Chapter 4

Computed Tomography Brain Images Semantic Segmentation

Poonam Fauzdar
GLA University, India

Sarvesh Kumar
GLA University, India

ABSTRACT

In this paper we applied an approach for segmenting brain tumour regions in a computed tomography images by proposing a multi-level fuzzy technique with quantization and minimum computed Euclidean distance applied to morphologically divided skull part. Since the edges identified with closed contours and further improved by adding minimum Euclidean distance, that is why the numerous results that are analyzed are very assuring and algorithm poses following advantages like less cost, global analysis of image, reduced time, more specificity and positive predictive value.

INTRODUCTION

Image segmentation, a process to analyse the peculiarities and provide a strong basis for quantitative and qualitative comparison of human pathology images and functions. All pixels of same label in a image share same format related to visual characteristics, so image segmentation process is more or less assign these labels to pixels during analysis. The image partitioning into homogeneous regions based on a set of characteristics, are the key features are very advantageous for computer vision applications and image analysis for abnormalities. Clustering is one of the methods available for image segmentation along with others like threshold based, edge based, region based, watershed based, feature based, background based algorithms etc. for this purpose. Clustering is defined as process for classifying pixels of any type of images based on similarity according to gray-level intensity, edge intensity, feature vector table, pixel colour etc.

Still in today era medical image segmentation or clustering remains one of the major challenges for researchers (Zacki, Fauzi & Besar 2011). Numerous different concepts and theories are proposed and implemented for segmentation of images considering various application areas but unsatisfactory results
Computed Tomography Brain Images Semantic Segmentation

have been brushed during analysis of abnormalities in special cases of medical images during classification of affected areas by different existing algorithm. Similar data is considered as statistics for classification of fundamental information employed in such a way that correspondent regions are grouped together as compare to dissimilar data that differ due to unique features (Cheng, Cheng & Koschan, 2011). Applications areas that include digital figures processing, need accurate and commonly used techniques for clustering procedure which partition prominent regions from original image and distinguish borders of all objects present in whole image and its basis for search are indices of dissimilarity, similarity or outer regions from all data points or pixels. The real idea of segmentation algorithms is to simplify the illustration of an image into distinguished regions that move towards more accurate and précised information analysis (Subash & Thangavel, 2012).

However, the problem is that the performance of algorithm for image segmentation and analysis would be improved by modernization of any of already proposed set method classic velocity accuracy. This chapter includes a comprehensive survey of existing image segmentation algorithms and propose an approach to segment an affected eccentric tissues of medical brain images along with a process of segmentation for distinguishing any abnormalities such as blood draining, blood clots, ventricles misaligned, abnormal behaviour of cells of brain images on a standard database of computed tomography brain images “MINAC”. This chapter helps to understand the issues in existing algorithm like long execution time and low accuracy.

Background

Segmentation of cranial binary structures in CT images represent an important step in identification of significant regions that in turn provide indication for divergent behaviour from healthy medical images of human body. X-ray images, Bone scan images, Ultrasound images, Mammogram images, MRI images etc. are found to be less compatible for diagnosis by both patients and doctors. These scan images lacks accuracy because of many reasons like metal implants or scan taken when the patient is not able to remain motionless due to issues like body pain, health, age etc., so CT scan images are most preferred for diagnosis because CT images are taken under controlled environment many times and they show every angle of images for detecting abnormalities and they provide high probability of accuracy and good detection of spastic, classifications and drains. The real idea of segmentation algorithms is to simplify the illustration of an image into distinguished regions that move towards more accurate and précised information analysis. Mainly medical image segmentation is typically used to locate distinct objects and boundaries of abnormal behavior tissues in main images. In recent scenario, growing attention has been put on robust techniques like clustering, segmentation, classification in data and image analysis. The main application areas of specific recent pattern recognition are related to medical images, remote sensing etc. For example: One major application that include mining information, extract autonomous and useful patterns from large collection of content in data warehouses or data marts. It involves the use of sophisticated online analytical processing tools to discover previously unknown, valid recent patterns and relationships between them in large data usage sets. Data mining consists of unique process of recognizing patterns from already managed data, it also includes analysis, classification and rule prediction. The CT scan images are more comfortable than other scanning techniques of abnormalities classification and does not have any side effects on human body because it does scanning without using radiation. Basic fundamental behind this scanning is employed using theories of radio wave movement and magnetic fields. There are different types of algorithm were developed for brain tumour detection.