters. Lee filter, khan filter, frost filter, Map filter, wiener filter are used in filter domain and wavelet, curvelet, Principal component analysis, non local mean algorithm are used in transform domain. But still there is scope for further denoising. The algorithm is generally based on pixel grouping and group matching.

This is the state-of-art algorithm in this denoising of images. We have studied the algorithm affect on our own satellite imagery. Lee filters are famous in denoising, but they cannot preserve the edges. For denoising purpose we used matlab software and for fusion and classification purpose we used ERDAS software. Finally accuracy calculations have to be performed.

The SAR image is a grey image and optical image is multispectral image. In fusion process both input images are having different resolutions and different frequency bands, but finally we will get better resolution with multi spectral image. This algorithm can be applied at different applications like crop classification, land use and land cover classification [3-4]. 2.

BM3D TECHNOLOGY PROCEDURE 1. Take the image in geotiff format. 2. Add noise to the image. 3. Divide the SAR image to small blocks. 4. Calculate euclidean distance between blocks. 5. If the distance is less than a threshold then apply DWT. 6. Apply hard threshold to low frequency region. 7. Apply IDWT. 8. Apply DWT once again. 9. Apply wiener filter to low frequency region. 10. Apply IDWT. 11. Calculate the quality parameters.

Table 1: Quality factors for ALOS data _CC _ESI _PSNR _ _LEE _0.542641 _0.237261 _12.69533 _ _WAVELET _0.629434 _0.163542 _13.38714 _ _PCA-LPG _0.764238 _0.566608 _17.75203 _ _BM3D _0.910328 _0.617572 _18.84444 _ _ Table 2: Quality factors for RISAT-1 data _CC _ESI _PSNR _ _LEE _0.587824 _0.2609 _12.63503 _ _WAVELET _0.651886 _0.165638 _13.20742 _ _PCA-LPG _0.991427 _0.694076 _25.77491 _ _BM3D _0.909661 _0.611382 _18.42953 _ _

/ / / (a) (b) (c) / / / (d) (e) (f) Figure 1: (a) Original Image (b) Noisy Image (c) Lee noised Image (d) Wavelet Denoised Image (e) PCA-LPG Denoised Image (f) BM3D denoised Image Table 3: Quality factors for RISAT-1 data (HH) _ENL _SSI _CC _ESI _PSNR _ _LEE _14.02162 _0.22968 _0.60234 _0.26845 _12.72096 _ _WAVELET _0.417097 _0.66023 _0.66129 _0.17218 _13.26927 _ _CURVELET _0.333365 _0.85223 _0.87324 _0.42131 _19.96674 _ _PCA-LPG _0.339668 _0.78794 _0.94507 _0.52301 _21.65689 _ _BM3D _18.21977 _0.39630 _0.92561 _0.63544 _19.20952 _ _

Table 4: Quality factors for RISAT-1 data (VH) _ENL _SSI _CC _ESI _PSNR _ _LEE _27.92204 _0.13515 _0.48948 _0.24571 _11.36118 _ _WAVELET _0.61512 _0.57989 _0.58189 _0.16895 _11.99679 _ _CURVELET _0.28418 _0.77940 _0.80652 _0.41399 _18.13353 _ _PCA-LPG _0.24349 _0.72973 _0.95054 _0.54092 _22.07292 _ _BM3D _21.66057 _0.28769 _0.89625 _0.61292 _17.24902 _ _ Table 5: Quality factors for RISAT-1 data (VV) _ENL _SSI _CC _ESI _PSNR _ _LEE _0.55084 _0.68467 _0.79035 _0.24068 _14.16556 _ _WAVELET _0.58806 _0.58296 _0.58457 _0.16667 _12.48269 _ _CURVELET _0.39220 _0.74066 _0.76365 _0.35313 _17.9062 _ _PCA-LPG _0.37298 _0.69658 _0.93178 _0.54436 _21.52579 _ _BM3D _20.93430 _0.34077 _0.90850 _0.62609 _18.24214 _ _ 4.

RESULTS AND DISCUSSIONS Correlation coefficient gives how any the two pictures are related or correlated to each other; it gives how the denoised image is away from the original image. From table 1, we can say that our method gives better CC value. In table quality parameters of ALOS satellite have been listed. Ideally the coefficient value is one and it should be nearby one. In any image processing, the main and crucial area is edge.

It may be in horizontal or vertical index. This value should be high for a denoising method. The denoising results of the new method and other existing technologies to microwave image are given in the Figure 1. From table 2, it is understood that the new method gives better CC value, better ESI value and better PSNR value.

We have compared the BM3D technology to latest RISAT-1images. Along with above quality parameters, other parameters like QNL and ESE are also to be calculated in microwave images. Table 3, Table 4 and Table 5 show the quality parameters evaluation for different polarizations. REFERENCES 1. Y. Murali Mohan Babu, M.V. Subramanyam, M.N.

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