

BRAIN TUMOR DETECTION BY USING COMPUTER VISION BASED ON MULTI-LEVEL IMAGE FILTERATION

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ABSTRACT. *MRI imaging assumes an essential part in brain tumor for conclusion, investigation and treatment arranging. Brain tumor identification is the procedure of the situating of tumor and size. It helps the specialist for decide the past strides of mind tumor. In this paper we utilize distinctive methods to obviously distinguish the tumor region from MRI picture. In our approach utilize two level of separating systems these altered half and half middle channel and middle filtering. as the clamor is evacuated we upgrade the picture quality by enhancing dim level of every pixel utilizing KNN mean calculation. The improved picture used to discover the limits of conceivable mind tumor with in pictures by identifying discontinuities in the shine. The picture division into conceivable tumor and non-tumor zones. and afterward sharp the both conceivable districts unmistakably envisioned the two regions in brain picture.*

Keywords: Brain tumor; MRI-image; Median filter; Morphological operator; SVM function; K-mean filtering.

1. Introduction. An assortment of essential tumors, gliomas are the most widely recognized sort of pituitary a denomas II and III meningioma last nerve sheath tumor. Brain tumors, which are likewise alluded to as non-harmful or threatening malignancies named amiable as he can, which is two vital factors first tumor size to distinguish a mind tumor and the tumor relies upon location[13]. Legend has fundamentally begun with the improvement of neoplasm, which relies upon the sort of tumor. Here and there as a rule is identified with threatening change of considerate neoplasm. Some other basic side effects of cerebral pain, eye optic circle, including behavioral disarranges, regurgitating and here and there changes in the skull's width [14]. The reason for mind tumor as world wellbeing association has proclaimed the utilization of PDAs, however there is no record of why. Such a chemotherapy, radiotherapy and surgery are the treatment of cerebrum tumors [15]. A therapeutic group is set up to evaluate the condition and treatment when patients are determined to have a mind tumor and distinctive medicines specialist's neoplasm compose and area.

In these cases, imaging assumes an imperative part in the treatment of mind tumors imaging is a strange way to deal with doctors or specialists existences of brain tumor[16]. The pictures which are acquired through these modalities are in a standard arrangement that is advanced imaging and correspondence for prescription (DICOM). This is a standard organization for all the restorative pictures. It was created by the national electronic makes affiliation. This standard configuration is predominantly utilized for putting away, printing and transmitting data in medicinal imaging. Amer AlBadarneh, Najadat and Ali M. Alraziqi et al, 2012] show the method for brain tumor classification of MRI images. applied Neural Network and K-NN algorithm and achieve 100% accuracy through using K-NN 98.92% using NN. But we improved the Vipin Y work, 2015.

Previously lot of the researchers proposed many techniques, and algorithms for find brain tumor and other kinds of abnormality of human brain using MRI.[Manoj K kowar,2012] shows his paper two techniques histogram and artificial neural network is best for detection because that tell the exact size of tumor and best efficiency of tumor result.[Rajesh c pail]MRI image provide better results other than CT scan and DICOM images provide better result other non-medical images jpg, png, bmp. [vinay parameshwarsppa, 2014] paper show segmentation of brain tumor from MRI is important but more time require.and calculate the area of tumor height, width and this segmentation give more efficient result.

Human body is made up of several types of cells. Brain is an exceedingly particular and touchy organ of human body. patient was determined to have a mind tumor, it will be the start of a voyage that might want to begin anything why is naturally genuine and dangerous mind tumor no one behind him? Brain tumors are caused by strange arrangement of cells inside the brain. These cells are neurons or glial cells, astrocytes and ependymal cells, which can include[12].

In this paper KNN show the mean square value which is being used to define the tumor ratio in that specific portion of brain. MRI clearly show that portion but with the use of KNN it enables the feature to doctors to find out the present ratio of tumor and also able to have some knowledge of patient upcoming tumor. A Support Vector Machine (SVM) performs grouping by finding the hyper plane that augments the margin between the two classes. SVM satisfy that the value of tumor is accurate. The results which was given by KNN, those same result would be verified by SVM algorithm to make sure that tumor is really a tumor. By using SVM it give 3% of disparity from previous results of finding brain tumors which mean it will give $2.73e+1$ mean square ratio. Morphology is an expansive arrangement of picture handling operations that procedure pictures in view of shapes. The most essential morphological operations are dilation and erosion.. Widening adds pixels to the limits of items in a picture, while dilation evacuates pixels on question limits. The quantity of pixels included or expelled from the items in a picture relies upon the size and state of the organizing component used to process the picture.

