Video SAR High-speed Processing Technology

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Abstract-Designing and implementing a Video SAR (Video Synthetic Aperture Radar, SAR) high-speed processing system through a Field Programmable Gate Array (FPGA), which can achieve an imaging processing speed of 5 frames per second. This paper proposes a high-speed processing scheme based on PFA imaging algorithm, which lays a foundation for the real-time performance of video SAR imaging processing. The system realizes radar imaging multi-pulse parallel range processing and high precision SINC interpolation parallel azimuth processing.video synthetic aperture radar(video-SAR) is a land-imaging mode where a sequence of images is continuously formed when the radar platform either files by or circles the scene. In this paper, the tensor decomposition algorithm is introduced for video-SAR image formation. It can achieve an imaging processing speed of 5 frames per second.

Keywords- Synthetic Aperture Radar(SAR), Video SAR, Radar Imaging, Tensor Decomposition,Image Processing.

I. INTRODUCTION

Video synthetic aperture radar (video-SAR) is a land-imaging mode where a sequence of images is continuously formed when the radar platform either flies by or circles the scene. Synthetic Aperture Radar (SAR) can take a fine radar image without relation to sunshine condition. Recently, video generated from SAR is discussed. The radar video offers the practical understanding of the target motion without the added implement. The radar video is often generated from raw data in spotlight mode.The Sandia National Laboratory has proposed an advancedVideo SAR algorithm and implemented it on the airborne.Currently, common video SAR imaging is mainly divided intonon-overlapping and overlapping frame data extraction. Whenextracting each frame of data in a non-overlapping manner, theradar should work at least in terahertz, which is currentlydifficult to implement. In the case of overlapping extraction, the frame rate can be increased by increasing the percentage of eachframe of overlap data. video SARdata, but the high energy consumption makes it unsuitable forlarge-scale applications.This paper proposes a high-speed imaging processing schemefor Video SAR using FPGA technology for the above problems.First of all, the echo data isframe extracted in an overlappingmanner. Increasing the frame rate by 5 frames/s by setting theoverlap rate. Afterwards , PFA imaging processing is perform each frame of data. In

the end, the imaging algorithm ismapped to the FPGA chip for acceleration processing. And amulti-pulse parallel processing architecture is built to ensure theprocessing speed of at 5 frames/s.

II . EXISTING SYSTEM

Spatiotemporal decomposition is used in existing method. Decomposition is based on the time and space variation of an image at different period. The spare features are only detected in the 2D images. The two dimensional array is sketched with the decomposition. This process is unable to give the heat map of salient features. It is complex to implement for videos. The existing method showed a moderate performance with decomposition of the salient features. Sparse detection accuracy is moderate. The output is less in resolution.

III.PROPOSED SYSTEM

We propose a novel technique for detection of visual saliency in SAR video based on video decomposition. First of all, the echo data is frame extracted in an overlapping manner. Increasing the frame rate by 5 frames/s by setting the overlap rate. Afterward, PFA imaging processing is performed on each frame of data. This process is good for the removing a small amount image source and more amount noise. Corrects image density and contrast. Helps to easily store and retrieve in fused form of image available in any form could be recovered and enhanced by white balancing using Gaussian filter.

IV. SYNTHETIC APERTURE RADAR(SAR)

Synthetic Aperture Radar(SAR) is a form of radar that is used to create two-dimensional images or three-dimensional reconstructions of objects, such as landscapes. SAR uses the motion of the radar antenna over a target region to provide finer spatial resolution than conventional beam-scanning radars. SAR is a coherent mostly airborne or spaceborne sidelooking radar system which utilizes the flight path of the platform to simulate an extremely large antenna.

V. RADAR IMAGING

Imaging radar provides its light to ultimate an area on the ground and take a picture at radio wavelengths. It uses an

antenna and digital computer storage to record its images. In a radar image, one can see only the energy that was reflected back towards the radar antenna.

VI.   MODULES

- Input Video processing
- Pre-processing
- Frame setup
- Sailency Map
- Tensor Decomposition

VII.   MODULES DESCRIPTION

➤ *INPUT VIDEO PROCESSING*

In order to execute the processing of the visual saliency the database folder is to be taken with .avi videos with duration less then 10seconds with rgb format.This is considered as the input data.

➤ *PRE-PROCESSING*

The gray conversion is known as the pre-processing. Gray code is a code assigning to each of a contiguous set of integers, or to each member of a circular list, a word of symbols such that no two code words are identical and each two adjacent code words differ by exactly one symbol.

➤ *FRAME SET UP*

i.   *FRAME CONVERSION*

The Frame Conversion block passes the input through to the output and sets the output sampling mode to the value of the Sampling mode of output signal parameter, which can be either Frame-based or Sample-based.

ii.   *BLOCK SELECTION*

This provides the block that is considered for the processing in the saliency detection.

➤ *SAILENCY MAP*

In computer vision, a saliency map is an image that shows each pixel's unique quality. The goal of a saliency map is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyze.

➤ *TENSOR DECOMPOSISTION*

Tensors are generalizations of vectors (that have one index) and matrices (that have two indices) to an arbitrary number of indices. A tensor can be represented as a multidimensional array of numerical values. A slice of the core tensor yielded from HOSVD of sub-tensors reflects the quality of the related image patch.

VIII.   ARCHITECTURE OF SAR
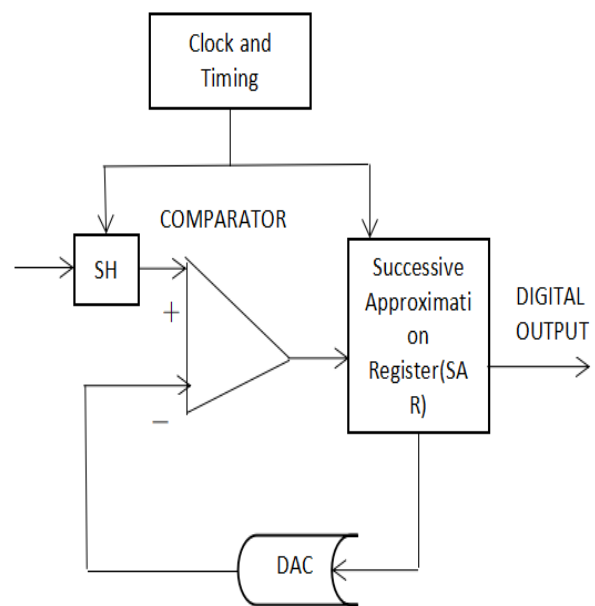
IX.   CONCLUSION

In this paper, The real data imaging result shows that the system is stable and reliable. And the processing time and imaging accuracy can meet the requirements of Video SAR real-time imaging and high resolution, which lays a foundation for Video SAR real-time imaging processing. The Video SAR can be used in non-contact detection technology, and can be widely used in clinical monitoring, earthquake relief and other fields. The monitoring system developed by thisradar can be used for real-time monitoring.

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