

**UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**FACULTY OF POSTGRADUATE STUDIES**

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Development of Brain Tumour Delineation Algorithm

**By**

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**A Thesis**

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## **Abstract**

In the field of medical image processing, detection of brain tumor from magnetic resonance image (MRI) brain scan has become one of the most active research. Detection of the tumor is the main objective of the system. Detection plays a critical role in biomedical imaging. In this research, MRI brain images are used for tumor detection process. This system includes test the brain image process, image filtering, segmentation, classification and delineation of the tumor area, the detailed procedures are implemented using MATLAB. The proposed method extracts the tumor region accurately from the MRI brain image. The experimental results indicate that the proposed method efficiently detected the tumor region from the brain image. And then, the equation of the tumor region in this system is effectively applied in any shape of the tumor region by using support vector machine.

# 1 Introduction

## 1.1 Preface

Our human system is made up of many organs; the brain is the first and foremost controller of it. Tumor is an excess cells growing in a controlled manner at the brain [1]; brain tumor is a very serious disease among children and adults, it is the most deadly and intractable diseases [2]; the location of the brain tumor and quickly spreading of the tumor make a critical problem in treatment [3]; Image of the brain tumor can be done by computer tomography (CT) scan, magnetic resonance image (MRI) scan, ultrasound...etc.

In this research, MRI scan is used to implement the system [4]; In the medical field, magnetic resonance image (MRI) is widely used [5]; MRI techniques is a noninvasive method and uses powerful magnet and radio waves to create the picture of the body. It is suited for examining soft tissues of the human body such as Ligament and tendon injury, spinal cord injury and brain tumors,...etc.[4] A brain tumor occurs when abnormal cells form within the brain and there are two main types of tumors, malignant or cancerous tumors and benign tumors. Cancerous tumors can be divided into primary tumors that start within the brain, and secondary tumors that have spread from somewhere also, known as brain metastasis tumors. [5] This article deals mainly with tumors that start within the brain. All types of brain tumors may produce symptoms that vary depending on the part of the brain involved. [6] These may include headaches, seizures, problem with vision, vomiting, and mental changes.[6][7] The headache is classically worse in the morning and goes away with vomiting.[5] More specific problems may include difficulty in walking, speaking and with sensation.[6][7] As the disease progresses unconsciousness may occur.[4]The cause of most brain tumors is unknown.[5] Risk factors that may occasionally be involved include a number of inherited conditions known as neurofibromatosis as well as exposure to the industrial chemical vinyl chloride, the Epstein-Barr virus, and ionizing radiation.[5][6][8] While

concern has been raised about mobile phone use, the evidence is not clear.[8] The most common types of primary tumors in adults are: meningioma (usually benign), and astrocytomas such as glioblastomas.[6] In children, the most common type is a malignant medulloblastoma .[8] Diagnosis is usually by medical examination along with computed tomography or magnetic resonance imaging.[5] This is then often confirmed by a biopsy. Based on the findings, the tumors are divided into different grades of severity. [6]The brain imaging analysis is main objective in the field of medical image analysis. Magnetic resonance (MR) imaging have many benefits over the medical imaging modalities such as a useful noninvasive technique for assisting in clinical diagnoses, the high level of contrast resolution, multispectral characteristics and ability to provide rich information about human soft tissue. MRI provides useful information in the field of surgery, radiotherapy treatment planning, stereotactic neurosurgery [9].

## **1.2 Project Objectives**

The project aims and objectives represented into two categories:

### **1.1.1 General objective:**

To identify the location, geometry and type of tumor based on segmentation and classification algorithms in order to achieve the following goals:

- ❖ Provide a simple training program to increase the Doctors knowledge on the tumor detection.
- ❖ Improve the Eye diagnosis and decrease the mistakes.
- ❖ Reduce time consumed for diagnosis.
- ❖ Provide high accuracy of detection and classification based on computerized method.

### **1.1.2 Specific objective**

To make a computer algorithm this can find the details of tumor and delineation the region of the tumor.

- ❖ Study and analysis the brain tumor.
- ❖ Study and analysis of brain tumor detection methods.
- ❖ Study and analysis of brain tumor delineation algorithms.

## 1.2 Problem statement

Eye detection and diagnosis is the traditional method in detecting brain tumor and classification of region is usually done on (MRI) image, this method based on tumor area and shape and here begins the problem

- ❖ Doctors vary in their knowledge.
- ❖ Eye diagnosis can lead to mistakes.
- ❖ Time consumed for diagnosis.
- ❖ Low Accuracy of detection and classification.

But the computer technique is used to solve the problem, reduce the time, and will give more accuracy for classification and detection.

## 1.3 Required Tools:

1. Image database (DICOM imaging).
2. MATLAB source (R2013a).
3. Windwos10 operating system.

## 1.5 Thesis layouts

This project thesis consist of five chapter, in chapter one, some overview including:

Introduction, objective and problems statement was included, while Chapter two represent the literature review and related works, in Chapter three the research methodology was included while Chapter four represents the results and discussion, in chapter five the conclusion and recommendation was included.