So includes multilevel preprocessing techniques, contrast enhancement, edge detection is used smoothing it also include multiple level post processing segmentation and morphological, which will provides us better estimation regarding identification brain tumor. These pictures are taken and changed over into gray scale images for pre-handling which incorporate a portion of the imaging improvement systems and most recent on post preparing which incorporate morphological operation. Morphological operations here have the focal impact in the recognition of the tumor [17]. In image processing morphological operation are utilized for examining and division of various examples in a picture. In this way by utilizing this calculation we can portion the tumor and furthermore we can obviously watch the state of the tumors.

2. Proposed methodology. The proposed methodology involves 7 steps. Median filters, image enhancement, find boundaries, divide a digital image, erosion and dilation method, segmentation. These processing on brain image help by algorithm and program code will be written in mat lab multiple level post processing segmentation and morphological, which will provides us better estimation regarding identification brain tumor. These pictures are taken and changed over into gray scale images for pre-handling which incorporate a portion of the imaging improvement systems and most recent on post preparing which incorporate morphological operation. Morphological operations here have the focal impact in the recognition of the tumor [17,18,19,20]. In image processing morphological operation are utilized for examining and division of various examples in a picture [21]. In this way by utilizing this calculation we can portion the tumor and furthermore we can obviously watch the state of the tumors.

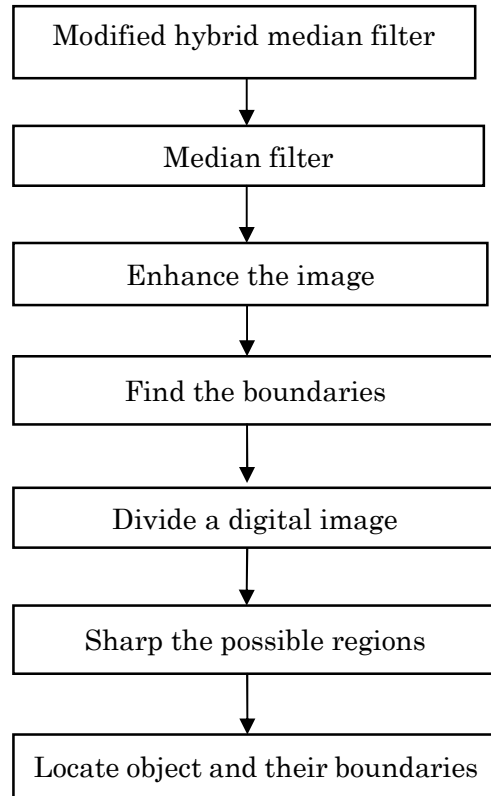


Figure-1.

3. Modified hybrid median filter. The entire document should be in Times New Roman or Times font. Type 3 fonts must not be used. This proposed channel is the adjusted rendition of the hybrid median filter clarified previously. It deals with the sub windows like half hybrid median filter . The maximum estimation of the 45o neighbors shaping a "X" and the middle estimation of the 90o neighbors framing a "+" are contrasted and the focal pixel and the middle estimation of that set is then spared as the new pixel esteem. Modified hybrid segmented filter used to remove the noise from the image and image quality is improved. Followings are the steps:

- I. Median filtering:** Middle filtering is a nonlinear filtering method, which is utilized to evacuate the 'speckle' commotion from a Ultrasound picture. It doles out to each pixel the median estimation of its neighborhood. The median is ascertained by first arranging all the pixel esteems from the encompassing neighborhood into numerical request and after that supplanting the pixel being considered with the center pixel esteem.
- II. Image enhancement:** A image enhancement system is to process a image with the goal that outcome is more reasonable than the first picture for a particular application.it is the procedure of contrast enhancement. We deliver a picture of higher complexity than the first by obscuring a specific level.enhancement anytime in a picture depend just on the gray level of every pixel to enhance the contrast. Than contrast enhancement improve the visualization of the MRI images.
- III. Find the boundaries:** It finding the boundaries of object within image. We make basic sketch like work by detecting discontinuities in brightness. Using svm function that's clearly identified the edges and extract data in computer vision.
- IV. Divide a digital image:** Divide a digital image into two parts possible area's tumor area and non-tumor area. Effective way of portioning an image into a foreground and background. This technique is a type of image segmentation that's isolate Tumor portion image into binary stated numbers. SVM algorithm clearly separate the tumor and non-tumor area.

