ISSN: 2096-3246
Volume 53, Issue 03, July, 2021

https://doi.org/10.5281/zenodo.12707102

MRI PICTURE OF A HUMAN BRAIN FOR AREA DETECTION FOR BRAIN TUMOR

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Keywords:
Brain tumour, magnetic resonance imaging (MRI), fuzzy clustering, colour mapping, and caney edge analysis.

ABSTRACT

It takes a lot of time and effort to identify, segment, and detect the affected region in a brain tumour. Magnetic resonance imaging (MRI) is a notion in image processing that allows one to see the various human body structures. Using standard imaging methods to detect aberrant brain regions is a huge challenge. Multiple imaging modalities are used in an MRI procedure to examine and record the brain's interior structure. This article focuses on a method for removing noise from medical photographs, and then how to improve them using a balance contrast enhancement technique (BCET) so that an accurate diagnosis may be made. The next step is to apply picture segmentation. The last step is to use the cunning edge detection approach to pick up on the subtle contours. To prove that the suggested method works, the results of the experiment showed that the area of the tumour and normal brain areas could be detected with approximately 98% accuracy in MRI pictures.

ISSN: 2096-3246
Volume 53, Issue 02, June, 2021
https://doi.org/10.5281/zenodo.12707102

Introduction

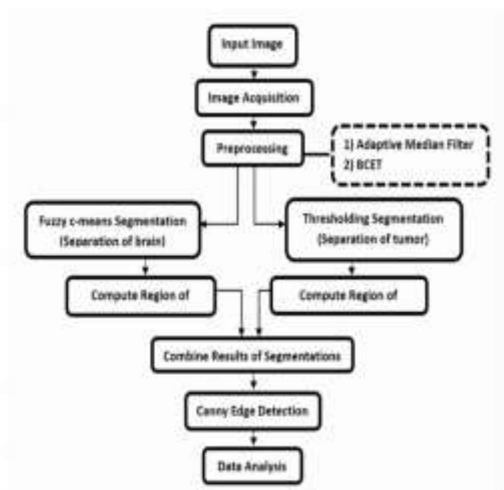
According to the National Cancer Institute (NCI), 22,070 new cases of brain and other critical nervous system (CNS) tumours might be reported in the United States in 2009. With an estimated 62,930 new cases of brain tumours detected in 2010, the American Brain Tumour Association (ABTA) provides more clarification on this data. A tumour in the brain is a collection of abnormal brain cells. Our brain-encasing cranium might be really stiff. Problems may arise from any boom inside such a restricted area. Tumours in the brain may be malignant or benign. The internal or skull strain might develop when tumours, whether malignant or not, continue to grow. Both mental and physical damage, even death, may result from this. These days, the majority of hospitals detect brain tumours using a technology similar to the one developed by the World Health Organisation (WHO). Brain tumours are ranked from most aggressive (malignant) to least aggressive (benign) by the World Health Organisation based on their cellular origin and cell behaviour.

RELATED WORK

A cluster of abnormal brain cells is known as a mental tumour. Most cancers, which are responsible for around 11% of all deaths worldwide, may also develop from tumours. Worldwide, the rate of new cases of cancer is rising at a frightening pace. As a result, early tumour diagnosis is crucial. Finding a way to isolate brain tumour cells from normal brain cells in magnetic resonance imaging (MRI) images while keeping the number of customisable parameters dependent on the input image to a minimal is a challenge that this work aims to address. In light of this, the researchers propose a suite of computational processes for picture teaching with the aim of facilitating further assessment by means of healthcare specialists. The most notable additions to this collection are the following: first-class picture enhancement; item of interest segmentation (brain tumours and brain locations in MRI images) with the creation of a side map.

1. IMPLEMENTATION

2. System Architecture



ISSN: 2096-3246
Volume 51, Issue 01, Jan, 2019
https://doi.org/10.5281/zenodo.12707102

