NOVATEUR PUBLICATIONS
International Journal of Research Publications in Engineering and Technology [IJRPET]
ISSN: 2454-7875
VOLUME 2, ISSUE 4, April -2016

A REVIEW OF COMPUTER AIDED DIAGNOSTIC SYSTEM FOR BRAIN TUMOUR DETECTION USING K-MEANS CLUSTERING

Urmila Ravindra Patil
Tatyasaheb Kore Institute of Engineering and Technology, Warananagar.
Prof. R. T. Patil
Assistant Professor Tatyasaheb Kore Institute of Engineering and Technology, Warananagar.

ABSTRACT:

The brain is the most important part of the central nervous system. The structure and function of the brain need to be studied non-invasively by researchers and medical practitioners using MRI imaging techniques. The body is formed by number of different types of cells. Each type of cell has special functions. When cells lose the ability to control their growth, they divide too often and without following any law. The extra cells form a mass of tissue called a tumour. MRI acts as an assistant diagnostic tool for the medical practitioners during disease diagnosis and treatment. This imaging modality produces images of soft tissues using MRI technique. The acquired medical images show the internal structure, but the medical practioners want to know more than peer images, such as emphasizing the abnormal tissue, quantifying its size, depicting its shape, and soon.

If such tasks are covered by the medical practioners themselves, it may be inaccurate, time consuming and burden them heavily. Segmentation is an vital process for extraction of suspicious region from complex medical images.

This increase time to reach the optimal solution in order to accelerate the segmentation process an application specific knowledge is used to initialize the centres of required clusters. There are no standard image segmentation techniques that can reliable results for all imaging applications like brain MRI, brain cancer diagnosis etc. An integrated k-means clustering algorithm with watershed and optimized k-means and c-mean clustering algorithm is used to overcome some segmentation problem. It will help to detect the brain tumour and thereby help the medical practioners for analyzing tumour size and region [1].

KEYWORDS: MRI segmentation, K-Means Clustering Algorithm, Watershed algorithm,

I. INTRODUCTION:

The tumour affected cells are found out by using K-means clustering algorithm using MATLAB simulator. Same process can be applied for brain cell without tumour [2].The searching time and area of tumour region were considered as comparison parameters for comparison of various methods. The C-means clustering produced good results and performed better than other optimized clustering methods. MRI images were segmented using k-means clustering and Watershed algorithm. The method is implemented using process of two stages. The first stage of the process uses k-means clustering and primary segmentation results are produced for the brain MRI images. Second stage of the process is applied as watershed segmentation algorithm to improve the results of the primary segmentation and the results obtained are final results.

The methods were compared in terms of area compares traditional k-means clustering method with watershed algorithm. The level of segmentation in optimized method is better than that of traditional K-means clustering algorithm. The comparison was done on the basis tumour region.

II. LITERATURE REVIEW:

1. **Kailash Sinha and G.R.Sinha, (2014):** presents a comparative study of three segmentation methods implemented for tumor detection. The methods includes k-means clustering with watershed segmentation algorithm, optimized k-means clustering with genetic algorithm and optimized c-means clustering with genetic algorithm. Traditional k-means algorithm is sensitive to the choice of initial cluster centers. Genetic C-means and k-means clustering techniques are used to detect tumor in brain by using MRI technique. At the end of process, the tumor is extracted from the MR image and its exact position and the shape are determined [1].
2. **J Vijay and J. Subhashini, described in (2013):** an efficient method for automatic brain tumors segmentation for the extraction of tumor tissues from MR images. In these methods, segmentation is carried out using K-means clustering algorithm for better

performance. This enhances the tumor boundaries more and is very fast when compared to many other clustering algorithms. The proposed technique produces appreciative results [2].

