**Whole Tumor Segmentation from**

**MRI Images Of Brain**

Submitted in partial fulfillment of requirements

For the degree of

Bachelors in Electronics Engineering

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**Certificate**

This is to certify that the Dissertation entitled “Whole Tumor Segmentation from MRI Images of Brain (Image Segmentation)”is bona fide record of the dissertation work done by

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**Abstract:**

This report presents an overview in the area of Medical Image Processing with special emphasis

on image segmentation. In first section we have presented an introduction to the field of medical

image processing.

Literature survey on present techniques of medical image segmentation is done in further

sections. These methods of segmentation have been discussed in brief. Homogeneity in tumor

and brain regions makes it difficult for tumor segmentation. Testing of these algorithms on

different modalities of MR images T1, T2, T1C and FLAIR have different results.

Further a comparative study between three basic algorithms of segmentation (K Means, GMM

EM & FCM) is done These three algorithms follow a probabilistic approach to segment given

imag into desired number of classes based on intensity. Detailed explanations of the algorithms

and their step wise implementation in MATLAB on MR Images of brain have been explained.

The effect of these segmentation techniques on different modalities and their results have been

discussed in the report. The advantages and drawbacks of the respective algorithms have also

been mentioned.

Region Growing approach has been used to remove the segmented tumor and convert the image

into binary image for evaluation purpose. The evaluation parameters and tools used are Dice

coefficient and Jaccard index. The testing and results of the tests over different patients have

been put in tabular form in this report. Conclusions drawn from this project have been listed in

last section.

***Key words: Tumor, Images , Segmentation***

**(Rough Index)**

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**Chapter 1**

**Introduction**

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| ***Outline***  *This chapter presents a brief introduction about Image Segmentation and its applications. It also includes the motivation behind doing this project along with its many advantages which makes it easy and flexible to use. At the end of this chapter we have organization of the thesis which gives a glimpse of each chapter*. |

* 1. **Introduction**

The segmentation of brain tumor from magnetic resonance (MR) images is a vital process for

treatment planning, monitoring of therapy, examining efficacy of radiation and drug treatments,

and studying the differences of healthy subjects and subjects with tumor. The process of

automatically extracting tumors from MR images is challenging process.

Many algorithms in literature give us accurate segmentation up to 95% but for real time

applications this algorithms should be optimised to give 100% accurate results. Major

challengein tumor segmentation is that of the intensity homogeneity between the tumor and

other brain tissues.

The segmentation techniques work best on T1C and FLAIR modalities of MR images. This is

because the tumor appears brighter than the rest of the brain and it becomes easier to segment.

Most of the algorithms discussed in the report use intensity based segmentation and exploit the

difference in intensities between different brain tissues for the segmentation of tumor.

Recent algorithms have moved from intensity based segmentation to pattern based segmentation.

Multiple features are taken in to consideration thus giving much better and accurate results.

Support Vector Machine, Decision Forest, Random Forest, Neural Networks and CNN are some

of the state of the art techniques which are being applied to solve the problem of Segmentation.

* 1. **Motivation**

Tumor segmentation from MR Images is one of the most challenging tasks in the field of

medical image segmentation. The process of segmentation is done by doctors and specialists.

Due to human involvement, this process is extremely slow and tedious. Also the manual

segmentation output differs from person to person due to personal perspective.

The usual standard used for validating segmentation results of the automatic methods is the

manual segmentation results done by human experts.A compounding issue is that any manual

segmentation method suffers from lack of reliability and reproducibility.

Hence there’s need for standardised and automated segmentation process, giving accurate results.

* 1. **Scope**

The scope of this project is to fully automate the process of tumor segmentation and reduce the

human errors and intervention. The automation process can lead to higher accuracy and

optimum utilisation of time.

* 1. **Organization Of Report**

This report is organized into 7 chapters. The brief information of each chapter is described as below:

**Chapter 1** provides a brief introduction of Tumor Segmentation from MRI Images, its history and automated techniques used in the project.It also includes Motivation and Scope of Project.

**Chapter 2** is devoted to literature survey which includes the studies, researches and reading process that have been carried out. It also reviews the different methods of Segmentation algorithm and fundamental concepts used to complete the prototype system.