IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319 5940

International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
Vol. 5, Issue 8, August 2016

Detection Algorithms in Medical Imaging

Priyanka Pareek[1], Pankaj Dalal[2]

M.Tech Scholar, Department of Computer Engineering[1]

Professor, Department of Computer Engineering[2]

Abstract: Image Processing is popular now a day in every field. The algorithms are keys of various activities in image processing. The medical science is one of the field using image processing called medical imaging. The medical imaging is one of the important tools for diagnosis of diseases inside of body especially delicate part like Brain. Researchers have worked over many algorithms for comparing images of body parts for diagnosis the diseases. Here we will review various algorithms proposed by researcher time in this area of medical imaging.

Keywords: brain disease affected area (Tumour), Region growing, MRI, segmentation, Texture analysis, Edge detection etc.

I. INTRODUCTION

This paper describes distinctive image processing techniques for distinguishing in MRI images. Brain disease affected area is one of the disease uses medical imaging. The Brain images are captured by MRI and other device also. This MRI images are compared. The image is having four segments to enhance the classification, performance and precision of recognizing the brain disease affected area. They are Pre-processing, segmentation, feature extraction and classification. Here we will review different image handling procedures, the discovering rate of the strategies and demonstrated the diverse exactness rate. Future examination lead towards enhancing the precision in identifying the tumor and growth can be analyzed. This paper demonstrates the MRI Image containing tumor which can likewise characterize the tumor sort.

II. STEPS INVOLVE IN DISEASE AFFECTED AREA DETECTION

A. Image Acquisition Stage: MRI examined Images are acquired and these two dimensional networks filtered images having pixels as its components.

B. Pre-Processing Stage: noise is expelled from the image, is enhanced in the way that better points of interest are improved. Most common techniques are: Text Removal, Noise Removal, Image Sharpening, and Image Enhancement.

C. Processing Stage: The segmentation operation is performed to extract the disease affected area portion from the MRI image.

D. Post-Processing Stage: For this purpose many methods of post processing can be used like Threshold Segmentation, Watershed Segmentation, and Morphological Operations.

E. Output Stage: At this stage we get the final result and find the disease affected object part in brain.

III. LITERATURE SURVEY

1. Brain tumour segmentation based on a hybrid clustering technique:

In 2015 Eman Abdel-Maksoud et. AL. introduced a proficient image segmentation approach using K-means clustering strategy composed with Fuzzy C-means calculation. In their proposed method level set division and threshold was used to give exact identification of brain disease affected area.

Their proposed strategy is the return of the K-means clustering for image segmentation in the parts of irrelevant count time. Additionally, the method can get ideal circumstances of the Fuzzy C-means in the parts of accuracy.

The execution of their proposed image segmentation strategy was tested by contrasting it and cutting edge segmentation technique for precision in respect care of time, and execution [1].

2. A Survey on Detecting Brain Tumour in MR images Using Image Processing Techniques:

In 2015 A.Sindhu et.Al. Introduced distinctive image preparing systems frameworks for perceiving Brain disease affected area in MRI image. They analysed Four sections in MRI image to upgrade the execution, arrangement and accuracy of recognizing the disease affected area.

These sections are Pre-processing, segmentation, feature extraction and characterization. They also present the outline of various images processing procedures amongst the present structures along with demonstrating the finding rate of the techniques and the distinctive accuracy rate.

Be that as it may, they can't recognize the variety in disease affected area in MRI which will give more powerful results [2].

DOI 10.17148/IJARCCE.2016.5804

IJARCCE
ISSN (Online) 2278-1021
ISSN (Print) 2319 5940
International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
Vol. 5, Issue 8, August 2016

3. Tumour Detection In Brain Using Morphological Image Processing:

In 2015 U.Vanitha et.Al Proposed morphological image processing to recognize the disease affected area from the brain either dangerous or non-threatening disease affected area. Their method is basically used to recognize the distinction in the tissues which have a greatly improved strategy when appeared in relation to computed tomography. So this makes this system an especially novel one for the brain disease affected area revelation and growth. They use the morphological operations like dilation; erosion and so on to extract the disease affected area from the MRI Image. They use the erosion (morphological calculation) to overlook the disease affected area out. Regardless, the issue arrives if the disease affected area is totally round then they failed to find the volume of that disease [3].

4. Brain Tumour Detection and Localization in Magnetic Resonance Imaging:

In 2014 Ed-Edily Mohd. Azhari et. Al proposed a customized brain disease affected area revelation and constrainment framework that can recognize and limit brain disease affected area in magnetic resonation imaging. The proposed brain disease affected area disclosure and impediment structure incorporates five phases: image securing, pre-processing, edge detection, modified histogram clustering and morphological operations. Before morphological operations, disease affected area appear as perfect white shading on unadulterated dim dark foundation.

