Automatic Brain Tumour Detection

[1]Shivani Palkar, [2]Kajal Bhoir, [3]Tanuja Sidankar, [4]Farheen Shaikh

[1,2,3]IT Students, [4]Assistant Professor
Bachelor of Engineering in Information Technology,
Pillai HOC College of Engineering and Technology, Rasayani, India

***Abstract*: Now-a-days with the use of medical field, the use of technology has increased too much. Automatic detection of brain tumor is a very difficult task. Due to variations in type, size, location and shape of tumors it is difficult to detect accurate result of the tumour without the help of technology. In this paper, first the dataset of MRI scan image is taken as input and it is preprocessed using median filter. After preprocessing of images, the detection and extraction of region like tumour identification and segmentation of brain tumour is done. The segmentation which further introduces two-step procedure technique; i.e. the HCSD (Hierarchical centroid shape descriptor) and K-mean clustering. The methods incorporates with some noise removal technique, skull removal, thresholding which are some basic concepts of image processing of brain tumour. Using MATLAB Software detection and extraction of tumour from MRI scan images of the brain is done.**

Index Terms: Brain tumour, MRI Image, Segmentation, HCSD, K- means clustering, MATLAB.

I. INTRODUCTION

Medical field makes use of the technology to recover the patient's life with the accurate and quick treatment without any side effects. The primary purpose of this paper is to develop an automated system that can accurately classify a tumour from abnormal tissues. In this paper, we put forward a hybrid framework that uses HCSD (Hierarchical centroid shape descriptor) and K-means clustering followed by threshold filter to detect the tumour objects in MRI scan images of brain. In this hybrid framework, Pre-processing of MRI images in which it contains median filter, is the primary step in image analysis which perform image enhancement and noise removal techniques which are used to enhance the image quality, and also it consists of skull removal technique. Segmentation technique is used for locating brain tumour. The main concept is to separate the region of tumour objects from other items of an MRI image by using K means clustering and Threshold filter. HCSD (Hierarchical centroid shape descriptor) is used to select only those with specific shape. Imaging is necessary in the field of medical science to visualize the structures of the Human body. The experimental results also verify that the proposed framework helps pathologists distinguish exact type, size, location and shape of the tumour and accordingly, it generates the report of the patient by using this system. In future the work will be extended to categorize the tissue as either Normal or Abnormal Tissue using a classification technique called as Support Vector Machine. Then the volume of the extracted tumor region will be calculated to analyze and detect its size.

Abbreviations and Acronyms

Hierarchical centroid shape descriptor (HCSD), Magnetic Resonance Imaging (MRI).

II. METHODOLOGY

In this proposed system we are implementing the system for brain tumour detection from MRI images, the malignant or beginning of tumor region we will find by this system. The complete system includes preprocessing of MRI by using Median filtering, Skull removing, Clustering, Thresholding, Segmentation, Performance measures. Magnetic Resonance (MR) allows to localize a brain tumour tissue and a mass of abnormal cells in a slice. This process automation is useful for experts for post processing and extraction of region in interest like tumour identification and segmentation. It further introduces a novel technique that uses two-step procedure; the HCSD (Hierarchical centroid shape descriptor) and K-mean clustering.

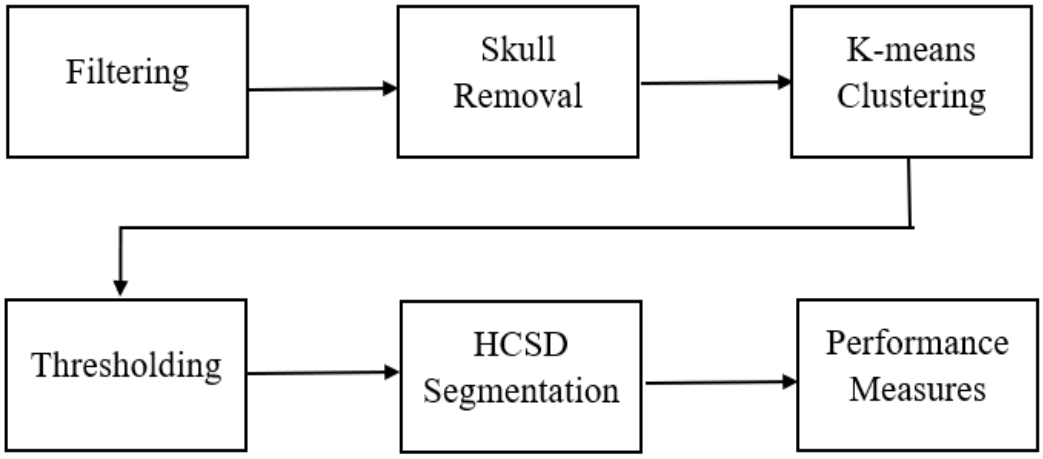
In these, detection of Brain Tumour, we follow six main steps. The steps are as follows-

