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NOISE REDUCTION IN SATELLITE ULTRASOUND IMAGES USING HMM BASED SCHEME

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Abstract **-In this work, I am going to apply HMM technique on satellite images for denoising purpose. The fundamental key challenge for noise reduction is to reduce or eliminate the noise without any change in other aspects of the image. By denoising , it involves the manipulation of the image to produce a visually high quality image. There are many kinds of noise that affect on satellite images but we have selected only impulsive noise i.e. Gaussian noise and Salt & Pepper Noise. The sobel operator is very similar to Prewitt operator. It is also a derivate mask and is used for edge detection. sobel operator is also used to detect two kinds of edges in an image, Vertical direction and Horizontal direction. Hidden Markov model follows the transform called Reference transform. It provides the time-frequency representation.**

Keywords: **Image Processing, Edge Detection, Sobel Operator, satellite images.**

I.INTRODUCTION

Image processing is a method to perform some operations on an image, in order to get an enhanced image or to extract some useful information from it. It is a type of signal processing in which input is an image and output may be image or characteristics/features associated with that image. There are two types of methods used for image processing namely, analogue and digital image processing. Digital image processing techniques help in manipulation of the digital images by using computers. The three general phases that all types of data have to undergo while using digital technique , are pre-processing, enhancement, and display information extraction. Image processing is important in modern data storage and data transmission,
especially in progressive transmission of images, video coding (teleconferencing), digital libraries, and image database, remote sensing. It has to do with manipulation of images done by algorithm to produce desired images Reducing noise from the satellite image is a challenge for the researchers in digital image processing. Several approaches are there for noise reduction. Digital image processing is the most important technique used in remote sensing. Images obtained by satellites are useful in many environmental applications such as tracking of earth resources, geographical mapping, prediction of agricultural crops, urban growth, weather, flood and fire control etc. The Sobel operator performs a 2-D spatial gradient measurement on images. The Sobel edge detector uses a pair of 3 x 3 convolution masks, one estimating gradient in the x-direction and the other estimating gradient in y–direction. The Sobel detector is incredibly sensitive to noise in pictures, it effectively highlight them as edges. Hence, Sobel operator is recommended in massive data communication found in data transfer. Digital Signal Processing (DSP) improve the quality of images taken under extremely unfavorable conditions in several ways: brightness and contrast adjustment, edge detection, noise reduction, focus adjustment, motion blur reduction etc.

II. EXISTING SYSTEM

Images taken with both digital cameras and conventional film cameras or Satellite sensor will pick up noise from a variety of sources. In existing system despeckling algorithm for (SAR) images based on the concepts of nonlocal filtering and wavelet-domain shrinkage have been used. SAR images have been denoised using additive white Gaussian noise, but it modifies the major processing steps.

For random-field-based image segmentation, the conditional random field (CRF) model offers theoretic advantages over the generative Markov random field one, since it directly models the posterior distribution of label field conditioned on an

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observable image. In this paper, we propose an adaptive hybrid CRF (AHCRF) model for synthetic aperture radar (SAR) image segmentation. Based on the generation of super pixels and their boundary feature analysis, the proposed method adaptively divides SAR image into different parts, namely, homogeneous regions, heterogeneous regions, and edges. Compared with pixel-level CRF models, regional-level CRF methods mainly have the following advantages. Super pixels may contain pixels belonging to the same object, and thus provide more accurate local contextual information for feature extraction. Defining CRF on super pixels instead of single pixel can improve the computation efficiency, since the graph nodes in regional-level CRF decreases significantly than those in pixel-level CRF.

The parallel computer architecture and parallel programming environment vary a lot, it is difficult to give a unified measurement to evaluate the performances of different parallel algorithms. Generally, the execution time of the parallel program can be decomposed into CPU time, communication time, synchronization time and process idle time. Suppose that the number of processors in the cluster is P, T_S is the required time from the start to the end of the algorithm on serial computer, and T_P is the required time from the start of algorithm to the last processor accomplished on parallel computer. Then, the speedup S_P and efficiency E_P can be used for evaluation, they are defined as,

$$S_P = \frac{T_P}{T_S}$$

$$E_P = \frac{S_P}{P}.$$

The speedup measures how the execution speed of the parallel algorithm is faster than the serial one. The efficiency measures the utilization of single processor's computing power.

III.PROPOSED SYSTEM

The proposed system aims to eliminating noise in the satellite images using hidden markov model. The purpose of HMM is used to measure the Noise and other inaccuracies. It produce values that tend to be closer to the true values of the measurements and their calculated values. Remote sensing image is used to analyze the noise occurrence in particular area. By reducing the noise in the satellite image for producing the high quality images. In hidden markov model, the sobel filter is used for edge detection.

a) Sobel operator functionalities

The sobel operator is very similar to all the operator. It is also a derivative mask and is used for edge detection. Sobel operator is also used to detect two kinds of edges in the images :vertical direction and horizontal direction.

1) working of vertical mask:

By applying vertical mask on the image it prominent vertical edges. It works like as first order derivate and calculates the difference of pixel intensities in edge region. The center column is of zero so it does not include the original values of an image but rather it calculates the difference of right and left pixel values around that edge. Also the center values of both the first and third column is 2 and -2 respectively.