Fig:-1 **System ArchitectureImage Acquisition**

In this system suggested approach the authors first believed that the MRI scan images as per the Following syntax

```
class Ui_ImageAcquisition(object):
    def __init__(self, Dialog):
        self.dialog = Dialog

    def browse_file(self):
        fileName, _ = QtWidgets.QFileDialog.getOpenFileName(None, "Select Photo")
        print(fileName)
        self.lineEdit.setText(fileName)

    def submit(self):
        try:
            image = self.lineEdit.text()
            if image == "" or image == "null":
                self.showMessageBox("Information", "Please Select Image")
            else:
                image = cv2.imread(image)  # READ THE INPUT IMAGE
                image = cv2.resize(image, (256, 256), interpolation=cv2.INTER_AREA)
                # print(image.shape)
                gray_image = cv2.cvtColor(image, cv2.COLOR_BGR2GRAY)
                print("Resize=",gray_image.shape)
                self.showMessageBox("Information", "Resize & Converted to Gray Color Image")
                cv2.imwrite('images/resize.jpg', image)
                cv2.imshow("GrayColor Image", gray_image)
                cv2.waitKey(0)
                self.dialog.hide()
```

Preprocessing

We suggested an adaptive median filter to remove noise from an image as preprocessing as following

```
class Ui_Preprocessing(object):

    def __init__(self, Dialog):
        self.dialog = Dialog

    def processimg(self):
        path="images/resize.jpg"
        self.lineEdit.setText(path)

    def AMF(self):
        try:
            gray_image = self.lineEdit.text()
            gray_image = cv2.imread(gray_image)
            gray_image = cv2.cvtColor(gray_image, cv2.COLOR_BGR2GRAY)
            image_amf = AdaptiveMedianFilter(gray_image)
            self.showMessageBox("Information", "Removed noisy data by AMF")
            cv2.imwrite('images/AMF.jpg', image_amf)
            cv2.imshow("Adaptive Median Filter", image_amf)
            cv2.waitKey(0)
        except Exception as e:
            print("Error=" + e.args[0])
            tb = sys.exc_info()[2]
            print(tb.tb_lineno)
```

FuzzyClustering

ISSN: 2096-3246
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https://doi.org/10.5281/zenodo.12707102

```
def FCM(image_AMF):
    list_img = []
    img = cv2.imread("images/"+str(image_AMF))
    #img = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)
    rgb_img = img.reshape((img.shape[0] * img.shape[1], 3))
    list_img.append(rgb_img)
    n_data = len(list_img)
    clusters = [2]

    # looping every images
    for index, rgb_img in enumerate(list_img):
        img = np.reshape(rgb_img, (256, 256, 3)).astype(np.uint8)
        shape = np.shape(img)

        # initialize graph
        #plt.figure(figsize=(20, 20))
        #plt.subplot(1, 4, 1)
        #plt.imshow(img)
        # looping every cluster
        print('Image ' + str(index + 1))
        for i, cluster in enumerate(clusters):
            # Fuzzy C Means
            new_time = time()
```

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Volume 51, Issue 01, Jan, 2019

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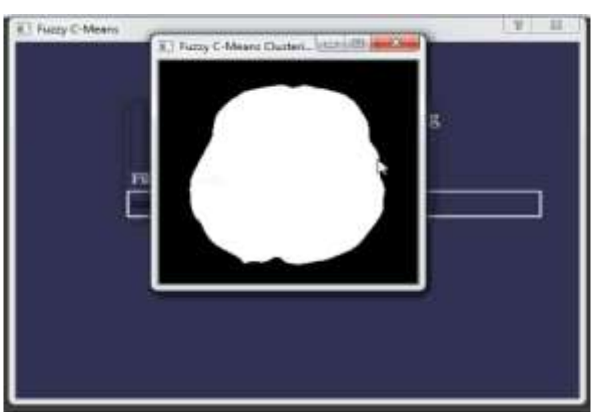
AdaptiveMedianFilter

```
def AdaptiveMedianFilter(grayimage):
    try:
        img_out = grayimage.copy()

        height = grayimage.shape[0]
        width = grayimage.shape[1]

        for i in np.arange(6, height - 5):
            for j in np.arange(6, width - 5):
                neighbors = []
                for k in np.arange(-6, 6):
                    for l in np.arange(-6, 6):
                        a = grayimage.item(i + k, j + l)
                        neighbors.append(a)
                neighbors.sort()
                median = neighbors[30]
                b = median
                img_out.itemset((i, j), b)

        cv2.imwrite('images/AMF.jpg', img_out.astype(np.uint8))
        #cv2.imshow('image', img_out)
        #cv2.waitKey(0)
        # cv2.destroyAllWindows()

    except Exception as e:
        print("Error=" + e.args[0])
        tb = sys.exc_info()[2]
        print(tb.tb_lineno)
    return img_out.astype(np.uint8)
```

3. EXPERIMENTAL RESULTS

In this paper the pre-processing degree playspicture filtering. The median clear out is used for image enhancement .It's far used to get rid of the noise in an photo .It is better than imply filter out ,weiner filter, Gaussian filter. Threshold is used to transform an depth photo. On applying morphological operation erode the image to get tumor element photo.