They utilized 50 neuro image to enhance the framework and 100 out-of-test neuron image to test the framework. The preparatory results display how a straightforward machine learning classifier with a variety of basic picture based image can convey about high characterization exactness [4]. The elementary results similarly demonstrate the ability and expertise of their five-phase brain tumour discovery and restriction approach. But problem is there can't distinguish and localize a diversity of other types of tumours in medical imagery.

5. A New Approach to Image Segmentation for Brain Tumour detection using Pillar K-means Algorithm:

Aslam A. H. et al. in 2013 demonstrated another way to deal with image segmentation utilizing Pillar K- means method. This segmentation technique incorporates another mechanism for grouping the components of high resolution images keeping in mind the end goal to enhance exactness and diminish the computation time.

The framework utilizes K-means for image segmentation upgraded by the calculation after Pillar. The Pillar calculation considers the course of action of Pillars should be arranged as far from each other to restrict the weight dispersion of a rooftop, as same as the amount of centroids between the data allocation. This figuring can streamline the K-means clustering for image segmentation in the parts of exactness and computation time.
This figuring appropriates each and every early on centroid according to the most extreme aggregate separation metric. Their examination surveys the proposed approach for picture division by standing out from K-means grouping estimation and Gaussian mix model and the venture of RGB, HSV, HSL and CIELAB shading spaces. Exploratory results explain the suitability of their approach to upgrade the division quality and accuracy parts of figuring time. A plan of trials with four particular shading spaces with restricted variance and execution conducted[5]. The exploratory results exhibit that the proposed approach for image segmentation using utilizing Pillar K-Means estimation can upgrade the precision and enhance the way of image segmentation in each and every shading space. The computation time is similarly made speedier than K-implies and keeping up the way of results.

6. Segmentation based detection of Brain Tumour:

Saptalakar B.K. et al. in 2013 depicts the identification of the brain disease affected area by segmentation and extraction of the identified disease affected area by filling the tumour district with gaps. The proposed strategy can be proficiently connected to identify and separate the cerebrum tumour from MRI images gotten from patient's information base [6]. Segmentation is done using watershed algorithm whereas tumour detection is done by comparing both hemispheric part of the brain.

7. An Artificial Neural Network Approach for Brain Tumour Detection Using Digital Image Segmentation:

In 2013 Kamal Kant Hiran exhibited an Artificial Neural Network based method for Brain disease affected area Detection, which gave the edge outline and section of brain and brain tumour itself. Scientist plots broad lab work for artificial neural network based Brain disease affected area classification using MR image.

The present strategy identifies disease affected area range by obscuring the disease affected area partition and upgrades the image for distinguishing proof of other brain sicknesses in individual. The displayed work shows that the strategy can viably identify the brain disease affected area and in this way helps the pros for recognizing disease affected area size and region [7].

Their work gives improved data about mind disease affected area discovery and division. As conclusion disease affected area is a confounded and touchy errand; along these lines, exactness and unwavering quality are constantly appointed much significance. The checked zone is fragmented and the appraisal of this apparatus from the radiologist, whom the task is worried with, is certain and this instrument helps them in determination, the treatment method and condition of the disease affected area observing.

IJARCCE
ISSN (Online) 2278-1021
ISSN (Print) 2319 5940
International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
Vol. 5, Issue 8, August 2016

8. An Efficient Brain Tumour Detection Algorithm Using Watershed & Thresholding Based Segmentation:

In 2012 Anam Mustaqeem et. Al developed system of 3D division of a brain disease affected area by using segmentation as a piece of conjunction with morphological operations. This examination was coordinated to recognize brain disease affected area using helpful imaging frameworks. The standard procedure used was segmentation, which is done using a framework in light of edge division, watershed segmentation and morphological operations.

The proposed division methodology was attempted diverse things with MRI inspected picture of human brains: thus discovering disease affected area. Tests of human brains were taken, analysed using MRI process and after that were taken care of through segmentation systems in this way giving compelling choosing results.

This methodology gives capable results when appeared differently in relation to past explores. Tests are associated on different images and results were surprising. These proposed examination is anything but difficult to execute and in this way can be overseen effortlessly however troublesome shading based segmentation of 3D images [8].

9. Brain Tumour MRI Image Classification with Feature Selection and Extraction Using Linear Discriminate Analysis:

In 2012 V.P.Gladis Pushpa Rathi et.AL Proposed highlight choice based framework for distinguishing brain tumor. Their system unites the Texture, Intensity, shape based components and gatherings the disease affected area as white matter, Dark matter, CSF, unordinary and ordinary zone.

