IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Impact Factor: 6.252
Volume 2, Issue 2, May 2022

Programmed Multi-Classification of Brain Tumor

Suraj Thorat[1], Hrushikesh Tilekar[2], Vaibhav Gohane[3], Prof. Mayuri Agrawal[4]
Students, Department of Computer Engineering[1,2,3]
Faculty, Department of Computer Engineering[1,2,3]
Sinhgad Inst. Smt. Kashibai Navale College of Engineering, Vadgaon Bk. Pune, Maharashtra, India
Savitribai Phule Pune University, Pune, Maharashtra, India
surajthorat985@gmail.com, hrushitilekar@gmail.com, vaibhavgohane2000@gmail.com

Abstract: *In this paper, we propose a brain tumor segmentation and classification method for multi-modality magnetic resonance image scans. The data from multi-modal brain tumor segmentation challenge are utilized which are co-registered and skull stripped, and the histogram matching is performed with a reference volume of high contrast. We are detecting tumor by using preprocessing, segmentation, feature extraction, optimization and lastly classification after that preprocessed images use to classify the tissue .We performed a leave-oneout cross-validation and achieved 88 Dice overlap for the complete tumor region, 75 for the core tumor region and 95 for enhancing tumor region, which is higher than the Dice overlap reported.*

Keywords: CNN, Preprocessing, Feature Extraction

I. Introduction

The detection and diagnosis of brain tumor from MRI is crucial to decrease the rate of casualties. Brain tumor is difficult to cure, because the brain has a very complex structure and the tissues are interconnected with each other in a complicated manner. Despite many existing approaches, robust and efficient segmentation of brain tumor is still an important and challenging task. Tumor segmentation and classification is a challenging task, because tumors vary in shape, appearance and location. It is hard to fully segment and classify brain tumor from mono-modality scans, because of its complicated structure. MRI provides the ability to capture multiple images known as multimodality images, which can provide the detailed structure of brain to efficiently classify the brain tumor. shows different MRI modalities of brain.

II. Motivation

We get motivated of existing system. We have to match user object with database image using Spatial gray level dependencies method. In that system first we have pre-processing on that images then select feature extraction and compare brain with database and get the result

III. Literature Survey

Linmin Pei, Syed M. S. Reza and Khan M. Iftekharuddin.,"Improved Brain Tumor Growth Prediction and Segmentation in Longitudinal Brain MRI"[1], : In this work, we propose a novel method to improve the predication of brain tumor growth by fusing with the state-of-art tumor segmentation. The Glioma Image Segmentation and Registration (GLISTR) is known for joint segmentation and deformable registration of brain scans as well as tumor growth prediction using MRI. This paper, for the first time in literature, aims to improve the tumor growth prediction by integrating the growth patterns of different tissues such as necrosis, edema, and tumor obtained from GLISTR with our stochastic texture-based tumor segmentation methods using a joint label fusion (JLF) technique. We evaluate the proposed method using several adult longitudinal cases from the 2015 BRATS [1) dataset. The experimental results show difference of these tissues growth prediction by applying GLISTR and joint label fusion. ANOV A analysis suggests statistically improvement in the longitudinal tumor core prediction results.