Fig:-5 Fuzzy C-Means Result



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https://doi.org/10.5281/zenodo.12707102
ISSN: 2096-3246
Volume 53, Issue 02, June, 2021

Fig:-2 Application Home Screen

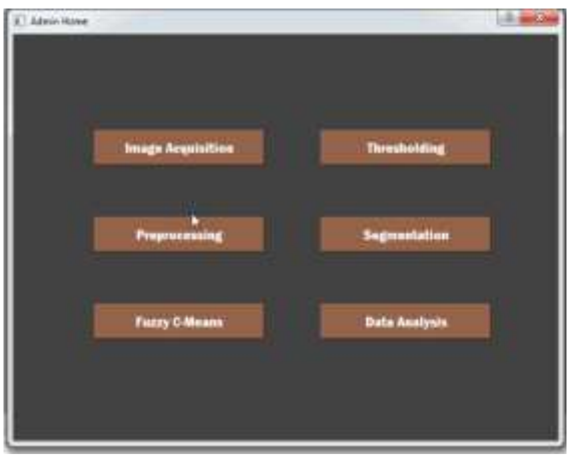

Fig:-3 Operation on MRI image

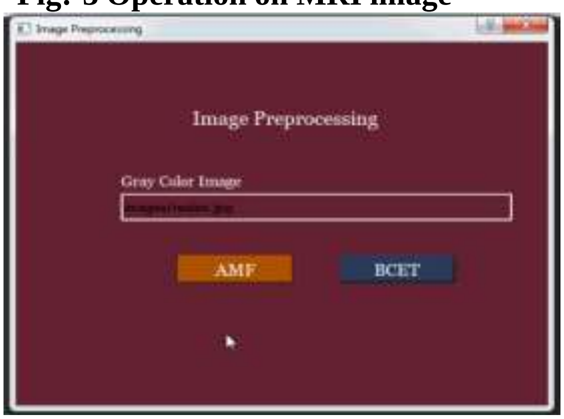

Fig:-4 Preprocessing

ISSN: 2096-3246
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https://doi.org/10.5281/zenodo.12707102

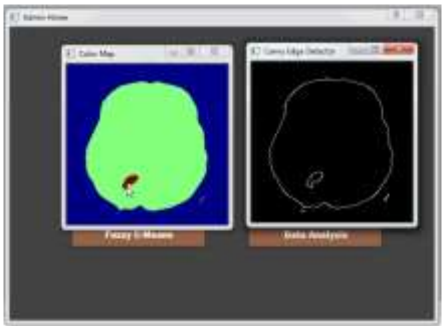

Fig:-5 Fuzzy C-Means Result

4. CONCLUSION

Using an MRI scan of the human brain, we may identify specific regions using this technique. We were able to acquire better outcomes by using our suggested method to segment MRI images using their histograms as input to the device. Following input, a procedure must be executed to verify all necessary outputs and get the one that generates images in the desired and correct arrangement. We use every kind of edge detector to segment every single MRI of a human brain. A review of work performance of various aspect detectors may be achieved by the use of two methods. To begin, there is the subjective method, which is based on human judgement. Secondly, this is called an objective approach, and it's based on signal-to-noise ratio values and suggests rectangle errors between the threshold detector picture and the original photo. With the help of the computerised era of threshold values and the fuzzy approach, edge detection is accomplished. The first organisations are calculated using the ok-method clustering algorithm while using the automated thrusholding approach. Next, a set of rules for fuzzy inference machines is used to establish a special threshold fee for each acquired group. The Caney aspect detector is then supplied with these thresholds.

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At the 2017 IEEE Conference on Emerging Devices and Smart Systems, Anoop Swathi presented a paper titled "Comparison of different image preprocessing methods used for Retinal Fundus images."
In their 2015 article "Image Processing techniques for Brain Tumour Detection: A Review," V. Y. Borole, S. S. Nimbhore, and S. S. Kawthekar discussed many methods for detecting brain tumours in the field of computer

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https://doi.org/10.5281/zenodo.12707102
ISSN: 2096-3246
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