1. Filtering
2. Skull Removing
3. K-means Clustering
4. Thresholding
5. HCSD Segmentation
6. Performance Analysis

Algorithms used in this system are-

1. K-means Clustering
2. HCSD (Hierarchical centroid shape descriptor)

System Architecture:



System Architecture

III. APPLICATIONS

The Magnetic Resonance Imaging (MRI) is widely used for the early detection of brain tumour images. The Magnetic Resonance Imaging (MRI) technique due to its superior resolution it is the finest than any other methods. To form complete images of the body parts and cells within the body, Magnetic Resonance Imaging (MRI) Scan utilizes strong radio waves and magnetic field. Manual segmentation of the abnormal tissue of the brain from the patients scanned images using MRI is generally tricky and takes lot of your time. That's why we are using Automated segmentation technique that is K-mean clustering and HCSD that give suitable results with less work for the manual operator. This system helps to detect brain tumour early and it is easy to use. The goal of this work is to supply an automatic tool which locates the tumor on MRI scanned image.

IV. CONCLUSION

In this paper, we introduced a two-step method for detection of brain tumour tissues. K-mean clustering and HCSD method were combined for perfectly identifying the shape and size of the tumour. In the first step, k-means groups the pixels of the image in k clusters, after that image is binaries by threshold value equal to k. In the remained binary structure tumour was found but with the healthy tissues surrounded to it. In the second stage it was discarded in order to detect the tissues belonging to the tumour only. The technique which was experimented have given the desired results which means the method is robust in detecting and adjoining the abnormal tissues in MRI rather than the inhomogeneity intensity or the complex shape of the brain tumour. This approach is vigorous to the shape change and do not require large dataset for the training purpose.

V. ACKNOWLEDGEMENT

We remain immensely obliged to Prof. Farheen Shaikh for providing us with the moral and technical support and guiding us. We would also like to thank our guide for providing us with her expert opinion and valuable suggestions at every stage of the project. We would like to thank Mr. J.E. Nalavade, Head of Information Technology for his motivation and valuable support. This acknowledgment is incomplete without thanking teaching and non-teaching staff of the department of their kind support. We would also like to thank Dr. Madhumita Chatterjee, Principal of Pillai HOC College of Engineering and Technology, Rasayani for providing the infrastructure and resources required for the project.

REFERENCES

1]Identification and classification of brain tumor MRI images with feature extraction using DWT and probabilistic neural network, N. Varuna Shree & T. N. R. Kumar, Department of CS&E, MSRIT, Bangalore, India, 2018.
2]Detection and analysis of brain tumor from MRI by Integrated Thresholding and Morphological Process with Histogram based method, Md. Rezwanul Islam, Md. Reezbhan Imteaz & Marium-E-Jannat, Dept. of Computer Science and Engineering Sylhet, Bangladesh, 2018 IEEE.
3]Implementation of Image Processing for Detection of Brain Tumors, Miss. Shrutika Santosh Hunnur, Prof. Akshata Raut & Prof. Swati Kulkarni, Department of EXTC, MGM's College of Engineering and Technology, Navi Mumbai, India, 2017 IEEE.
4]Brain tumor detection and segmentation using conditional random field, Prof. C.Hemasundara Rao, Prof. Dr. P.V. Naganjaneyulu & Prof. Dr.K.Satya Prasad, ECE department, 2017 IEEE.