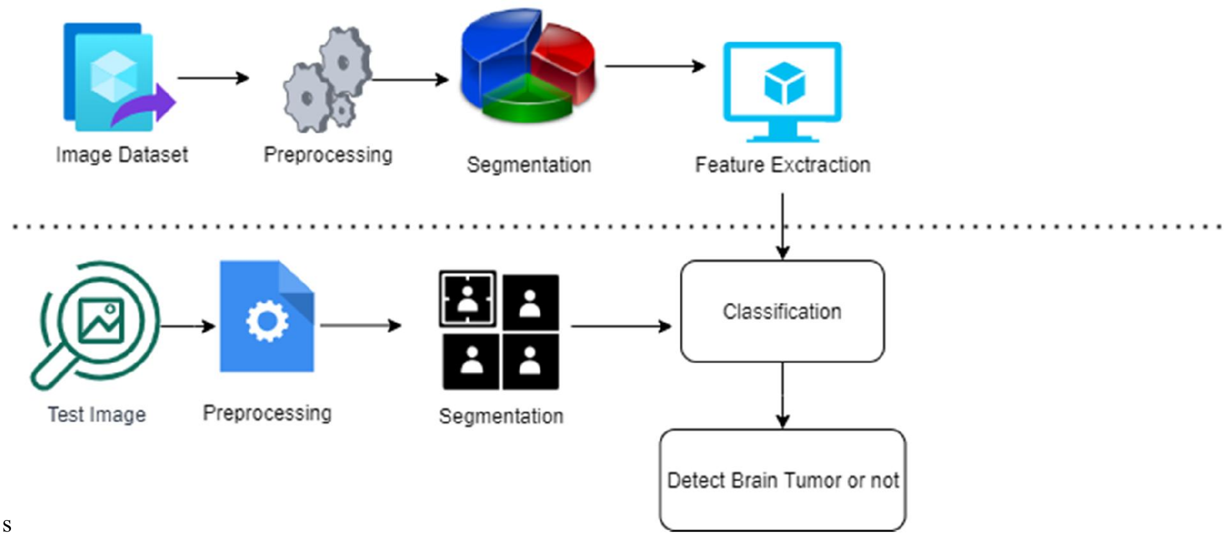
Lina Chato,Erik Chow., "Wavelet Transform to Improve Accuracy of a Prediction Model for Overall Survival Time of Brain Tumor Patients Based On MRI Images"[2], —In this poster, denoising wavelet transform (DWT) method is proposed to improve the accuracy of a prediction model for overall survival time of brain tumor patients using Magnetic resonance imaging (MRI) images based on classification approach. The BraTS dataset is used in this work. The histogram features are extracted from MRI images to train a prediction model using machine learning methods. As the dataset consists of only 163 samples, various machine learning methods have been used to develop an accurate prediction model. In general the MRI imaging system corrupted the MRI information with noise. The results show that the two-dimension denoising wavelet transform method slightly improved the accuracy of a prediction model based on histogram features. The best accuracy is achieved by daubechies 4 level 4 (db4-L4) with a 10 folds cross validation linear support vector Machine (SVM) when including patients' age information. However, daubechies 2 level 1 and 3 (db2-L1, db2- L3) with a 10 folds cross validation simple tree produce an improved accuracy when the patients' age does not combined with histogram features vector. When a 10% hold out validation method is used, the daubechies 2 level 3 (db2-L3) with simple tree achieves 66.7% accuracy

Parveen ,Amritpal singh," Detection of Brain Tumor in MRI Images, using Combination of Fuzzy C-Means and SVM"[3], MRI is the most important technique, in detecting the brain tumor. In this paper data mining methods are used for classification of MRI images. A new hybrid technique based on the support vector machine (SVM) and fuzzy c-means for brain tumor classification is proposed. The purposed algorithm is a combination of support vector machine (SVM) and fuzzy cmeans, a hybrid technique for prediction of brain tumor. In this algorithm the image is enhanced using enhancement techniques such as contrast improvement, and mid-range stretch. Double thresholding and morphological operations are used for skull striping. Fuzzy c-means (FCM) clustering is used for the segmentation of the image to detect the suspicious region in brain MRI image. Grey level run length matrix (GLRLM) is used for extraction of feature from the brain image, after which SVM technique is applied to classify the brain MRI images, which provide accurate and more effective result for classification of brain MRI images.

G.Hemanth, M.Janardhan, L.Sujihelen, "Design And Implementing Brain Tumor Detection Using Machine Learning Approach"[4], Nowadays, brain tumor detection has turned up as a general causality in the realm of health care. Brain tumor can be denoted as a malformed mass of tissue wherein the cells multiply abruptly and ceaselessly, that is there is no control over the growth of the cells. The process of Image segmentation is adopted for extracting abnormal tumor region within the brain. In the MRI (magnetic resonance image), segmentation of brain tissue holds very significant in order to identify the presence of outlines concerning the brain tumor. There is abundance of hidden information in stored in the Health care sector. With appropriate use of accurate data mining classification techniques, early prediction of any disease can be effectively performed. In the medical field, the techniques of ML (machine learning) and Data mining holds a significant stand. Majority of which is adopted effectively. The research examines list of risk factors that are being traced out in brain tumor surveillance systems. Also the method proposed assures to be highly efficient and precise for brain tumor detection, classification and segmentation. To achieve this precise automatic or semiautomatic methods are needed. The research proposes an automatic segmentation method that relies upon CNN (Convolution Neural Networks), determining small 3 x 3 kernels. By incorporating this single technique, segmentation and classification is accomplished. CNN (a ML technique) from NN (Neural Networks) where in it has layer based for results classification. Various levels involved in the proposed mechanisms are: 1. Data collection, 2. Pre-processing, 3. Average filtering, 4. segmentation, 5. feature extraction, 6. CNN via classification and identification. By utilizing the DM (data mining) techniques, significant relations and patterns from the data can be extracted. The techniques of ML (machine learning) and Data mining are being effectively employed for brain tumor detection and prevention at an early stage.

