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# Predicting Malignant Cancer Using Machine Learning

Sudhanshu Mukherjee[1], Vinil Harsh[2], Aniket Chikhale[3]
[1, 2, 3]*Department of Computer Science and Engineering, G.H. Raisoni Academy of Engineering and Technology, Maharashtra, India*

***Abstract: One of the primary concerns that is also a demanding issue within the realm of medical specialism is the detection and removal of tumours. Because visualisation approaches had the drawback of being adversarial, doctors relied heavily on MRI images to provide a superior result. Pre-processing, tumour segmentation, and tumour operations are the three stages in which tumour image processing takes place. Following the acquisition of the source image, the original image is converted to grayscale. Additionally, a noise removal filter and a median filter for quality development are provided, followed by an exploration stage that yields hits orgasmic identical images. Finally, the watershed algorithm is used to complete the segmentation. This proposed methodology is useful in automatically organising reports in a short amount of time, and exploration has resulted in the removal of many less tumour parameters.***
***Keywords: MRI Imaging, Segmentation, Watershed Algorithm.***

## I. INTRODUCTION

Recently, there's been a resurgence in interest in biological and physiological image analysis approaches in two main areas. The most vital is the advancement of visual data for human studies as well as the processing and storage of biological and physiological picture data. Occasionally, a biological picture is characterised as a two-dimensional function (x, y), where x and y represent the values at a certain position. is a limited resource. We should constantly remember that an image is represented when it is made up of a finite number of elements, each of which has a unique place and value. They presented the MRI results of individuals who were diagnosed with multiple sclerosis as children in the setting for an MRI image with a grey level. MRI pictures are taken throughout the year to diagnose and track the progression of a brain illness. Biomedical images are as diverse as the areas of the physical body. For example, to examine soft tissue within the physical body, we must use an MRI scan for soft tissue imaging such as the brain, liver, and other soft tissue. Those interested in researching hard tissue such as bone or cartilage, on the other hand, should use an X-ray instead of an MRI to obtain a tough tissue image. The differences within the biomedical image are not only in the area, but also in the processing method. To put it another way, processing an MRI image requires a different procedure than processing an X-ray image.

## II. METHODOLOGY

The research framework is being used to create a system that can detect CANCER utilising numeric data and reports from MRI patients. In the brain tumour module, the user will be given MRI reports of the patient as input, and the system will forecast if the patient is malignant or benign based on the symptoms of linked cancer.

The suggested system is a MATLAB-based programme with a user-friendly graphical user interface. The MRI scan must be scanned and saved as a soft copy in the image database by the medical practitioner. The user must continue the picture processing procedures by selecting options such as image enhancement, image segmentation, and so on. Following the successful detection of a tumour, information such as the tumor's size, area, and perimeter will be provided in the output field. The proposed technique yields promising outcomes in terms of competence, precision, and exactness.

### *A. Brain Tumor*

Brain cancer grows in an unusual way and can occur in any area of the brain. It's been difficult to figure out which part of the brain has cancer. The most difficult aspect of brain cancer treatment is distinguishing brain tumour cells from healthy brain tissue. Tumor occurs when brain tumour cells begin to split and rise abnormally. When discovered with analytic biological imaging techniques, it seems to be a solid lump. When cancer cells divide and duplicate themselves, they create a tumour, which is a collection of malignant cells. Tumors have a variety of symptoms, including pressing, crushing, and destroying non-cancerous cells on the outside. Primary brain tumours and metastatic brain tumours are the two forms of brain tumours. A brain tumour is defined as abnormal cell proliferation within the brain. Although certain tumours are cancerous or malignant, they must be diagnosed and treated as soon as possible.

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1) *Benign:* Tumors are harmless cells that get bigger gradually in the brain. It is usually constant at one place and does not transmit. Most of the benign brain cell removal procedures and make histogram similar to detection of tumors by MRI scans.
2) *Malignant:* A tumor is a cancerous cell that transmits to other zones of the brain. Most of the times tumors are secondary but it can be primary too.

