Parallel programming Application on Medical Image Processing: MRI contours matching algorithm based on GPU accelerated methods for Tumor differential Analysis

Michael Bidollahkhany [a]

[a] Graduate Student of Artificial intelligence and Robotics, K. N. Toosi University of Technology, Tehran, Iran
Michaelkhany@gmail.com

ABSTRACT

The goal of this paper is to investigate new methods of tumor progress study using machine vision, image processing and parallel programming techniques and proposing a solution to boost performance of magnetic resonance images differential detection that supports large scale medical image processing systems in determining the activity of tumors. After detection the tumor, we need to watch it out and log any activity and measuring rate of the tumor, growth, scattering, even decline and eliminating progresses. Following method can make it possible to compress the records of patient's MR or CT scan images and help physician and medics to scan every progress of tumor or even septicity's area, thus detect the result of efficiency of treatment. Now by use of parallel programming and using modern graphic processing units we're able to do this processing steps rapidly and apply this method on huge amounts of medical images, network based or by a personal computer.

Keywords: **Medical image processing, Parallel Algorithms, Information Retrieval, Edge detection, Tumor study;**

1. Introduction

Hitherto there were lots of drawbacks on processing those huge amounts of medical and non-medical records of patients, for example if a physician claims a list of patient's visual document contents (or Blob type contents in databases) which are related to specific defectiveness, the computer should process every contents in one thread and this was a big trouble time wasting method in large databases. Traditionally expensive dedicated hardware was used to achieve the desired rate of detection [1] or accuracy of information retrieval from image processing. With the advent of General Purpose GPU (GPGPU) and growing support for parallel programming language like CUDA, it has become possible to use GPU for such computational tasks [1], and now media information retrieval and image processing have their accuracy and acceleration in same time.

2. Advanced edge detection algorithms

Edge detection is the most fundamental and most frequent used technique for image segmentation.
Several edge models can be distinguished [2]:

- Step edge aka Ideal edge: Intensity transition over one pixel. These edges never occur in real images
- Ramp: The ramp is closer to the reality
- Roof edge: They arise e.g. in range images (pipes in front of a wall)
- Real edge: A step edge blurred with a Gaussian (models to image blurring from focusing limitations) is the closest model to reality

Figure 1 - The most common edge models (a) step or ideal edge, (b) ramp, (c) roof edge, and (d) the real edge