River Boundaries Extraction With Edge Detection Using SAR Images

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Abstract - *Analysis edge of river the extraction of River boundaries on SAR images is play important role. SAR image processing is also important for the research developments in many fields of study including Remote Sensing, GIS and Disaster Management We proposed extraction of river boundaries method to overcome the difficulty to classify river. Therefore, the paper suggested effective method to extract river boundaries in mountain areas using SAR images. The results shows accurate positions of river boundaries and eliminated false part correctly.*

Key Words: *SAR; Segmentation; Level Set; Canny edge detector ;*

1.INTRODUCTION

River boundaries extraction on SAR images is valuable for many applications such as flood monitoring and quick mapping. Classification and image segmentation are crucial issues in the automated analysis of polar metric radar remote sensing, In synthetic aperture radar (SAR) images several approaches have been developed for forest/non-forest taste, oil leak detection and segmentation and agricultural crop classification. where additional optical images, radar image pairs and laser radar data are difficult to obtained or are high cost. Therefore, this paper shows efficient method to exact river boundaries in mountain areas on SAR images. The experiment results shows exact positions of river boundaries and eliminated mountain shadows effectively.

Fig 1: Flood disaster in north India 2013

This is example of flood disaster in uttarakhand in 2013 were 400 houses are destroy,265 were damaged, 600 people are dead and 10000 are injured so our project aim to control that type of risk up to certain level.

2. Literature Survey

1)Wang Xiaoliang,Li chunsheng and Wu Renbiao

In this Paper,River boundaries extraction on SAR images is important for monitoring of flood. The author proposed a river boundaries extraction method to conquer the complicated to differentiate rivers from mountain shadows through fusing GIS information. The experiment results represent that using pretend river vector maps could obtain more correct and precise river boundaries. When using real small scale vector maps, author obtained a few false areas or missed areas. It was mainly because the maps' scale was too small and there were more position differences between river lines in vector maps and real rivers.

2)ParamateHorkaew,SupattraPuttinaovarat,Kanit Khaimook

In this Paper,Topographic mapping of river boundary area is important in the environment management and hydrological modeling. Prime advantages of remote sensing technology for river delineation are reducing labor cost and time and elevating restrictions on ground surveys. However, these techniques are as yet to produce satisfactory result due to, for instance, the lack of an effective means of removing shadow and spurious noise. This paper arrives at a conclusion that taking into account contextual information in water body classification and extraction yields more preferable results over the traditional water index based extraction, in terms of the robustness against both noise and shadow. Furthermore, by including DSM data, it can perform river delineation with at Greater resolution, allowing the extraction narrower river branch.

3)Hongya Zhang,Kaimin Sun,and Wenzhuo Li

In this Paper, shadow features are taken into consideration during image segmentation, and then according to the numerical features of the images, supposed shadows are extracted. Furthermore, some dark objects which could be incorrect for shadows are lined out according to object properties and spatial relationship between objects. Authors have put forward a systematic and effective method for shadow detection and removal in a single metropolitan high-resolution remote sensing image. In order to get a shadow detection result, image segmentation considering shadows is practical first. Then, assumed shadows are selected through supernatural features and Spatial information of objects and false shadows are ruled out.

4)Junjun Yin,Jian Yang

In this Paper, multiphase level set method for the segmentation of multi band and polar metric SAR data. The level set formulation is used to form an energy functional that includes the image arithmetical information defined on energetic contours. In addition

to the classical Wish art/Gaussian distribution for locating area boundaries, edge information is included into the power functional to improve the performance of polar metric data segmentation. A CFAR edge indicator was incorporated into an active contour model to accurately detect field boundaries and accelerate curve evolution. The proposed active contour model was then embedded into a multiphase level set framework, in which a piecewise constant approximation approach was adopted to represent the image. Both synthetic and real multi band polar metric SAR data were used for verification and evaluation. An empirical parameter setting criterion was developed in the experiments to ensure that the components of the energy functional are proportional.