The examination has been performed on 140 disease affected area contained brain MR images from the Internet Brain Segmentation Storehouse. The proposed system use SVM for grouping. Here they use two phases for course of action one is SVM without nonstop training another is SVM with continuous training. The proposed framework has been finished over a greater database as appear differently in relation to any past work and is all the more effective and convincing.

PCA and Direct Discriminate Examination (LDA) were associated on the preparation sets. The Support Vector Machine (SVM) classifier served as a relationship of nonlinear systems versus linear ones [9]. PCA and LDA systems are used to decrease the amount of components used.
Their proposed framework is more profitable as it examinations the information as per gathering class variable and gives decreased list of features with high classification precision.

10. DmA Texture based Tumour detection and automatic Segmentation using Seeded Region Growing Method:

In 2011 Mukesh Kumar et.AL proposed a composition based examination to recognize variety from the standard in the brain and a automatic locale developing system to section the brain tumours. In their proposed system they are merging the two parameters to convey more exact results.

Furthermore in this framework there is no need to pick the seed point physically thus there is no need of human intervention. They acknowledge that the mind tumour has created in extensive size and their structure may be of any kind, for example, snakelike or round shaped etc.

This is area developing section framework for portion of brain tumour in MRI; in which it is possible to choose variety from the standard is accessible in the images or not [10].

11. An Improved Implementation of Brain Tumour Detection Using Segmentation Based Hierarchical Self Organizing Map:

In 2010 T. Logeswari and M. Karnan proposed a clustering based methodology utilizing a Self Organizing Map (SOM) calculation for image segmentation. The proposed segmentation system contains two phases.

In the main stage, the MRI brain picture is secured from patient database. In that film artifact and noise are emptied. In the second stage (MR) image segmentation is to conclusively see the premier tissue structures in these picture volumes.

A self-organizing map comprises of parts called nodes or neurons. Associated with each node is a weight vector of the same estimation as the input data vectors and a position in the map space. The standard arrangement of nodes is a regular spacing in a hexagonal or rectangular matrix.

The self-organizing map depicts a mapping from a higher dimensional input space to a lower dimensional map space. The technique for putting a vector from data space onto the map is to find the node with the closest weight vector to the vector consumed from data space and to allot the map coordinates of this node to the vector. Euclidean to all weight vectors is figured. The neuron with weight vector most like the input is known as the best matching unit (BMU) [11].
The weights of the BMU and neurons close it in the SOM cross section are adjusted towards the input vector. The degree of the change reduces with time and with division from the BMU. The Self-Organizing Map as a clustering tool gives a minimized representation of the data conveyance, has been generally connected in the perception of high-dimensional data.

IJARCCE
ISSN (Online) 2278-1021
ISSN (Print) 2319 5940
International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
Vol. 5, Issue 8, August 2016

TABLE I
ANALYSIS OF EXISTING METHODS.

S.No.	Author	Year	Image Preprocessing	Segmentation	Feature Extraction	Limitations
1	Eman Abdel-Maksoud et.AL.	2015	median filter	skull Removal	-	Not efficient to detect the abnormity part when it is light dense.
2	U.Vanitha et.Al	2015	Gray Scale Conversion & Contrast Adjustment	Erosion	Thresholding	Difficult to identify and detect the tumor object of having non-uniform shape.
3	Ed-Edily Mohd. Azhari et al	2014	median filter	Watershed segmentation	-	This approach is based on machine learning. Training for Detection of tumor using machine learning require more time to detect.
4	Harneet Kaur	2014	Decision based Median filter	object base segmentation	-	Time complexity is an issue compare to latest devised methods.
5	Aslam et al.	2013	color image change into gray scale	edge detection	-	Difficult to identify and detect the tumor of having non-uniform shape.
6	Kamal Kant Hiran	2013	High pass Filter	Watershed segmentation	Thresholding/high pass filter	Shape of detected volume is not accurate.
7	V.P.Gladis Pushpa Rathi	2012	Normalization	-	Intensity based Feature Extaction	Collecting a variety of tumor image and train classifier for detection and compare reference image with input image, all these steps are require more time and efforts.
8	Anam Mustaqeem et. Al	2012	Noise Removal/Gray Conversion	Watershed segmentation	Morphological operation	Shape of detected tumor is similar to original tumor but not exact to real one.
9	Pratibha Sharma	2012	Laplacian filter/gray conversion	Erosion/Watershed Segmentation	spatial filters	Shape of detected tumor is similar to original tumor but not exact to real one.
10	Mukesh Kumar	2011	Skull Remove/Texture Analysis	Morphological Operations	Region Growing Method	Result vary in different optical light condition. it means getting exact results from input MRI image is again a big task with this algorithm
11	T. Logeswari and M. Karnan	2010	Weighted Median filter	fuzzy based segmentation process	adaptive thresholding	Time complexity is an issue compare to latest devised methods.

