

# A Study of Edge Detection and Image Segmentation by Using Thresholding

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**Abstract:** In image processing edge detection is very essential part for studying purpose. Edge detection is a process that detects the presence and location of edges constituted by sharp changes in color intensity like brightness of an image. Edge detection of an image significantly reduces the amount of data and filters out useless information, while preserving the important structural elements. It is the useful part for the image segmentation. There are many traditional methods of edge detection by using edge detectors such as Sobel, prewitt, canny edge detectors. In this paper also study the various types of edge detection and types of edge detection in detail as well as how it works? The main purpose of this study is how to work image segmentation by using thresholding. And thresholding is a fundamental step of edge detection. Also segmentation methods can be divided into this 'Edge-based segmentation group'. Or thresholding is a best suitable segmentation method. So, we try to focus on the study of image segmentation by using thresholding in edge detection steps.

**Keywords:** Edge detection, image segmentation, image processing, computer vision, Thresholding.

## 1. INTRODUCTION

The edge detection is a fundamental tool in image processing machine vision and computer vision, particularly in the areas of feature detection and feature extraction. The edges of images are considered to be most important image attribute that provide valuable information for human image perception. The edge detection is a terminology in image processing particularly in the areas of feature extraction to refer to algorithms which aim at identifying points in a digital image at which the image brightness sharply. Edge detection plays a crucial role in much medical imaging application by anatomical structures. The threshold and edge detection method of image processing has been holden the important status in the image segmentation application because of its intuitive and the simplicity [1]. Edge detectors are local image processing methods designed to detect edge pixels. Image processing is a series to enhance, alter, or select regions of interest.

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Diagnoses of the disease are usually based on visual recognition of abnormal cells and tissues harvested from biopsies. Sometimes resonance imaging (MRI) system, computed tomography (CT) system, ultra sound system, X-ray system, positron emission tomography system and nuclear imaging (PET). Edge detection has applications in all areas of research such as medicine [6]. Image edge detection is an integral component of image processing to enhance the clarity of edges and the type of edges. The purpose of detecting sharp changes in images brightness is to capture important events and changes in properties of the world [7]. Edges characterize boundaries and edge detection is one of the most difficult tasks in image processing hence it is a problem of fundamental importance in image processing.

## 2. IMAGE SEGMENTATION

It is the process of partitioning an image into semantically interpretable regions. An image segmentation is the partition of an image into a set of nonoverlapping regions whose union is the entire image. The purpose of segmentation is to decompose the image into parts that are meaningful with respect to a particular application." Segmentation subdivides an image into its constituent or objects [2]. The level of detail to which the subdivision is carried depends on the problem being solved. Segmentation of nontrivial images is one of the most difficult tasks in image processing. The neurophysiologists' and psychologists' belief that figure and ground constituted one of the fundamental problems in vision was reflected in the attempts of workers in computer vision to implement a process called segmentation. The purpose of this process is very much like the idea of separating figure from ground. The fundamental problem in segmentation is to partitioning an image into regions that satisfy the preceding conditions [10]. Segmentation algorithms for monochrome images generally are based on one of two basic categories dealing with properties of intensity values i. e. discontinuity and similarity. In the first category, the assumptions in those boundaries of regions are sufficiently different from each other and from the background to allow boundary detection based on local discontinuities in intensity. Edge-based segmentation is the principal approach used in this category. Region-based segmentation approaches in the second

category are based on partitioning an image into regions that are similar according to a set of predefined criteria.

### 3. EDGE DETECTION

Edge detection methods are transforming original image into edge images benefits from the changes of grey tones in the image. The edges provide important visual information since they correspond to major physical, photometrical or geometrical variations in the scene object. Physical edges are produced by variation in the reflectance, illumination, orientation and depth of the scene surfaces [4]. Edge detection of an image reduces significantly the amount of data and filters out information that may be regarded as an image. It is a problem of fundamental importance in image analysis [3]. This explanation of an image is easy to incorporate into a large amount of object recognition algorithms used in computer vision along with other image processing application. The major property of the edge detection technique is its ability to extract the exact edge line with good orientation as well as more literature about edge detection has been available in the past three decades[2].

Four types of edge detection i.e. i) Step edge ii) Ramp edge iii) Ridge edge iv) Roof edge.

i) Step Edge: The image intensity abruptly changes from one value on one side of the discontinuity to a different value on the opposite side.

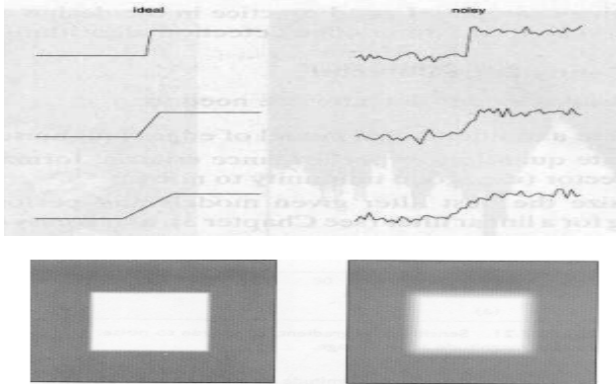


Figure1

ii) Ramp Edge: A step edge where the intensity change is not instantaneous but occur over a finite distance.

### 4. IMAGE SEGMENTATION BY USING THRESHOLDING

Thresholding is fundamental step of edge detection. Thresholding is very popular tool in image segmentation. Gray-level Thresholding is the simplest segmentation process. Many objects or image regions are characterized by constant reflectively or light absorption of

iii) Ridge Edge: The image intensity abruptly changes value but then return to the starting value within some short distance.

