International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 04, 2020
ISSN: 1475-7192

VIDEO SAR HIGH SPEED PROCESSING TECHNOLOGY

[1]KAVYA.R, [2]SAGADEVAN.K, [3]PRIYADHARSHNI.G

ABSTRACT

In modern science and technologies, images gain much broader scope due to the ever-growing importance of scientific visualization. Designing and implementing a Video SAR (Video Synthetic Aperture Radar) is a high-speed processing technology that can achieve an image processing of higher speed. This paper uses PFA algorithm for high speed processing of images. This system is suitable for real time image processing applications. In this proposed approach the exact boundaries or edges of the images are detected. Digital watermarking technique is used for copyright information. The watermark is embedded with the real image in order to resist from different types of attacks. In watermarking technology the DCT algorithm is used for more security purpose. This technique shows more robustness against high stream, low stream, frame drop, frame trim attacks, etc,

KEYWORDS*: SAR video, image processing, watermarking, DCT.*

I. INTRODUCTION

Image processing is the processing of images using mathematical operations. The input for processing can be of any format like an image, a series of image, a photograph, etc,. The image can be treated in two dimensional, as well as three dimensional formats.

The common SAR video can be classified into overlapping and non-overlapping frames. The extraction of each and every frame of data is based on different frequency range.

Though human vision system can easily understand the complexity in images ,it is difficult for the computers to do so .The saliency detection algorithms which are more commonly used can be classified into saliency detection in images and saliency detection in videos .The dynamic neural network algorithm is used to detect the sparse region from the moving region .The technology is developed in such a way that privacy is becoming impossible .The copyright theft of data can be avoided by using digital watermarking .The original image is embedded into the

[1] IFET College of Engineering, Villupuram, Tamil Nadu, India
[2] IFET College of Engineering, Villupuram, Tamil Nadu, India
[3] IFET College of Engineering, Villupuram, Tamil Nadu, India

Received: 03 Dec 2019 | Revised: 21 Jan 2020 | Accepted: 18 Feb 2020

watermark image to protect it from illegal copying .In order to prove ownership or copyright watermark is extracted from the original image and tested.

II. EXISTING SYSTEM

A single image processing is performed on the target image by the traditional SAR video when the image is static .The overlapping of raw data takes place by this SAR during the synthetic aperture time. Each and every data of a single frame is processed separately to obtain a sequence of images .The video SAR high-speed imaging processing system is mainly composed of four modules .This type of radar can only capture images and they cannot cover a large area in which the apertures are very small .In this detecting SAR, the spatiotemporal algorithm is used for saliency model. The current saliency detection method which is used can detect the image only if it is stationery .This leads to misclassification of images when they are moving. During the process of saliency mapping motion images capturing plays a major role than the detection of spatial feature. Therefore, moving objects cannot be segmented easily and it is complex .The existing method showed a moderate performance with decomposition of the salient features. Sparse detection accuracy is moderate. The output has less resolution.

III. PROPOSED SYSTEM

In this paper a novel method to decompose a SAR video is designed to extract the sparse spatiotemporal features from it .The salient features from the surrounding is obtained from the algorithm used and saliency mapping for the input video is generated .Tensor decomposition is the algorithm which is used to determine the vectors or edges of an image .Sparsity measures are used to estimate the proper weight to combine sparse features .This approach is suitable for finding the salient regions in videos where the background is dynamic.

The embedding of watermark technology can be done in video coding and also in compressed video .The extraction of watermark is done by decoding or even by using separate algorithm .The basic block based video coding framework is based on four key components .This watermarking process includes insertion ,detection and removal of images .In this paper the same watermark can be embedded into each frame in every candidate scene .The separate keys are required to remove the watermarked image from the original image .

IV. BLOCK DIAGRAM

The performance of the proposed decomposition algorithm is measured by decomposing the standard videos where the background is available, and the quality of the estimated background is analyzed with the ground-truth image. In order to execute the processing of the visual saliency, the database folder is to be taken in .avi video format which is considered as the input data .The input video taken is preprocessed by gray scaling. The intensity of every image is understood by the process of gray scaling.