The above table summarise all paper with respect to attributes and limitations.

VI. CONCLUSION & FUTURE SCOPE

Image processing is a vital field of research now days. Early stage identification of brain disease affected area can help a medical expert to start proper treatment of a patient. MRI is a way to get the internal structure of human body in the form of digital image. For early stage identification of brain disease affected area it requires segmenting disease affected areas and edema within images from different MR modalities. This paper gives enhanced information about brain disease affected area detection and segmentation. The marked area is segmented and the assessment of this tool from the radiologist, whom the project is concerned with, is positive and this tool helps them in diagnosis, the treatment procedure and state of the toumor monitoring. The methods studied in this paper have some limitations which have been discussed. Solution of this problem is a novel automated, fast, and approximate segmentation algorithm.

The input would be a patient study consisting of a set of MRI slices. The required output is a corresponding set of the slices that circumscribe the disease affected area with axis-parallel bounding boxes. The proposed approach should based on an unsupervised change detection method

IJARCCE
ISSN (Online) 2278-1021
ISSN (Print) 2319 5940
International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
Vol. 5, Issue 8, August 2016

that searches for the most dissimilar region between the left and the right halves of a brain in an axial view MR slice. This change detection process should uses a novel score function based on Bhattacharya coefficient computed with gray level intensity histograms.

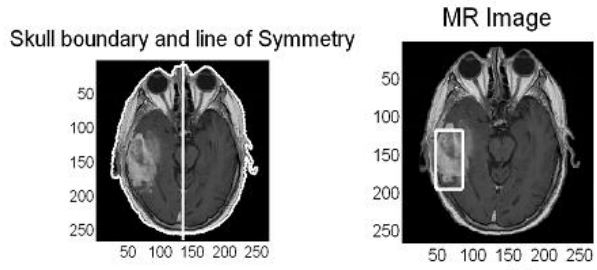

Fig I: MRI Scan Slice of a patient with detected brain disease affected area in rectangular box.

REFERENCES

[1] Eman Abdel-Maksoud, Mohammed Elmogy,Rashid Al-Awadi, Brain tumor segmentation based on a hybrid clustering technique, Egyptian Informatics Journal, Volume 16, Issue 1, pp. 71–81, 2015.
[2] A.Sindhu, S.Meera, A Survey on Detecting Brain Tumour in mri Images Using Image Processing Techniques, International Journal of Innovative Research in Computer and Communication Engineering, Vol. 3, Issue 1, 2015.
[3] U.Vanitha, P.Prabhu Deepak, N.Pon Nageswaran, Tumor Detection In Brain Using Morphological Image Processing, Journal of Applied Science and Engineering Methodologies, Vol. 1, No.1, pp. 131-136, 2015
[4] Ed-Edily Mohd. Azhari, Muhd. Mudzakkir Mohd. Hatta, Zaw Zaw Htike, Brain Tumor Detection And Localization In Magnetic Resonance Imaging, International Journal of Information Technology Convergence and Services, Vol.4, No.1, 2014
[5] Hakeem Aejaz Aslam, Tirumala Ramashri, Mohammed Imtiaz Ali Ahsan, A New Approach to Image Segmentation for Brain Tumor detection using Pillar K-means Algorithm, International Journal of Advanced Research in Computer and Communication Engineering, vol. 2, Issue 3, 2013.
[6] B.K.Saptalakar, Segmentation Based Detection Of Brain Tumor, International Journal of Computer and Electronics Research, Vol. 2, Issue 1, 2013
[7] Kamal Kant Hiran, Ruchi Doshi, An Artificial Neural Network Approach for Brain Tumor Detection Using Digital Image Segmentation, International Journal of Emerging Trends & Technology in Computer Science, Vol. 2, Issue 5, 2013.
[8] Anam Mustaqeem, An Efficient Brain Tumor Detection Algorithm Using Watershed & Thresholding Based Segmentation, I.J. Image, Graphics and Signal Processing, DOI: 10.5815/ijigsp.2012.10.05, 2012.
[9] V.P.Gladis Pushpa Rathi, Dr.S.Palani, Brain Tumor MRI Image Classification with feature Selection and Extraction using Linear Discriminant Analysis, IJARCSE, vol. 2 Issue 1, 2012.
[10] Mukesh Kumar, Kamal K.Mehta, A Texture based Tumor detection and automatic Segmentation using Seeded Region Growing Method, Int. J. Comp. Tech. Appl., Vol 2 (4), pp. 855-859, 2011.
[11] T. Logeswari and M. Karnan, An improved implementation of brain tumor detection using segmentation based on soft computing, Journal of Cancer Research and Experimental Oncology Vol. 2(1) pp. 006-014, 2010.