Tumor happened when the cells were splitting and rising unusually. It's seemed to be solid when it recognized with analytic medical imaging methods. The actual reason of brain tumors is neither clear nor is actual symptoms known. Thus, people can suffer from it without getting known about this danger. When tumor extend in any part of brain then it is known as brain tumor. Now when brain tumor can recognize number of symptoms including seizure, mood changing, difficulty in walking and hearing, vision, and muscular movement etc.
The following technique can be used to capture the image of the tumor by CT scan, MRI.

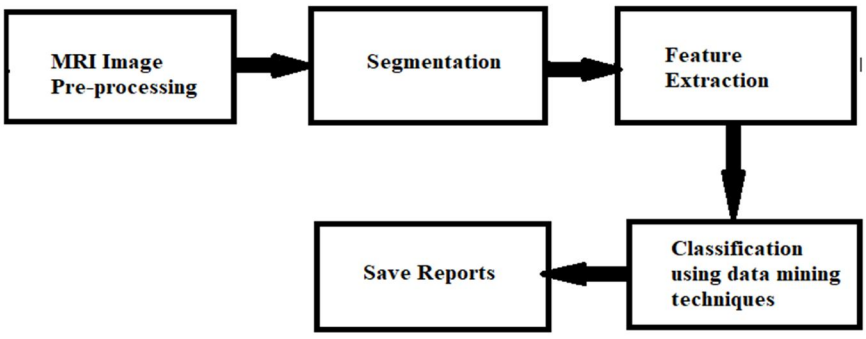


Fig 1 : Block Diagram of the system

a) *MRI:* It is a technique for imaging, it uses a magnetic field and radio waves to form images of the organs and tissues in the body.
b) *Image processing:* It is the manipulation of images using different algorithms. It uses software and provides clear images so that we can get proper conclusion. In our project the software used for image processing is MATLAB.
c) *Segmentation:* It is the method of dividing an image into multiple segments. It's used to identify items in photos all the time. We used the Fuzzy C-Means Algorithm and the Watershed Algorithm for this.

- Fuzzy C-Means Algorithm: It is a clustering algorithm in which each data item is a property of a cluster to a fraction of the extent that has previously been established, i.e. the items might belong to many groups.
- Watershed Algorithm: It is a grayscale image modification specified in image processing. It is mostly used in image processing for segmentation.

d) Feature Extraction: Feature Extraction is a process of amplitude reduction by which an underdone data is reduced for processing. It selects or combine variables into features, reduce data that must be processed.
At this step, the area of the highlighted tumor or the image provides the attribute values. Mean, Median, Standard Deviation, Smoothness, Variance and may more may fall under the attributes.

➢ *Standard Deviation*

$$\tilde{f}(x,y)=\sqrt{\frac{1}{mn-1}\sum_{(r,c)\in W}\left(g(r,c)-\frac{1}{mn-1}\sum_{(r,c)\in W}g(r,c)\right)^2}$$

➢ *Median*

$$\tilde{f}(x,y)=median\{g(r,c)\,|\,(r,c)\in W\}$$

e) *Classification:* This strategy is used to gather vital and relevant data in order to forecast and analyse it.

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*B. Applications*

The application's main objective is to detect cancer.

*1)* The primary motivation for the development of this application is to provide effective treatment as quickly as possible and to protect human life that is in risk.
*2)* This application is helpful to both doctors and patients.
*3)* The manual documentation is inefficient, slow, and inaccurate. This request is designed to overwhelm such issues.

## III. RESULT AND DISCUSSION

This suggested system uses a segmentation tool in MATLAB and GUI programming to identify brain tumours from MRI reports. Using MATLAB's "guide," we'll create additional image processing processes that run at the same time as picture segmentation. Image segmentation is aided by the use of MATLAB GUIDE (GUI), which makes it simple to personalise to all or any additional MRI image attributes.