-1	0	1
-2	0	2
-1	0	1

There is only one difference that is it has "2" and "-2" values in center of first and third column. When applied on an image this mask will highlight the vertical edges. This give more weight age to the pixel values around the edge region. This increase the edge intensity and it become enhanced comparatively to the original image. Sample image for applying two masks as shown in figure 1.

(1)

Figure 1

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After applying vertical mask as shown in figure 2

Figure 2

2) working of horizontal mask:

By applying horizontal mask, it will prominent the horizontal edges in an image. It works on the principle of vertical mask and calculates difference among the pixel intensities of a particular edge. As the center row of mask is consist of zeros so it does not include the original values of edge in the image but rather it calculate the difference of above and below pixel intensities of the particular edge. Thus increasing the sudden change of intensities and making the edge more visible.

-1	-2	-1
0	0	0
1	2	1

This mask will find edges in horizontal direction and it is because that zeros column is in horizontal direction. When you will convolve this mask onto an image it would prominent horizontal edges in the image. The only difference between it is that it have 2 and -2 as a center element of first and third row.

After applying horizontal mask as shown in figure 3

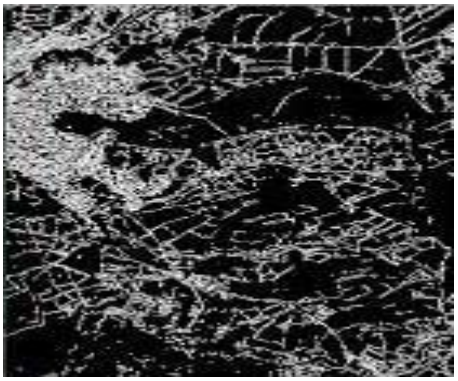

Figure 3

IV.PROPOSED SYSTEM ARCHITECTURE

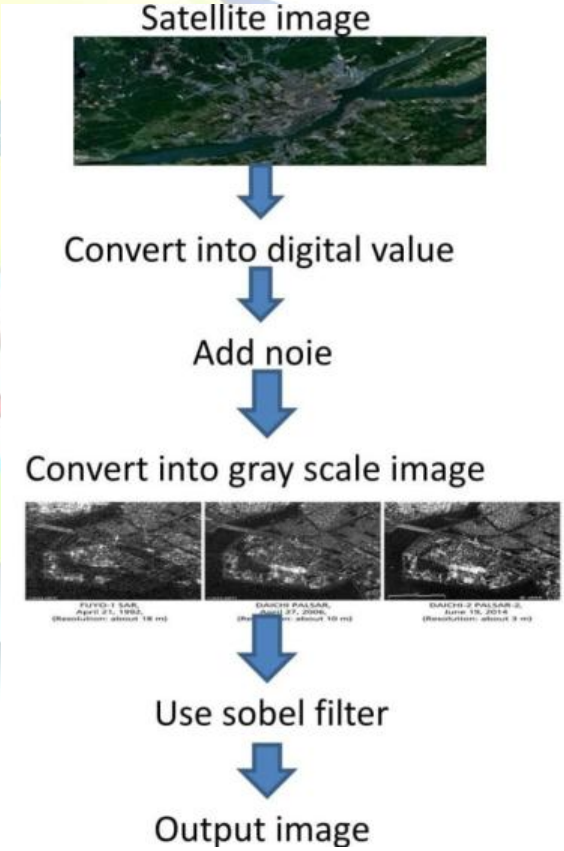

Figure 4

V.MODULES AND METHODOLOGY

In this work, there are five modules have been takes place. The sobel operator is used for edge

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detection in this technique.

1) Image to Pixel creation(digital value)

First, we have to create the database of all images which we are going to stores. These images are based on the common satellite images. we are storing images in database that where the mat lab folder is stored for future image retrieval. Then , to convert the image into pixel format i.e, digital value. Based on the digital value, the original image is converted into gray scale images . we have to choose any satellite image as our convenient. To do the saturation of our image to capture all its bright colors. Then convert into gray scale image to calculate the pixel value. In image to pixel creation we are going to convert that image into pixel format and each pixel of the image going to convert into gray scale value. Based on the grey scale value only the image was classified into separate categories

2) Adding noise

To add the noise in the original image, because it is difficult to find the noisy image in the browser. In this method, the original image is changed into blurred image.

3) Edge detection

In color co-occurrence feature category we are going to extract the RGB Based features of image and those RGB based features will varies for every image. The color distribution of the pixels in an image contains huge amount of information about the image contents. The attribute of an image can be acquired from the image color distribution by means of color co occurrence matrix. This matrix calculates the occurrence probability of a pixel along with its adjacent neighbors to construct the specific color information. This matrix also represents the spatial information of an image.

The sobel operator is used for edge detection. The techniques of sobel filter is mentioned earlier. By following this technique the edge should be detected for all the satellite images.

4) Bit pattern extraction

Bit Pattern Feature (BPF), characterizes the edges, shape, and image contents. The binary vector quantization produces a representative bit pattern codebook from a set of training bitmap images. The neighboring algorithm is used for bit pattern features extraction. Hidden markov model follows the bit pattern extraction.

5) Image retrieval

After completing all the modules, the original image is retrieved. The noise is fully removed by the use of sobel filter.

VI.CONCLUSION

This project helps to reduce the noise in the satellite images. Noise removal is a major problem in Remote sensing Images. The major advantages of this concept is that, the Overall quality of the noise removed images was high. It has very accurate processing rate. Peak signal to noise ratio was low. The future work is to improve the color quality by adding some extra feature.

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