5)Che-Chun Su,Lawrence K. Cormack, and Alan C. Bovik

In this Paper,Natural scene statistics have played an increasingly important role in both our understanding giving out of the function and evolution of the human vision system, and in the development of current image applications. Because range (egocentric distance) is arguably the most important thing a visual system must compute (from an evolutionary perspective), the joint statistics between image information (color and luminance) and range information are of particular interest. By utilizing high-resolution, high-quality color images and co-registered range maps in the LIVE Color+3D Data-base, we examined the statistical relationships between multi-scale, multi-orientation Gabor decompositions of luminance/chrominance and range/depth data in natural scenes.

6)Venu Shah,Archana Choudhary and Kavita Tewari

In this Paper,Satellite image processing plays a crucial role for the research developments in various fields of study include Astronomy, Remote sensing, GIS, Agriculture monitoring and Disaster management. In this work, the methods similar to edge detection, thresholding, image erosion and other color and feature extraction algorithms are presented to extract water content (river).Thus, the proposed Hill climbing algorithm along with k means clustering algorithm works fine and helps in extract color of the desired information from the image while edge detection and threshold stage also helps to extract very well details from the satellite image. Both these schemes can Be used to predict river condition as drought, flooded or normal. By varying threshold level in k means clustering a distinguished color that helps to distinctly identify the desired information.

3. Proposed Approach

3.1 Data Preparation

In this process, the provided by USGS website were obtained as the inputs, while the earth truth segmentation was composed from manual digitizing. As an example to demonstrate the possible of our scheme, the study areas in Pathumthani Province were
considered. Depicts respective imagery of the areas bands' features (band assignment and corresponding wavelength). Each image has the measurement of 400 by 400 pixels and the resolution of 5 meters.

3.2 Water Index Classification

In our experiment, NDWI2 and MNDWI induces were calculated. The classification of these induces traditionally required experimental thresholds whose values varied depending on earth treatment components. Appropriately choosing the thresholds requires interference from an expert as it needed to be able to discriminate between water, non-water, and mixture features. Moreover, determining these values by dissimilar experts gave differing decision with high inter and intra observer variability. By employing SVM followed by relaxation labeling, easy decision on the values are required, rather it iteratively assigns classes'
probabilities based on non-linear discriminator and related gathering.

3.3 Canny edge detection

The Canny edge detector is an tool that uses a multi-stage algorithm to detect a wide range of edges in image .Canny also produced a computational theory of edge detection explaining why the technique works. Canny edge detection is a technique to extract helpful structural information from different visualization objects and considerably reduce the amount of data to be processed. It has been generally applied in various computer image systems. Canny has found that the requirements for the application of edge detection on various visualization systems are relatively similar.

Thus, an edge detection solution to address these requirements can be implemented in a wide range of situations .The Process of Canny edge detection algorithm can be broken down to 5 different steps:

1. Apply Gaussian clean to smooth the image in order to remove the noise
2. Detect the intensity gradients of the given image
3. Apply non-maximum control to get rid of false response to edge detection
4. Apply twice threshold to determine possible edges
5. path edge by hysteresis: Finalize the detection of edges by suppressing all the other edges that are fragile and not connected to tough edges.

Gaussian Filter

Since all edge detection results are easily affect by image blare it is important to filter out the noise to prevent false detection caused by noise. To soft the image, a Gaussian filter is applied with the image. This step will slightly smooth the image to reduce the property of clear noise on the edge detector.

3.4 Relaxation Labeling Process

preceding to iterative labelling, the process did require
the initial possibility values given to each pixel. In this situation, a probability with Gaussian density function, whose random variable obtained from SVM, is adopted as it most resemblances the connection between river and its induces. Although the have attractive qualities in terms of extracting water region, their main limitations are due to moderate-resolution.

3.5 Connected Component Process

Groups of river pixels classify from the before step served as an input to the associated part labeling. In this paper, connectivity was chosen. section having fewer pixel count than a prescribed threshold (depending on the size of water body of interest)

were discarded as well as those classified as non-river. The resulting image finally contained only delineate river.

4. Conclusion

A river boundaries extraction method on SAR images in mountain areas was proposed. The proposed method fulfilled the river extraction effectively through fusing vector maps of rivers contained in GIS information.
The difficulty to distinguish rivers from mountain shadows was occupied successfully. The proposed method has been applied to SAR images with different resolution with satisfactory results. Fusing vector.

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