The pre-processing of a specific picture is required initially, followed by segmentation, and finally, the morphological operation is performed on the chosen MRI image.

The following are crucial steps:

*1)* Excellent MRI picture of brain.
*2)* Change it into gray scale image.
*3)* Consider three other sub plots for MRI of patient's brain tumor alone and identified tumor.
*4)* Implement and run the program.
*5)* Final result will be a tumor region.

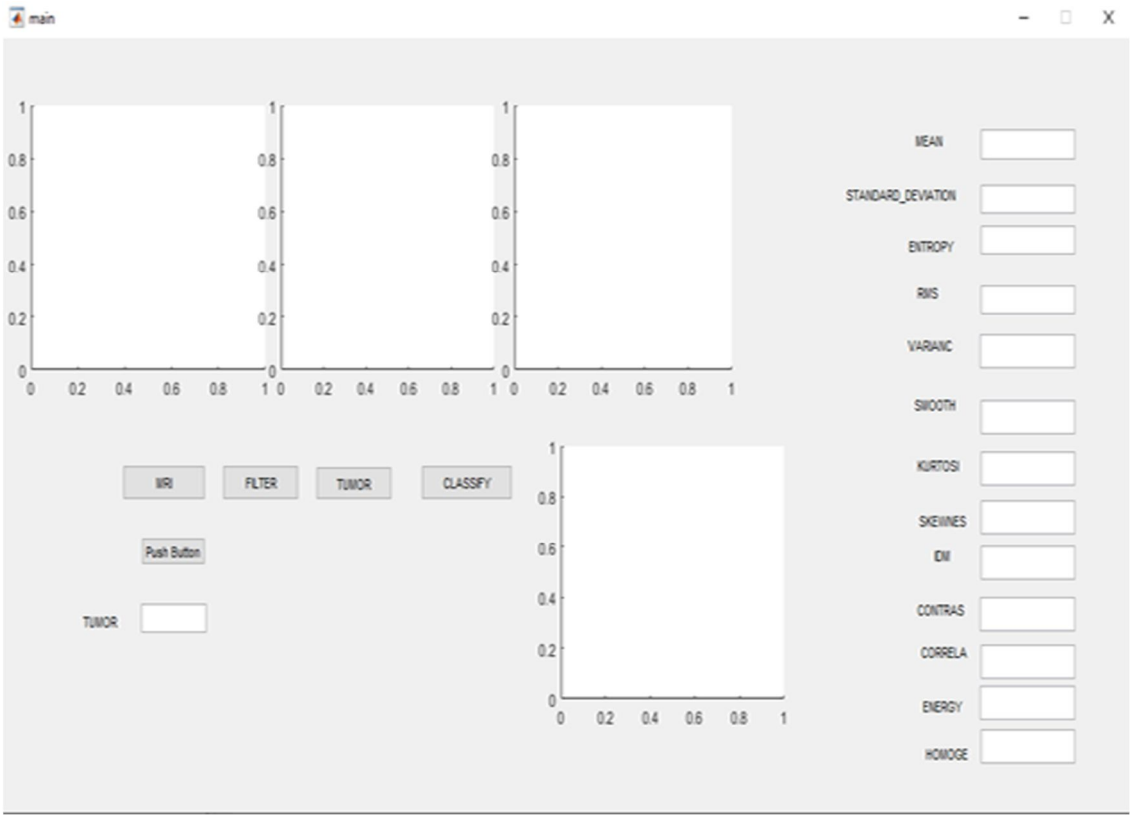


Fig 2: Working Dashboard

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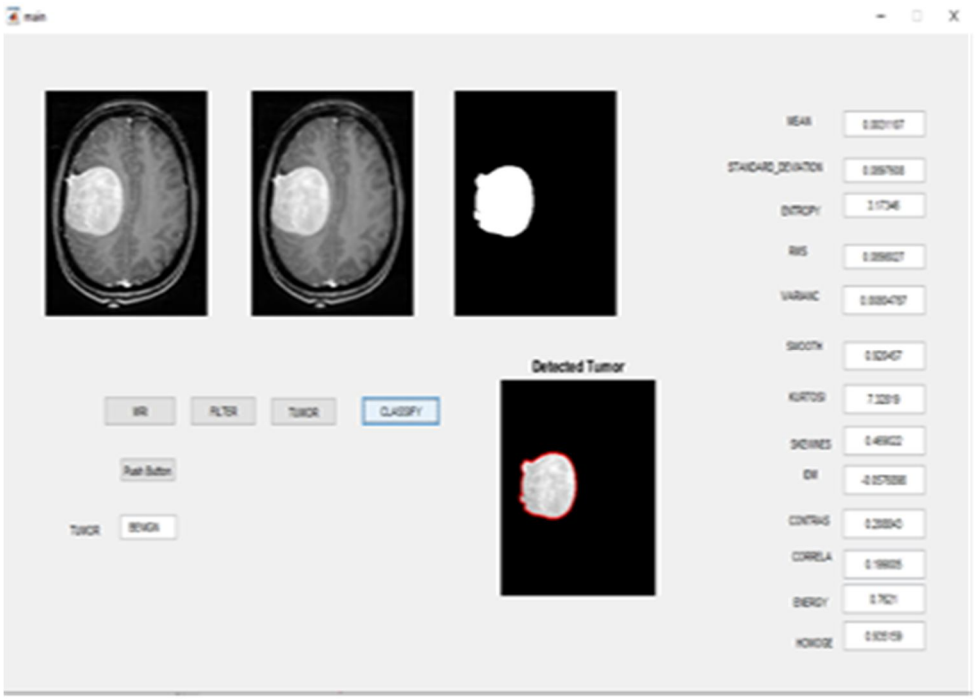


Fig 3: Dashboard after tumor detection

*a) MRI Button:* This option allows us to select an MRI image from our database.

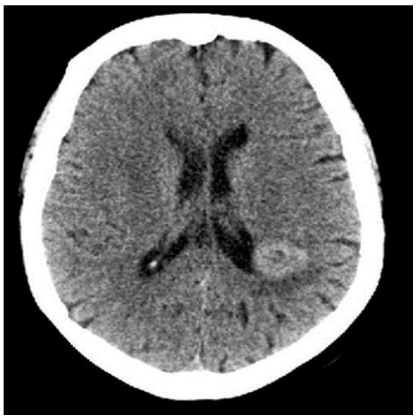

Fig 4: Original MRI images for brain tumor

*b) Filter Button:* This button can be used to clean up an image by removing noisy data.

*c) Tumor Button:* When we press this button, we only see the image of the tumour, i.e. the affected area, and the unaffected area is disregarded. The area that isn't affected turns black.

*d) Classify Button:* This button highlights the affected area, i.e. the tumour. We employ the Watershed Algorithm, segmentation, and contour of the picture to detect brain tumours from MRI scans.

## IV. FUTURE SCOPE

In the future, this software will be enhanced so that tumours can be classified according to their type. In addition, tumour growth is frequently confirmed by plotting a graph, which may be created by researching successive photographs of a tumor-affected patient. As we all know, when we apply different tests for tumour identification, we chose this. We may argue that in the future, because the system will be more advanced, this method should be utilised for brain tumour detection.

Recent work can be enhanced by looking at a large number of MRI images and using a variety of feature extraction approaches, as well as linking with another classification model to get more precise results.

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## V. CONCLUSION

The proposed work has been completed in accordance with all specifications. The system is incredibly extensible and user-friendly. The method eliminates human errors and minimises the amount of matter generated by the previously established manual system.We can extract tumours from various brain MRI reports in our database and determine whether or not they are affected by tumours with a zero mistake rate.