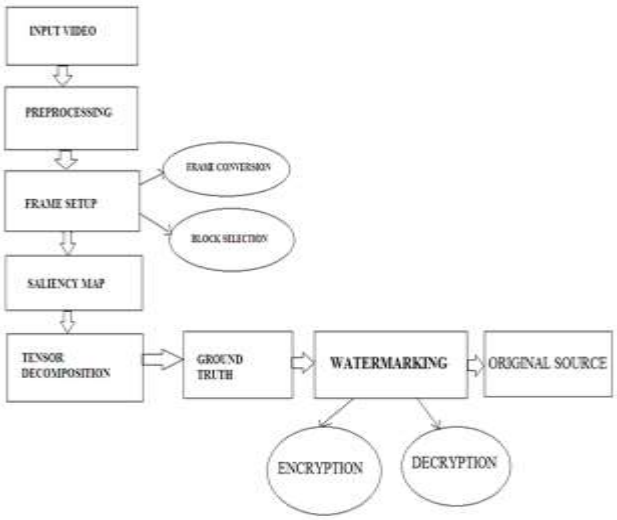

Figure 1. High speed processing technology

Frame conversion is done for the input video and a block is selected from n number of frames. Block randomization is commonly used technique to select a block from the frames. The result of saliency map shows of quality of each pixel in an image .The set of contours extracted from the image gives the saliency map .The broad overview of tensors are shown to decompose an image .Tensors are considered to be more rigid than matrix decomposition .The ground truth analysis deals with the heat map and jet map of an image ,which deals with direct observation of an image .

The jet map image is taken as input image and the watermark image is considered to be the cover image .Encrytion of data takes place by hiding the original input image with the watermarked image .The encryption of watermark image is based on random key array generation using user key .The process of extraction requires the key for extracting image and encrypted script.

Decoding is the process of extracting watermark image and the cover image separately .Only an authorized user can decrypt the data since it requires decoding key .The system extracts and converts the garbled data into easily understandable form .Data encrypted with public key can be decrypted only with the private key .Privacy is the foremost reasons for implementing an encryption-Decoding system. There are certain approaches followed for encrypting and decrypting the key.

V. SIMULATION RESULTS

TENSOR DECOMPOSITION

The input image is fragmented into super pixels and saliency mapping is done .Tensor decomposition is the algorithm which is mainly used to determine the edges of the image.

Fig.2 Tensor Decomposition

GROUND TRUTH

This ground truth contains the heat map and jet map of the input image .It is the graphical representation of data where the individual values contained in a matrix are represented as colours.

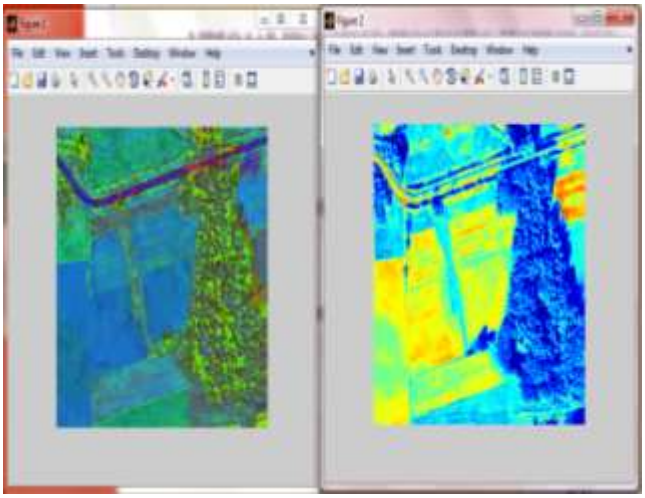

Fig 3. Heat map and Jet map

ENCRYPTION PHASE

The data to be transmitted is encrypted with a duplicate cover image .The original data is hide behind a duplicate image and transmitted for security purpose .

Fig 4. Encryption phase

DECRYPTION PHASE

To retrieve the original data from the encrypted data the key is generated .The inverse cosine transform is performed to recover the original image from the duplicate image.

Fig 5. Decryption phase

VI. CONCLUSION

The real data imaging result shows the system to be more stable and reliable .The processing time and accuracy lays a foundation for real time applications for SAR video .The Video SAR is used in non contact detection technology and can be widely used in clinical monitoring ,weather monitoring ,earthquake relief and other fields .The saliency detection algorithm based on the proposed decomposition algorithm shows an outstanding performance irrespective of the complexity in video .This proposed algorithm segments the salient region from background for

very large salient object .For protecting the copyright a robust video watermarking algorithm based on DCT algorithm is used for embedding and extracting processes .The result shows that the proposed algorithm has strong ability to resist from various watermark attacks.

