IMAGE EDGE DETECTION USING WAVELET TRANSFORM

Nithin Jatoth

Indian Institute of Information Technology, Nagpur
Electronics and Communication Engineering Department

ABSTRACT

The image edge detection, wavelet transform provides facility to select the size of the image details that will be detected. Wavelets transform separates the lower frequencies and higher frequencies easily, which is prime important for edge detection. The wavelet scale sets the size of detected edges. For discrete wavelet transform, many signals are passed through wavelet filter for choice of the scale. For 2-D image, wavelet analysis is carried out in terms of horizontal and vertical function and edges are detected seperately.

HOW DOES IT WORK?

A wavelet has oscillating wave-like characteristics and its energy is concentrated in time over relatively small intervals.

- **Wavelet Families:** There are different forms of Wavelets, which include Haar Wavelet, Daubechies wavelet, Bi-orthogonal Wavelet, Coiflet Wavelet, Symlets Wavelet, Morlet Wavelet and Maxican Hat Wavelet.
- **Signal and Daubechies Wavelet Transform :** The Daubechies wavelets, based on the work of Ingrid Daubechies, are a family of orthogonal wavelets defining a discrete wavelet transform and characterized by a maximal number of vanishing moments for some given support. With each wavelet type of this class, there is a scaling function which generates an orthogonal multiresolution analysis. Transform coefficients are used for signal analysis, signal compression and segmentation.
- **Wavelet Decomposition :** Wavelet decomposes a signal into higher and lower frequencies using discrete wavelets band pass filters. These filters works on by passing low frequencies as well as high frequencies into the low pass and high pass filter.

BIBLIOGRAPHY

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INTRODUCTION

Edge detection process is considered as one of the fundamental and important operation in the field of image processing and computer vision. It involves image segmentation, where edge of the object is located for recognizing the target shape. Edges of the image can be detected and analyzed by using high pass and low pass output of the wavelet transform. The edge will be shown by the function passing through zero in low pass filter.

ALGORITHM

Two algorithms have been presented in this paper for image edge detection and image reconstruction.

Algorithm for Edge Detection to display the decomposed image:

- Take an image Pass it through low and high pass filter.
- Save the coefficients in workspace.
- Down sample it because the data has got doubled (discrete filters).
- Horizontal details contain horizontal edges, vertical details contain vertical edges and diagonal details contain diagonal edges.
- Display the decomposed image.

Algorithm for Reconstruction of Image to get an edge of an image:

- Take the approximation and detail of last level. In our case, it is three.
- Save them in an array and Add them to get new approximations and details.
- This is a first level reconstruction.
- Pass them through low and high pass filters.
- To get an edge of given image CA3=0 Thresholding to cater ghost edges.
- Display the edge detected image

FUTURE RESEARCH

A new proposed image fusion algorithm can be proposed based on region segmentation. The experimental results showed that the image fusion algorithm based on region segmentation can overcome the drawbacks of single segmentation rule and processing in specific part, and the effect is better than the traditional wavelet-based image fusion algorithm.

RESULTS

We have chosen an Original Image as shown in the image below.

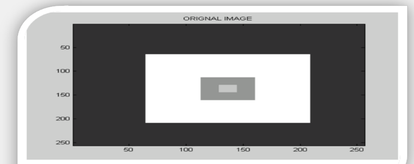

Fig. 1 Original image

We have converted the Original Image into Decomposed Image as shown in the image below.

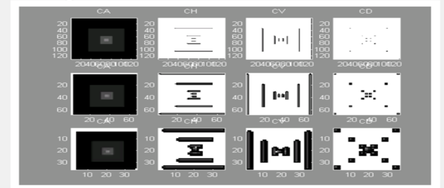

Fig.2 Decomposed Image

Finally, by reconstructing the Decomposed Image, We have we have obtained the edges of the Image as shown in the image below.

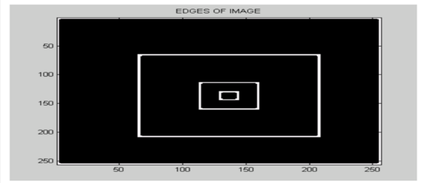

Fig. 3 Edges of the image

CONCLUSION

Edge detection and reconstruction scheme of simple images have been investigated using wavelet transform.Edge detection code written for this paper is quite flexible in sense that it works for any type of wavelet, for all images and of course for any decomposition level depending on the size of image.This research work is restricted only for manual thresholding and it is the limitation of this paper. This restriction can be removed with the automatic thresholding for a perfect code of edge detection.

CONTRIBUTORS

Dr. Tapan Jain	Instructor
Jatoth Nithin	BT20ECE071

bt20ece071@iiitn.ac.in