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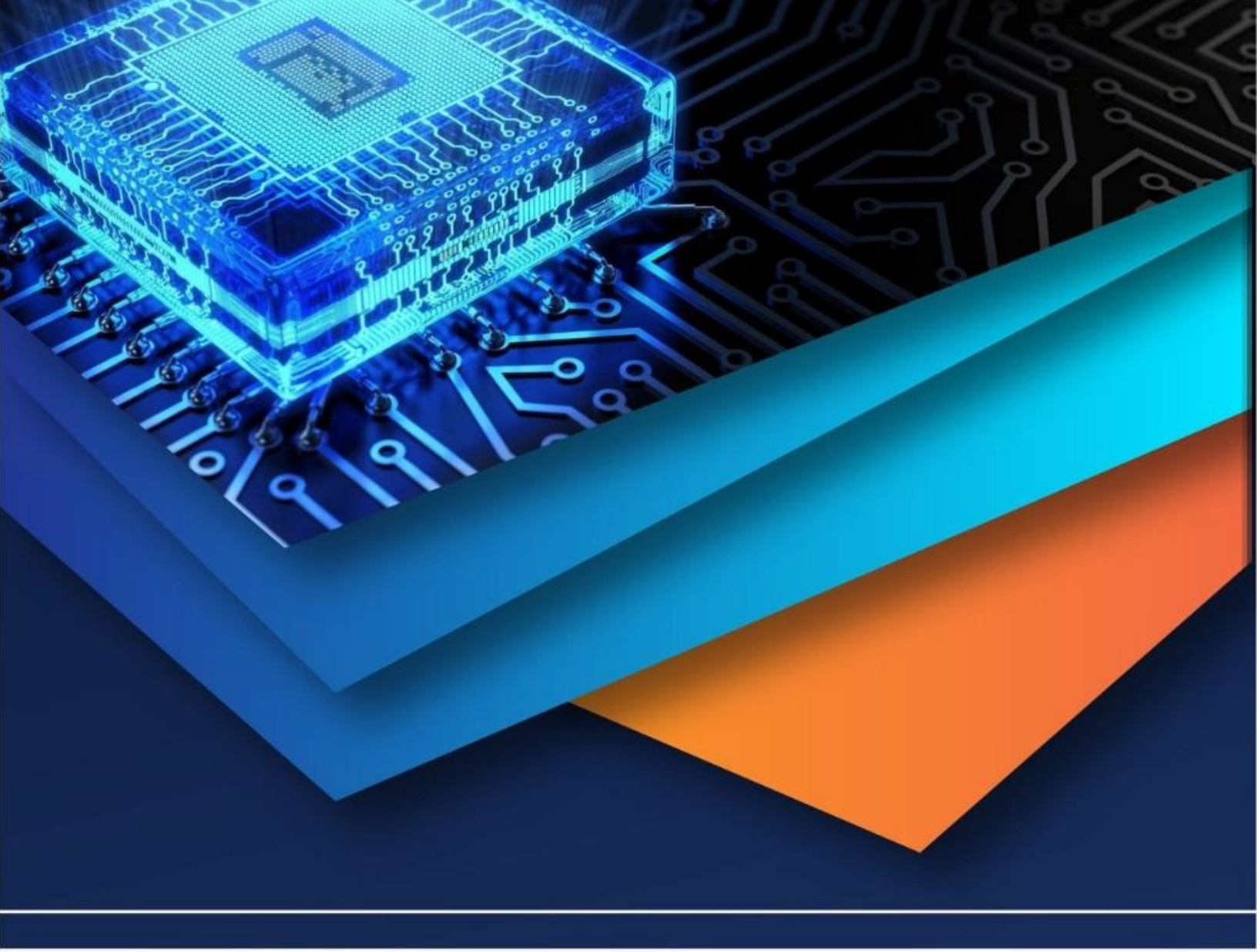

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