- V. **Sharp the both possible regions:** After that we will sharp the both conceivable district tumor and non-tumor region. Morphological operation utilized an image processing apparatuses for honing the districts. The erosion and dilation methods are used.
- VI. **Locate object and their boundaries:** After sharpness we attempt to find question and their limits in picture. We will doling out a same mark to each pixel have particular visual attributes. Partitioning a computerized picture into multiple segments. Segmentation process separates data from complex medicinal picture.
- VII. **Data collection:** The data used in this study were obtained from patient hospitalized in different hospitals and were observed 11 trained data sets and 17 untrained datasets that are stored in database. one of the image is taken from the database and subjected to tumor detection. There are two types of brain images benign and malignant 12 benign images and 11 malignant images. We process both types of images and show there results.

4. Experimental design:

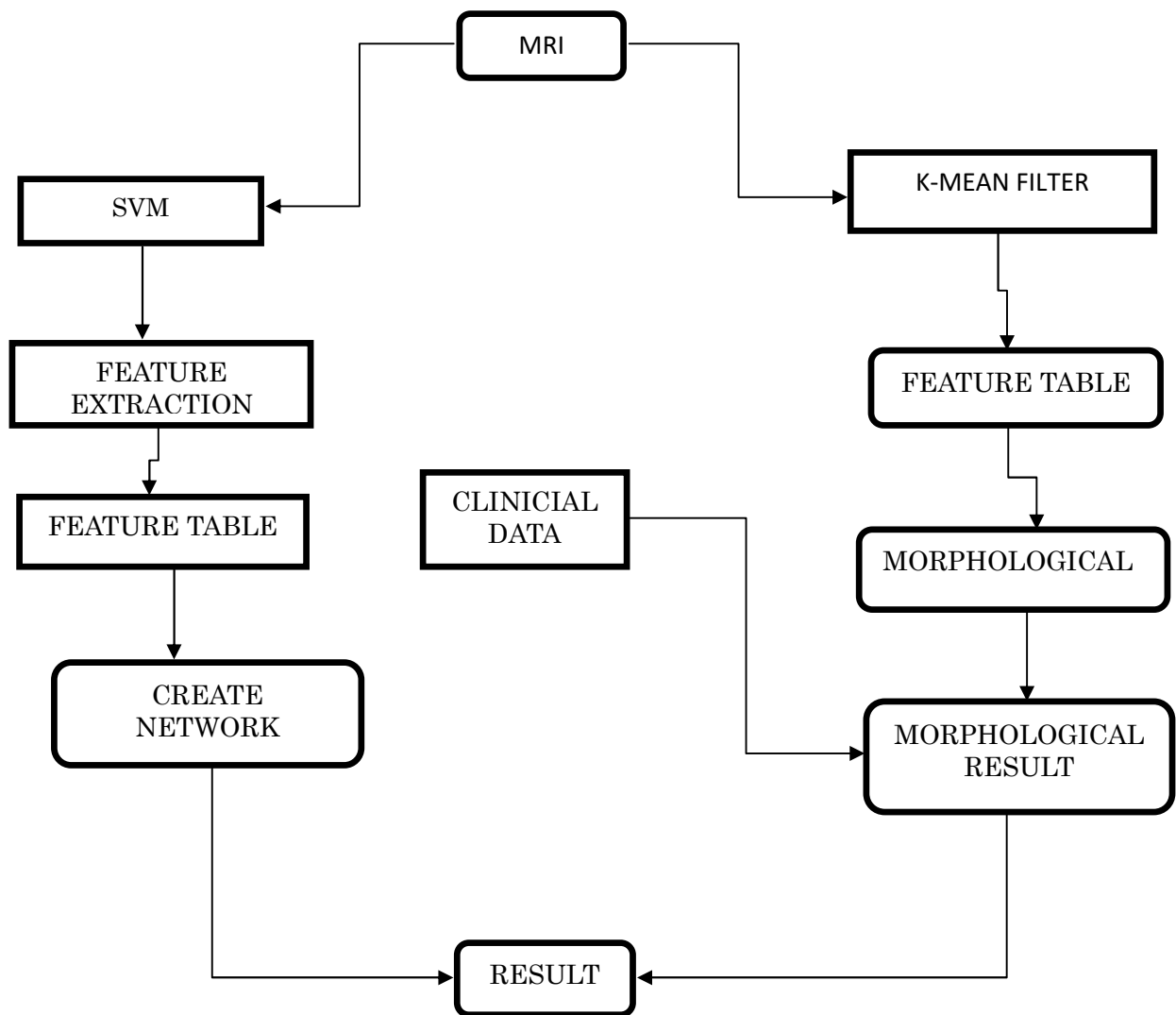


Figure-2.

