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A Review on Deep Image Compression Using Machine Learning Technique

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Abstract- **In computer science, image processing is any kind of signal processing for which the input is an image sets such as photographs or frames of video; the output of image processing can be an image. It can also be a set of characteristics or a set of image related parameters. Image-processing techniques mostly involve treating the image as a two-dimensional signal and it constitutes applying various signal-processing techniques to the image. In this work processing includes different forms of information processing where the input is an MRI image. Image processing techniques are mostly derived from the signal processing techniques application in the domain of images.**

Keywords- **MRI images, K- Nearest Neighbor (KNN), Computed Tomography**

I. INTRODUCTION

The most important part of the central nervous system is a human brain. MRI Imaging techniques are used by researchers and doctors to study noninvasively the design and function of the brain. Human body consists of many types of cells and each has some special function. When cells divide without any order and very frequently and are there is no control on their growth, the extra cells forms a mass of tissue which is termed as tumour. In order to diagnose and treat this disease, doctors use MRI as an assistant diagnostic tool. Images of soft tissues are produced by this imaging modality. Only Internal structures can be understood through such medical images, these images are not enough for the doctors and wants to understand more such as emphasized abnormal tissues, quantifying its sizes, depicting its shape, and so on. If the above requirements are carried out by the doctors themselves, there are lot of chances of inaccuracy, time consuming and a very heavy task.

In order to extract suspicious region from complex medical images, one important process is called segmentation.

Below are the two imaging techniques for diagnosing of brain tumor

- Magnetic Resonance Imaging (MRI),
- Computed Tomography (CT)

There are few advantages of MRI over CT scan such as MRI does not use ionizing radiation while CT scans do and these radiations are harmful on repeated exposure. Tumor can be best understood as an abnormal and uncontrolled growth of cells. If this uncontrolled growth occurs in the brain cells, it is said to be brain tumor. Based on the initial location of the cells from which uncontrolled growth are initiated the tumor is broadly classified into two categories as below

- Primary Tumor
- Secondary Tumor

Primary Tumor are so called when the tumor are initiated in the brain tissues. Secondary brain tumors are so called when the tumor cells are initiated in some other parts of the body and it is spread up to the brain tissues. Secondary brain tumor are are also named as Metastatic brain tumor.

Further tumor is categorized on the following basis:

- Tumor Location
- Types of Cells where the tumor is invoked
- Tumor growth rate.

which indicates its severity and the nearby affected tissues or cells.

Based on the growth rate, boundaries of tumor and spreading nature Primary brain tumor is further divided into two categories[1] as below

- Benign Tumor.
- Malignant Tumor.

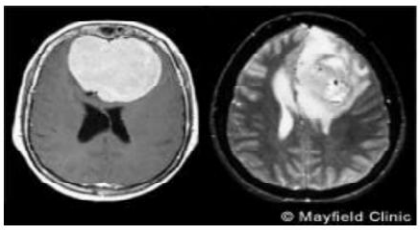

Fig.1 MRI Image of Benign and Malignant tumors.

Some of the features of Benign tumor are slower growth rate, clear and distinct tumor boundaries and rarely spreading nature. Thus, benign tumor does not have any serious side effects, however their location determines the vital role in threat to life. Some of the features of

Malignat tumor are Rapid Growth, Capricious boundaries, rapid spreading nature and affecting nearby cells.

II.LITEREATURE REVIEW

In this paper author [6] the proposed algorithm is a combination of SVM and c-means, this is a combine technique for the detection of brain tumor. In this section the image is polished using the contrast, mid-range stretch. Double image segmentation and binary image are used for the brain extraction. Fuzzy c-means (FCM) clustering is used for the image segmentation. Grey level run length matrix (GLRLM) generally used for the retrieving of special attributes. Then, single, double, and multi SVM technique are applied to the MRI images separation.

In this paper [7] author explained mechanical grouping approach for MRI images which is predicted by using the Adaboost machine learning algorithm. The proposed approach included three modules: engaging, attribute taking out, and analysis. The first one is engaging that removes the crude information, which transforms the RGB image into black and white metre, middle filtration minimum segmented is used. To take out the attributes by using GLCM technique 22 features were extracted from an MRI. For classification boosting technique used (Adaboost). The accuracy of the system will be increased by increasing training database images. Also the system can be implementing for different types of classes like Glioma and Meningioma.

In this paper [8] author proposed, a novel technique which includes Normalization of Histogram and K-means Segmentation. First, input image is pre-processed in order to remove the unwanted signals or noise from it. To de-noise filters such as Median filter, Adaptive filter, Averaging filter, Un-sharp masking filter and Gaussian filter is used in the MRI images. The histogram of the pre-processed image is normalized and classification of MRI is done. Finally, the image is segmented using K-means algorithm in order to take out the tumor from the MRI. Efficient classification of the MRIs is done using NB Classifier and SVM so as to provide accurate prediction and classification. The proposed method has some limitations that it could not find out the precise or accurate boundary of the tumor region.

In this paper [9] author proposed method in that MRI image of brain is de-noised using DWT by thresholding of wavelet co-efficient. Genetic algorithm is applied to detect the tumor pixels. A genetic algorithm is then used in order to determine the best combination of information extracted by the selected criterion. The present approach uses k-Means clustering methods into Genetic Algorithms for guiding this last Evolutionary Algorithm in his search for finding the optimal or sub-optimal data partition. The limitation of this work is that wavelet transform require large storage and its computational cost is high.