3. **K. S. Angel Viji and Dr. J. Jayakumari, (2011):** said that after a manual segmentation procedure the tumor identification, the investigations has been made for the potential use of MRI data for improving brain tumor shape approximation and 2D & 3D visualization for surgical planning and assessing tumor. Computer-Aided Diagnosis (CAD) system with watershed segmentation for Automatic detection of brain tumor through MRI was developed. The CAD system can provide the valuable outlook and accuracy of earlier brain tumor detection. It consists of four stages. First stage is image acquisition. Second preprocessing and enhancement. Third, feature extraction, feature selection, classification, and segmentation are performed. The final step is to detect the tumor in 2D visualization [3].
4. **Heena Hooda,Om Prakash Verma and Tripti Singhal, (2015):** said that, performance analysis of image segmentation techniques, K-Means Clustering, Fuzzy C-Means Clustering and Region Growing for detection of brain tumor from sample MRI images of brain.

   The performance evaluation of the above-mentioned techniques is done on the basis of error percentage as compared to ground truth [4].
5. **Ehab F. Badran, Esraa Galal Mahmoud, and Nadder Hamdy,(2014):** discussed about scanning method that a computer-based method for defining tumor region in the brain using MRI images are presented. A classification of brain into healthy brain or a brain having a tumor is first done which is then followed by further classification into benign or malignant tumor. The algorithm incorporates steps for preprocessing, image segmentation, feature extraction and image classification using neural network techniques. Finally, the tumor area is specified by region of interest technique as confirmation step. An user friendly MATLAB GUI program has been constructed to test the proposed algorithm [5].
6. **Shubhangi Handore and Danashri Kokare, (2010):** describes that comparative study of various methods for tumor detection. Tumor detection by Edge Detection gives the exact location of tumor and image segmentation plays an important role in medical imaging. So, Segmentation can work efficiently for detecting and extracting the tumor from MRI image of the patient [6].

III. PROPOSED METHODOLOGY:

a) OBJECTIVE OF PROPOSED METHOD:

1) Detection of brain tumour with MRI observations is a tedious job & requires lots of experience to reduce the efforts & improve accuracy of detection it is proposed to develop computer aided diagnostic (CAD) system for detection of tumour.
2) After detection of brain tumour it is required to identify its stage i.e. the tumour is malignant or benign hence classification of tumour stages for better diagnosis purpose will be done.
3) Finally the system will assist the physicians to develop supporting opinion to minimize human errors. The proposed CAD system will be a user friendly & less complicate to operate.

The proposed system consists of following steps:-

1. Image pre-processing.
2. Image Standardization.
3. K- Means based segmentation.
4. ROI and features extraction.
5. Classification by using neural network.

B) FLOW DIAGRAM:

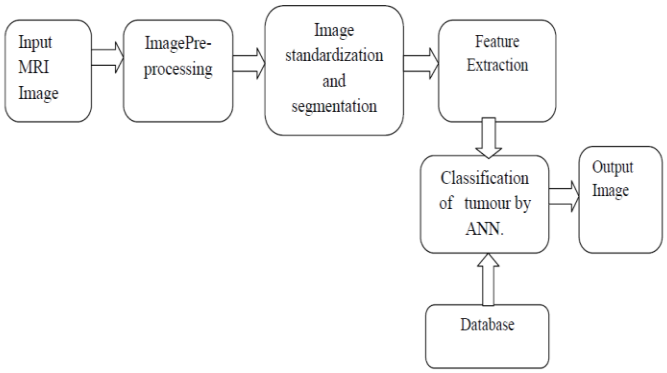

Fig. No. 1. Flow chart of proposed method

a) IMAGE PRE-PROCESSING

Pre-processing and enhancement techniques are used to improve the detection of the suspicious regions in MRI. The Pre-processing stage is used for reducing image noise, highlighting edges, or displaying digital images [3].

Image pre-processing will improve the quality of data through the application of methods for de-noising. Filters such as

Median filter or Laplacian filter or Gaussian filter will be observed & best suited will be used. Image standardization, i.e. gray scale transformation can be used if necessary.

b) IMAGE STANDARDIZATION

It is nothing but improvement of an image appearance by increasing dominance of some features or by decreasing ambiguity between different regions of the image. Image enhancement processes consist of a collection of techniques that seek to improve the visual appearance of an image or to convert the image to a form better suited for analysis by a human or machine. Histogram processing is the act of altering an image by modifying its histogram.

