A REVIEW OF BRAIN TUMOR CLASSIFICATION FROM MRI IMAGES

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Abstract
A brain tumor occur when abnormal cells form within the brain. There are two main types of tumors. They are cancerous and non-cancerous tumors. Progressive brain cancer can only spread inward because the skull will not let the brain tumour expands outward. Current invasive techniques such as biopsy and spinal tap methods can determine whether the brain tumour is cancerous or non-cancerous. MRI plays a vital role in detecting brain abnormalities by determining the size and location of affected tissues. Computer aided diagnostic system helps to identify the tumor type and it avoid human errors in diagnosis. But because of unknown noise, poor image contrast, weak boundaries etc in medical images leads to poor efficiency of the most of the existing classification methods. So an accurate classification of medical images is necessary for clinical diagnosis.

Keywords: ANFIS, GLCM, PNN, FOS, SOS

I. INTRODUCTION

The field of Medical Image Processing which is a rapidly growing and competitive field. Medical Image methodologies are utilized for Medical detection and treatment of diseases. A brain tumor is an abnormal growth of tissue in the brain or central spine that can disrupt proper brain function. Doctors refer to a tumor based on where the tumor cells originated, and whether they are cancerous (malignant) or not (benign). But doctors face extremely difficulty in the separation of the brain abnormality from the MRI brain images, planning of treatment and diagnosing brain anomalies like tumour, and the study of anatomical structure. Thus the brain image classification has become very important. There are over 120 types of brain and central nervous system tumors. Brain and spinal cord tumors are different for everyone. They form in different areas, develop from different cell types, and may have different treatment options. Diagnosing a brain tumor can be a complicated process and involve a number of specialists, depending on where you live or where you seek medical attention. A brain scan, most often an MRI, is the first step. A biopsy may be necessary, so a pathologist can be brought in to help identify the brain tumor type. At present, brain tumor segmentation in brain tumor images is mostly performed manually in clinical practice. Apart from being time consuming, manual brain tumor delineation is difficult and depends on the individual operator.

II. LITERATURE SURVEY

A.Lakshmi et al [1] proposed a computer-aided classification method which uses ANFIS Classifier and morphological operations to detect, segment and diagnose the brain tumor regions. In Preprocessing Most commonly used enhancement and noise reduction techniques are implemented that can give best achievable results. Texture related features are used to differentiate benign and malignant tissues in MRI Brain image. The gray level co-occurrence matrix (GLCM) four properties of GLCM namely, contrast, correlation, energy and homogeneity are the features used. Features are formed by the construction of wavelets from the brain MRI. In this work, the neuro-fuzzy based approach namely adaptive neuro fuzzy inference system (ANFIS) is used. The performance of tumor segmentation are analyzed with similarity index (SI – 0.78), extra fraction (EF – 0.0098),

overlap fraction (OF – 0.723) and accuracy (99.4%).The pixel level information features are extracted and trained for brain tumor diagnosis.

In [2] Meiyan Huang et al. Propose a novel automatic tumor segmentation method for MRI images. This method treats tumor segmentation as a classification problem. Here a softmax regression model is used which considers data distribution of different classes by learning which can further improve classification performance. Here the testing sample is independently projected on these different dictionaries using the local anchor embedding (LAE) method. A patch-based technique was used in extracting the image feature. But the patch feature may be insufficient to discriminate the brain tumor segmentation task because of the complex characteristics of brain MRI images. The average dice similarities of the proposed method for segmenting complete tumor, tumor core, and contrast-enhancing tumor on real patient data are 0.84, 0.685, and 0.585, respectively.

According to Ata'a A. Hasan, [3] a supervised probabilistic neural network (PNN) classifier is utilized to classify the experimental images into normal and abnormal. This method is a combination of Discrete Multiwavelet Transform, Texture features extracted and Probabilistic Neural Network. A PNN is primarily a classifier since it can map any input pattern to a number of classifications that is it can be utilized for classification problems. PNN is a fast training process and have an inherently parallel structure that is guaranteed to converge to an optimal classifier. It has an advantage that the size of the representative training set increases and training samples can be added or removed without extensive retraining. In texture feature extraction the simplest statistics such as gray level first-order statistics (FOS) and Second-order statistics (SOS) such as Gray-Level Co-occurrence Matrix (GLCM) are considered. The classification efficiency is around 97%. An Efficient Brain Image Classification Using Probabilistic Neural Network and Tumor Detection Using Image Processing.In [4] Kshitija V. Shingare proposed a four stage classification. It include Pre-processing of the input brain MR image using Gaussian filter & histogram equalization then feature extraction for the ROI is done with the help of Gray Level Co-occurrence Matrix (GLCM). Selected features are given as input to Probabilistic Neural Network (PNN) for training, and finally classify Normal (non-tumorous) image and abnormal (tumorous) image. Then the classified tumorous image is segmented out to locate tumor. Brain tumour classification using two-tier classifier with adaptive segmentation technique

According to [5],V. Anitha et al. proposed a system uses that uses the adaptive pillar Kmeans algorithm for successful segmentation and the classification methodology is done by the twotier classification approach. at first the selforganising map neural network trains the features extracted from the discrete wavelet transform blend wavelets and the resultant filter factors are consequently trained by the K-nearest neighbour and the testing process is also accomplished in two stages. and the classification methodology is done by the two-tier classification approach. In this work avails segmenting the MR image with Adaptive Pillar K means clustering algorithm and classifying cancerous and non-cancerous brain tumours automatically by the two-tier classifier approach, which uses the statistical texture features extracted by DWT. The classification performances such as sensitivity, specificity and accuracy also comparatively better than the conventional method.

III. CONCLUSION

This work provides a detailed description on the various image processing techniques for the detection of Brain tumour in MRI image. The process consist of mainly four steps. They are Preprocessing, segmentation, feature extraction and classification respectively.

Research in future are inclined towards the improvement of accuracy and also it can be Progressed in the detection of the tumour

REFERENCES

[1] Lakshmi, A., and T. Arivoli. "Computer aided diagnosis system for brain tumor detection and segmentation." Journal of Theoretical and Applied Information Technology 64.2 (2014).

[2] Huang, Meiyan, et al. "Brain tumor segmentation based on local independent projection based classification." IEEE transactions on biomedical engineering 61.10 (2014): 2633- 2645.

[3] Dahab, Dina Aboul, Samy SA Ghoniemy, and Gamal M. Selim. "Automated brain tumor detection and identification using image processing and probabilistic neural network techniques." International journal of image processing and visual communication 1.2 (2012): 1-8.

[4] Demirhan, Ayse, Mustafa Toru, and Inan Guler. "Segmentation of tumor and edema along with healthy tissues of brain using wavelets and neural networks." IEEE journal of biomedical and health informatics 19.4 (2015): 1451-1458. Dept.of Electronics and Communication 9

[5] Anitha, V., and S. Murugavalli. "Brain tumour classification using two-tier classifier with adaptive segmentation technique." IET Computer Vision 10.1 (2016): 9-17.