



*Florida Institute of Technology*

# METHOD AND APPARATUS FOR PROCESSING COMPLEX INTERFEROMETRIC SAR DATA

## *Summary*

A computer system for processing interferometric synthetic aperture radar (SAR) images includes a database for storing SAR images to be processed, and a processor for processing interferometric SAR images from the database. The processing includes receiving first and second complex SAR data sets of a same scene, with the second complex SAR data set being offset in phase with respect to the first complex SAR data set. Each complex SAR data set includes a plurality of pixels. An interferogram is formed based on the first and second complex SAR data sets for providing a phase difference there between. A complex anisotropic diffusion algorithm is applied to the interferogram. The interferogram includes a real and an imaginary part for each pixel. A shock filter is applied to the interferogram. The processing further includes performing a two-dimensional variation phase unwrapping on the interferogram after application of the shock filter.

## **Applications**

- The present invention relates to the field of image processing, and more particularly, to processing synthetic aperture radar (SAR) images.
- Another application of the anisotropic diffusion algorithm and a shock filter is with respect to vector and road extraction for material classification. A computer-implemented method for vector extraction in SAR images comprises selecting a SAR image for vector extraction, processing the selected SAR image with an anisotropic diffusion algorithm and extracting vector data based on the processed SAR image.

## **Advantages**

- The advantage of selectively controlling the convection function  $c$  based on a statistical analysis of the distribution of gradient values for the SAR data set being processed provides increased resolution. Intra-region smoothing and edge preservation is provided for images corrupted by additive noise. In cases where the SAR data sets contains speckle, the anisotropic diffusion algorithm with the adjustable convection function  $c$  produces edge-sensitive speckle reduction.

## *The Technology*

A computer system for processing interferometric synthetic aperture radar (SAR) images includes a database for storing SAR images to be processed, and a processor for processing interferometric SAR images from the database. The processing includes receiving first and second complex SAR data sets of a same scene, with the second complex SAR data set being offset in phase with respect to the first complex SAR data set. Each complex SAR data set includes a plurality of pixels. An interferogram is formed based on the first and second complex SAR data sets for providing a phase difference there between. A complex anisotropic diffusion algorithm is applied to the interferogram. The interferogram includes a real and an imaginary part for each pixel. A shock filter is applied to the interferogram. The processing further includes performing a two-dimensional variational phase unwrapping on the interferogram after application of the shock filter.

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