Common uses of histogram processing include normalization by which one makes the histogram of an image as flat as possible. This is also known as contrast enhancement. Intensity transformation functions based on information extracted from image such as enhancement, compression, segmentation and description.

c) FEATURE EXTRACTION

It will be divide the image into regions of similar attributes by using improved segmentation methods. Most of the segmentation methods are adhoc. In proposed work different soft computing segmentation methods may be used such as seeded region growing, K means clustering, etc. for better improvement. The step is the ROI whereby the tumor location is defined by using un-sharp contrast enhancement filter. In healthy brains, the output is the brain boundary. The system also gives a message when it fails to analyze the image [5].

d) K-MEANS CLUSTERING ALGORITHM FOR SEGMENTATION

Clustering refers to the process of grouping pixels of an image such that pixels which are in the same group are similar among them and dissimilar to the pixels which belong to the other groups (clusters).The proposed method combine segmentation and the K means algorithm [2]. The algorithm starts clustering by determining k initial central points, either at random or using some heuristic data. It then group search image pixel under the central point it is closest to. Next, it calculates new central points by averaging the pixels grouped under reach central point.

K-means clustering is a method of cluster analysis which aims to partition n observations into k clustering where each observation belongs to the cluster with the nearest mean. Means is one of the simplest unsupervised learning algorithms that solve the well-known clustering problem.

CLASSIFICATION

For classification of features the back propagation neural network can be used. Training a

Network by back-propagation involves three stages:

1) The feed-forward of the input training pattern.
2) The back-propagation of the associated error.
3) The adjustment of the weights.

IV. CONCLUSION

After completion of this paper we will be able to detect brain tumour with observations carried out in MRI, mainly this method requires lot of expertise in this field and but once we accomplished project we will be able to detect brain tumour by using computer aided diagnostic for detection of brain tumour. Once identification of brain tumour is done we can also classify the brain tumour according to malignant or benign. The developed system will help physician for decision making and reduction of human errors can be possible.

V. REFERENCES

1. Kailash Sinha, G.R.Sinha, " *Efficient Segmentation Methods for Tumor Detection in MRI Images*"2014 IEEE Student's Conference on Electrical, Electronics and Computer Science.978-1-4799-2526-1/14/©2014IEEE. pp.1-6.
2. J.Vijay, J. Subhashini, " *An Efficient Brain Tumor Detection Methodology Using k mean clustering algorithm* " International conference on Communication and Signal Processing, April 3-5,2013,India.978-1-4673-4866-9/13/©2013 IEEE.pp.653-657.
3. K. S. Angel Viji and Dr. J. Jayakumari, " *Automatic Detection of Brain Tumor based on Magnetic Resonance Image using CAD System with watershed segmentation*" Proceedings of 2011 International Conference on Signal Processing, Communication, Computing and Networking Technologies. (ICSCCN2011). 978-1-61284-653-8/11©2011 IEEE.pp.145-150.
4. Shubhangi Handore & Dhanashri Kokare," *Performance Analysis of Various Methods to Tumour Detection.*" IEEE (2015) International Conference on Pervasive Computing (ICPC), 978-1-4799-6272-3/15/(c) 2015 IEEE.pp.1-4.

5. Heena Hooda, Om Prakash, Verma Tripti Singhal," *Brain Tumor Segmentation: A Performance Analysis using K-Means, Fuzzy C-Means and Region Growing Algorithm*." 2014 IEEE International Conference on Advanced Communication Control and Computing Technologies. (ICACCCT) ISBNNo.978-1-4799-3914-5/14/©2014 IEEE. pp.1621-1626.
6. Ehab F. Badran, Esraa Galal Mahmoud, and Nadde," *An Algorithm for Detecting Brain Tumors in MRI Images*" 2010 IEEE Arab Academy for Science and Technology & Maritime Transport Alexandria, Egypt . 978-1-4244-7042-6/10© 2010 IEEE .pp.368- 373.