5. Implementation.

- i. **Load the MRI image:** In the first step of implementation. Load the original MRI image from the database that is the original image from which the tumor has to be detected using Matlab.

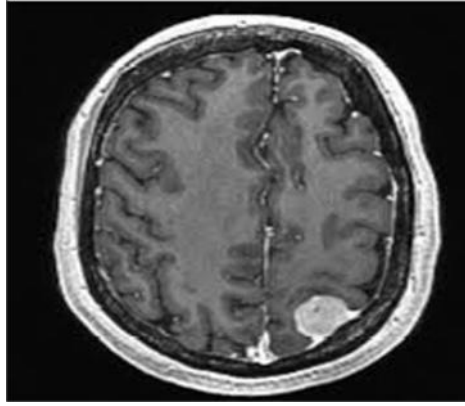


Figure-3: Brain MRI image.

- ii. **Image enhancement:** In the 2nd step we remove the noise Applying two filter and due to image enhancement increase and clearly visualize brain tumor image because original image contain noise which has to be removed and the image quality enhance.



Figure-4: Enhance MRI image¹



Figure-5: Enhance MRI image²

- iii. **Separate the tumor and non-tumor area:**

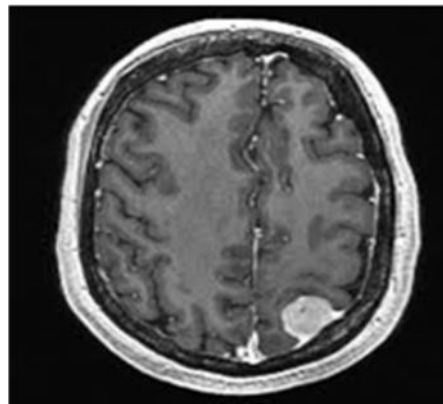


Figure-6: Object in cluster¹

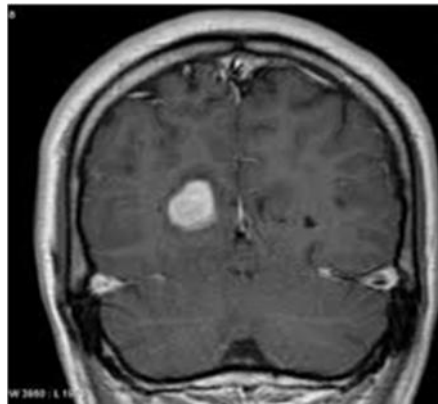


Figure-7: Object in cluster²

iv. Segmentation:

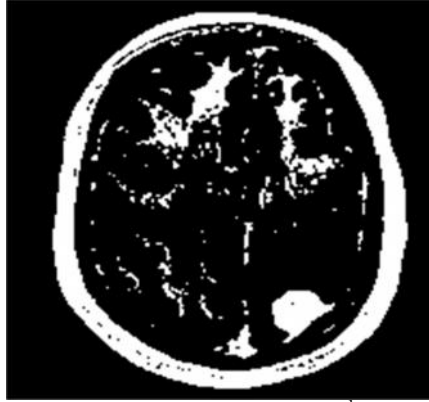


Figure-8: Segmented tumor¹



Figure-9: Segmented tumor²

6. Conclusion. MRI images is the best solution to fine the brain tumor. In this proposed system brain images to be a significant way to detect the brain tumor. Brain tumor is detected by using median filter and and segmentation method with the help of some morphological operators. The mortality rate of brain cancer is the most elevated among every single other kind of tumor; it can be recognized ahead of schedule by distinguishing the brain nodules. In this paper, picture pre-processing and image segmentation are executed to acquire the finding result. By utilizing these means, the nodules are identified and a few highlights are removed. The result of implementation has been show in the table a given below.

No.of patient	condition	Without ANN	With ANN SVM	With filters
37	Normal	8%	8%	2%
71	Mild	8.1%	9%	5%
11	Moderate	7%	7.5%	7%
9	severe	8%	8.1%	2%
Average		7%	8%	4%

The table 1 shows the result of the implementation of algorithmic solution and non-algorithmic results, as shown in the table, without neural network the accuracy is 6.9% but with neural network which had applied on dataset which is also available on physic.net is 7.7% more accurate, with the help of filtration result will be more elaborated which help doctors to find exact tumour which give 4% of accuracy This is done with the help of clinical data, mapped the values with clinical values and find out the accuracy rate. with the reference of Filters the result would be better and become better with the passage of time and it never requires that much significant value to check the disparity of results from previous and it will improve more.

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