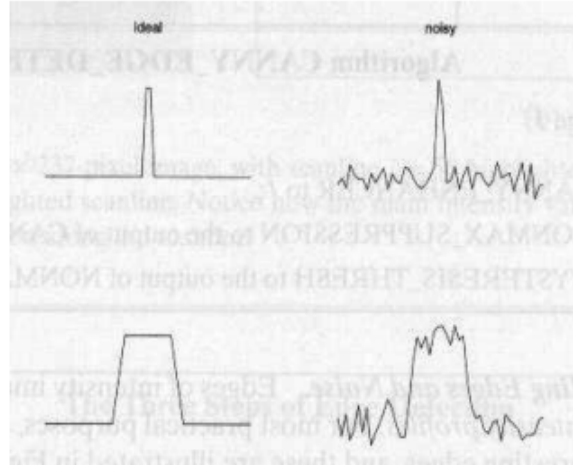


Figure2

iv) Roof Edge: A ridge edge where the intensity changes is not instantaneous but occur over a finite distance means it usually generated by the intersection of two surfaces.

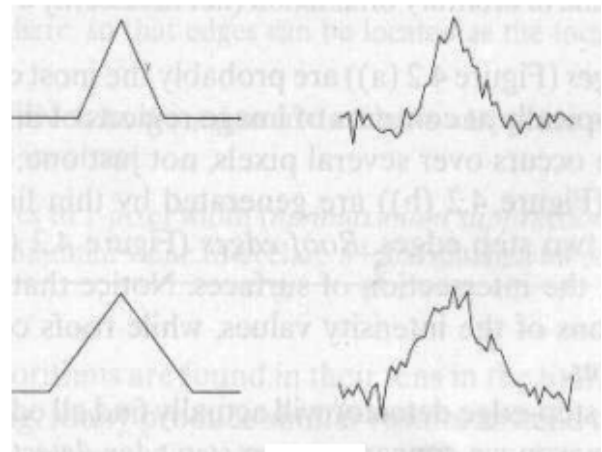


Figure3

their surfaces and a brightness constant or threshold can be determined to segment objects and background. But if the objects and background occupy different ranges of gray levels, we can “mark” the object pixels by a process called Thresholding. Thresholding is computationally inexpensive and fast and it is the oldest segmentation method or it still widely used in simple application. Thresholding can easily be done in real time using specialized hardware. The

threshold is set as the gray-level corresponding to the minimum probability between the maxima of two or more normal distributions, which result is minimum error segmentation [11].



Figure4: Original Image



Figure: Threshold Image

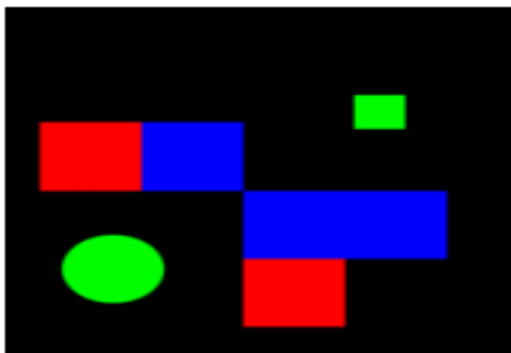


Figure5: Original Image

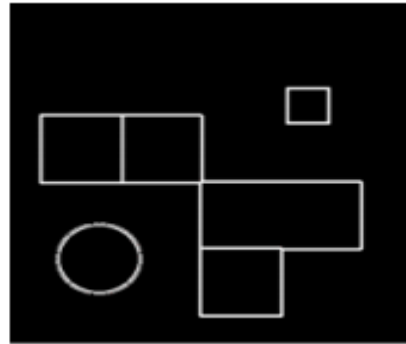


Figure: Threshold Image

## 5. CONCLUSION

Image segmentation is one of the most important steps leading to the analysis of processed image data and its main goal is to divide an image into parts that have a strong correlation with objects or areas of the real world contained in the image. There is a lot of work remaining so; if we will get more information about it then we want to need deeply study the image segmentation.

## 6. REFERENCE

- [1] Study and Analysis of Various Edge Detection Methods for X-Ray Images  
G. A. Kudale, M. D. Pawar
- [2] EDGE DETECTION TECHNIQUES FOR IMAGE SEGMENTATION  
Muthukrishnan.R and M.Radha
- [3] Edge Detectors in Image Processing J. S. Doha, Qatar
- [4] Unique Techniques for edge detection methods In digital Image Processing  
K. Sau, M. Pal, P. Karmaka
- [5] Edge Detection with Sub-pixel Accuracy Based on Approximation of Edge  
With Erf Function M. HAGARA, P.KULLA
- [6] Bipolar Incoherent Image Processing for Edge Detection of Medical Images  
B. Therese, Dr. S. Sundaravivelu
- [7] Morphological Edge Detection Algorithm Based on Multi-Structure Elements  
of Different Directions C.NagaRaju, S.NagaMani, G.rakesh Prasad,S.Sunitha.
- [8] Speckle Noise Removal and Edge Detection Using Mathematical Morphology  
A. Singhal, M. Singh
- [9] Image Steganography Using LSB and Edge – Detection Technique  
N.Jain, S.Meshram, S.Dubey
- [10] Image Segmentation Yu-Hsiang Wang
- [11] Edge Detection Techniques: Evaluations and Comparisons E. Nadernejad