# Chapter 79
# Detection and Segmentation of Medical Images Using Generic Algorithms

**Hardev Mukeshbhai Khandhar**
*Charotar University of Science and Technology, India*

**Chintan M. Bhatt**
*Charotar University of Science and Technology, India*

**Simon Fong**
*University of Macau, Macau*

## ABSTRACT

*Image processing plays an indispensable and significant role in the development of various fields like medical imaging, astronomy, GIS, disaster management, agriculture monitoring, and so on. Medical images which are recorded in digital forms are processed by high-end computers to extract whatever information we desire. In the fast-developing modern world of medical imaging diagnosis and prognosis, where manual photo interpretation is time-consuming, automatic object detection from devices like CT-Scans and MRIs has limited potential to generate the required results. This article addresses the process of identifying Region of Interests in cancer based medical images based on combination of Otsuâ€™s algorithm and Canny edge detection methods. The primary objective of this paper is to derive meaningful and potential information from medical image in different scenarios by applying the image segementation in combination with genetic algorithms in a robust manner to detect region of interest.*

## INTRODUCTION

In the modernized digital world, the term image processing is often referred to using various methods to process images. Precisely, the means of translation between any human visual system and the digital imaging devices is defined as image processing. Specifically, it indicates the application of algorithms

DOI: 10.4018/978-1-6684-7544-7.ch079

and mathematical operators for processing an image. We perform the method of image processing on an image for getting an enhanced intensified image as well as to extract useful information from it. Here, we consider the image as an input and output may be an image or certain characteristics and features associated with the image. More accurately, the task of converting an image into digital form followed by other mathematical operations in order to get some desirable reports is image processing and digital transformation.

Modern computers manipulate the digital images with digital processing techniques. To get over the flaws as well as to get originality of information, the image with deficiencies has to undergo various phases of processing. To improve the interpretability and perspective of information in images for human understanding, we require image enhancement and other automated image processing methodologies. The basic need of digital image processing is to enhance human interpretation by improved pictorial information and to make the process automated by a machine, which will further reduce human efforts and give results that are more accurate.

When information about an object or any phenomenon is acquired without making any kind of physical contact with that object is called remote sensing. An aircraft flying at high altitudes scans the earth to obtain the information about it, which becomes remote sensing. This process is done with the help of sensors that collect data. Data is collected in the form of images and the entire concept of remote sensing provides potentiality for analyzing, manipulating and visualizing these images. This is often integrated with Geographic Information System (GIS). By remote sensing, we attempt to "sense" certain characteristics of our earth. Special cameras are used to remotely sense an area by measuring its reflected and emitted radiations at a particular distance from the targeted area. The benefit of remote sensing enables repetitive coverage of an area in dynamic themes, which keep changing with time and allows easy collection of data over a variety of resolutions.

"The information of areas which are difficult-to-reach are obtained by medical images, and they provide huge volume of data and monitor events and areas without any interference. The new sensors/ high end medical equipment provide high resolution imagery with better quality. This has increased the potential for analysis tools to identify and extract linear features (Singh and Garg et al, 2013)". Being one among the exponentially growing technologies, image processing in remote sensing and medical images forms a core investigation field within the disciplines of engineering and computer science. Healthcare, Agriculture, forestry, hydrology, geology and land cover are areas of application of image processing. Automatic extraction of roads and objects through remote sensing is an active subject of research. The role of image processing is developing in areas such as surveillance, natural calamity prediction, disaster management, geographic information, precise healthcare systems etc. and to overcome the challenges of urban and sub-urban mapping and development. Ever since the exponential development in the world technology, automatic road detection has become an important part of photogrammetry.

The motivation for this research comes from farsightedness and the need for an enhanced technology in order to reduce the endless human efforts and make the outcomes more accurate and informative. The task of object detection would become a regular routine with varied outputs in case of a human being. The machine on the other hand can perform the same task for an infinite number of times and still give more informative and precise results. Object detection will also help to identify every minute feature from an image in various fields. Looking at the exponential growth of technology, this task will contribute towards investigation, quick analysis and decision making for a particular task.

Precise analysis of medical images such as the segmentation, the detection and the quantification of tumors and cancers are an important task for many clinical applications including medical content-