REFERENCE

1. Melvin, W.; Scheer, J. Principles of Modern Radar Vol. II: Advanced Techniques. Edison; Scitech Publishing: Mendham, NJ, USA, 2013, ISBN:978-1-891121-53-1.

2. Willey, C. Synthetic aperture radars—A paradigm for technology evolution. IEEE Trans. Aerosp. Electron. Syst. 1985, 21, 440–443.

3. Currie, A.; Brown, M.A. Wide-swath SAR. IEE Proc. F Radar Signal Process. 1992,139,122–135,doi:10.1049/ip-f-2.1992.0016.

4. Krieger, G.; Gebert, N.; Moreira, A. Unambiguous SAR signal reconstruction from nonuniform displaced phase center sampling. IEEE Geosci. Remote Sens. Lett. 2004,1,260–264, doi:10.1109/LGRS.2004.832700.

5. Gebert, N.; Krieger, G.; Moreira, A. Digital beamforming on receive: Techniques and optimization strategies for high-resolution wide-swath SAR imaging. IEEE Trans. Aerosp. Electron. Syst. 2009, 45, doi:10.1109/TAES.2009.5089542.

6. Gebert, N. Multi-Channel Azimuth Processing for High-Resolution Wide-Swath SAR Imaging; DLR (German Aerospace Center): Köln, Germany, 2009.

7. Cerutti-Maori, D.; Sikaneta, I.; Klare, J.; Gierull, C.H. MIMO SAR processing for multichannel high-resolution wide-swath radars. IEEE Trans. Geosci. Remote Sens. 2014,52,5034–5055, doi:10.1109/TGRS.2013.2286520.

8. Liu, B.; He, Y. Improved DBF algorithm for multichannel high-resolution wide-swath SAR. IEEE Trans. Geosci. Remote Sens. 2016,54,1209–1225, doi:10.1109/TGRS.2015.2476496.

9. Meta, A.; Hoogeboom, P.; Ligthart, L.P. Signal processing for FMCW SAR. IEEE Trans. Geosci. RemoteSens.2007, 45, 3519–3532, doi:10.1109/TGRS.2007.906140.

10. Kim, J.H.; Younis, M.; Moreira, A.; Wiesbeck, W. Spaceborne MIMO synthetic aperture radar for multimodal operation. IEEE Trans. Geosci. Remote Sens. 2015, 53, 2453–2466, doi:10.1109/TGRS.2014.2360148.

11. Damini, A.; Balaji, B.; Parry, C.; Mantle, V. A videoSAR mode for the X-band wideband experimental airborne radar. Proc. SPIE Def. Secur. Sens. Int. Soc. Opt. Photonics2010,7699,76990E, doi:10.1117/12.855376.

12. Wallace, H.B. Development of a video SAR for FMV through clouds. Proc. SPIE Def. Secur. Sens. Int. Soc. Opt. Photonics 20159749,94790L, doi:10.1117/12.2181420. 15. Miller, J.; Bishop, E.; Doerry, A. An application of backprojection for video SAR image formation exploiting a subaperature circular shift register. Proc. SPIE Def. Secur. Sens. Int. Soc. Opt. Photonics 2013, 8746, 874609, doi:10.1117/12.2016417.

13. Wallace, H.; Gorman, J.; Maloney, P. Video Synthetic Aperture Radar (ViSAR); Defense Advanced Research Projects Agency: Arlington, VA, USA, 2012.

14. Baumgartner, S.V.; Krieger, G. Simultaneous high-resolution wide-swath SAR imaging and ground moving target indication: Processing approaches and system concepts. IEEE J. Sel. Top. App. Earth Obs. Remote Sens. 2015, 8, 5015–5029, doi:10.1109/JSTARS.2015.2450019.

15. De Wit, J.; Meta, A.; Hoogeboom, P. Modified range-Doppler processing for FM-CW synthetic aperture radar. IEEE Geosci. Remote Sens. Lett. 2006, 3, 83–87, doi:10.1109/LGRS.2005.856700.

16. Jiang, Z.H.; Huang-Fu, K. Squint LFMCW SAR data processing using Doppler-centroid-dependentfrequency scaling algorithm. IEEE Trans. Geosci. RemoteSens.2008,46,3535–3543, doi:10.1109/TGRS.2008.2000755.

17. Xin, Q.; Jiang, Z.; Cheng, P.; He, M. Signal processing for digital beamforming FMCW SAR. Math. Probl. Eng. 2014, 2014, 859890, doi:10.1155/2014/859890.