In this paper [10] author Proposed Methodology in which Image is processed through: Preprocessing, Segmentation, Feature extraction Classification stages. In preprocessing, Morphology technique using double thresholding is applied to remove the skull out of the MRI brain images. The present work presents the comparison study of two techniques used for tumor detection of MRI images. One is based on the Level set method that uses the non-parametric deformable models with active contour to segment the brain tumor from the MRI brain images. The other one is the K-means segmentation algorithm. After the segmentation decision making is performed in two stages: Feature extraction using Discrete Wavelet Transform and Gray Level Co-occurrence Matrix, and classification using the Support Vector Machine. Level Set method gives better results than k-means segmentation.

In this paper [11] author proposes an intellectual classification system to recognize normal and abnormal MRI brain images. Under these techniques, image preprocessing, image feature extraction and subsequent classification of brain cancer is successfully performed. In pre-processing MRI brain RGB images are converted in grey scale image. Median Filter is applied to remove noise from MRI image. Then Skull Masking is use to remove non-brain tissue from MRT brain image. Dilation and erosion are two elementary morphological operations used for skull masking. In feature extraction symmetrical, gray scale and texture features are extracted. When different machine learning techniques: Support Vector Machine (SVM), K-Nearest Neighbor (KNN) and Hybrid Classifier (SVM-KNN) is used to classify 50 images, it is observed from the results that the Hybrid classifier SVM-KNN demonstrated the highest classification accuracy rate.

III. BIOMEDICAL IMAGING

Biomedical imaging focuses on the detention of images for both diagnostic and salutary purposes. Polaroids of in vivo physiology and biological processes can be gathered through advanced sensors and computer technology. Biomedical imaging technologies employ either x-rays (CT scans), magnetism (MRI), sound (ultrasound), radioactive narcotics (nuclear medicine: SPECT, PET) or light (endoscopy, OCT) to examine the existing condition of an organ or tissue and can monitor a patient over time for diagnostic and treatment evaluation.

IV.MAGNETIC RESONANCE IMAGING (MRI)

The brain images attained by magnetic resonance imaging are offered a three-level approach which is used for its

design. It comprises of second-level discrete wavelet transform disintegration of the image under study, feature abstraction from the LH and HL sub-bands using first order figures, and succeeding classification with the k-nearest neighbor (k-NN), learning vector quantization (LVQ), and probabilistic neural networks (PNN) algorithms. Then a collective classifier system is established where the preceding machines form the base classifiers and support vector machines (SVM) are engaged to comprehensive decisions.

The planned methodology was tested on a large data sets of normal and pathological MRIs and thus the acquired outcomes show a higher presentation globally than when using features mined from the LL sub-band, as frequently done, leading to the deduction that the horizontal and vertical sub-bands of the wavelet transform can efficiently and professionally encode the perceptive features of normal and irrational images. The investigational results also show that consuming a collaborative classifier progresses the correct classification rates.

V. CONCLUSION

This research is to create a helpful tool for doctors to make them able to detect the tumor types and its boundaries as early as possible and categorize which type of tumor is affecting the brain, in order to save the patient's life. As we already know that our brain is the most crucial part of our Central Nervous system (CNS) which controls all other functions and movements of our body. Proceeding with our research, we perform segmentation of brain tumor from magnetic resonance images. One of the techniques is manual segmentation for finding tumor from the MRI. This is time consuming and has possibilities of generating human errors. Also the manual segmentation method will also depend on different doctors and their expertise which can vary in large extent sometimes. This process of manual segmentation can take minimum of three hours to complete thus my proposed work which is done using repeated SVM classifier may yield an accurate and uniform result.

REFERENCE

[1]. Brain Tumor Segmentation Methods-A Review and Challenges Sanjeeva Polepaka1, Dr. Ch. Srinivasa Rao2, Dr. M. Chandra Mohan3
[2]. Girish Katti, Magnetic Resonance Imaging (MRI) A Review, Jan 19, 2016.
[3]. Syeda Arshiya Ara, Ayesha Shireen, Magnetic Resonance Imaging (MRI) A Review, Jan 19, 2016.
[4]. Durgesh K. Srivastava, 2lekha Bhambhu, Data Classification Using Support Vector Machine.
[5]. Yali Liu, Image Denoising Method based on Threshold, Wavelet Transform and Genetic Algorithm, Vol. 8, No. 2 (2015), pp. 29-40.
[6]. Roohollah Aslanzadeh1, An Efficient Evolutionary Based Method For Image Segmentation.
[7]. Fateme Fahiman -Shape: A new algorithm for clustering finite time series waveforms, Oct 26, 2017. Basketball Player Detection, Vol. 12, No. 1, 2015.
[8]. Hanane DALIMI1, Mohamed AFIFI1, Segmentation by fusion of histogram-based K-means, IJCSI International Journal of Computer Science Issues, Volume 12, Issue 4, July 2015.
[9]. Ji Peirong Hu Xinyu Zhao Qing, A New Genetic Algorithm for Optimization.
[10]. Kalaiselvi1, P. Nagaraja2 and K.S. Anbarasi3, Brain Tumor Segmentation from MRI Scans using Image Processing Transformations and Clustering Technique, May 10, 2016.
[11]. Sadegh Bafandeh Imandoust And Mohammad Bolandraftar, Application of K-Nearest Neighbor (KNN) Approach for Predicting Economic Events: Theoretical Background, Vol. 3, Issue 5, Sep-Oct 2013, pp.605-610.
[12]. Ching-Hsue cheng,You-chen and Tzu-cheng Lin FCM Based Automatic Thres holding Algorithm to Segment IEEE 19-22 Aug 2007