Hadi Sabahi, Hamid Soltanian-Zadeh, Lisa Scarpace and Tom Mikkelsen, Herny Februariyanti, :Voxel-Based Treatment Prediction of Glioblastoma Multiform Tumor Using Diffusion Tensor Imaging"[5], This paper proposes a method to predict the effect of Bevacizumab therapy on Glioblastoma Multiform (GBM) tumors. The prediction is critical for effective treatment planning. The proposed method is developed and evaluated using Diffusion Tensor Imaging (DTI) and post-contrast Tlweighted Magnetic Resonance Images (pc-Tl-MRI) of 14 patients with GBM tumors gathered before and after the treatment. First, the proposed method calculates diffusion anisotropy indices (DAI) of all voxels in the brain. These diffusion anisotropy indices are Fractional Anisotropy (FA), Mean Diffusivity (MD), Relative Anisotropy (RA), and Volume Ratio (VR). Then, it registers post-treatment pc-Tl-MRI and pre-treatment DAI maps to pre-treatment pc-TI-MRI. Next, it uses a thresholding method to segment the tumor from pc-TlMRI studies. Comparing Gd-enhanced voxels of the pre- and post-treatment pc-TI-MRI, the DAIs of the tumor are labeled based on their response to the treatment. The voxels of 7 patients are randomly selected to train 4 classifiers (ANN, SVM, KNN, and ANFIS) and then all voxels of the other 7 patients are used to test them. For each classifier, four performance measures (sensitivity, specificity, positive predictive value, and accuracy) are calculated. Experimental results show that the ANFIS is more accurate than the other classifiers in predicting the treatment response.

IV. System Architecture



s

Figure: System architecture

V. Algorithm

5.1 CNN

- Build a small convolutional neural network as defined in the architecture below.
- Select images to train the convolutional neural network.
- Extraction of feature filters/feature maps.
- Implementation of the convolutional layer.
- Apply the ReLu Activation function on the convolutional layer to convert all negative values to zero
- Then apply max pooling on convolutional layers.
- Next Flatten, This layer used for convert 2D matrix into 1D array.
- Make a fully connected layer
- Then input an image into CNN to predict the image content
- Back propagation to calculate the error rate
- Then Create CNN model.

VI. Conclusion

This paper presented an algorithm to hierarchically classify the tumor into three regions: whole tumor, core tumor and enhancing tumor. Intensity, intensity difference, neighborhood information and wavelet features are extracted and utilized on multimodality MRI scans with various classifiers. The use of SVM and CNN classifier has increased the classification accuracy as evident by quantitative results of our proposed method which are comparable or higher than the state of the ar

References

[1]. E. Holland, "Glioblastoma multiforme: the terminator," Proceedings of the National Academy of Sciences, 97(12), pp.6242-6244.

[2]. K. Urbanska, J. Sokołowska, M. Szmidt, and P. Sysa, 2014. Glioblastoma ´ overview. Contemporary oncology, 18(5), p.307.

[3]. G. Anandgaonkar, G. Sable, 2014. Brain tumor detection and identification from T1 post contrast MR images using cluster based segmentation. International Journal of Science and Research, 3(4), 814-7.

[4]. M. Sujan, N. Alam, S. Abdullah, M. Jahirul, 2016. A Segmentation based Automated System for Brain Tumor Detection. International Journal of Computer Applications, 153(10), 41-49.

[5]. U. ˙Ilhan, A. Ilhan, 2017, 9th International Conference on Theory and Application of Soft Computing, Computing with Words and Perception, ICSCCW.

[6]. The Cancer Imaging Archive, 2017. REMBRANDT. https://wiki.cancerimagingarchive.net/display /Public/REMBRA NDT

[7]. G. Blanchet, and M. Charbit, 2006. Digital signal and image processing using MATLAB (Vol. 4). London: Iste.

[8]. C. Shannon, 1948, A mathematical theory of communication, The Bell Syst. Tech. J. 27, pp. 379–423.

[9]. A. Li, Y. Li, T. Wang, and W. Niu, 2015, October. Medical image segmentation based on maximum entropy multi-threshold segmentation optimized by improved cuckoo search algorithm. In 2015 8th International Congress on Image and Signal Processing (CISP) (pp. 470-475). IEEE.

[10]. K. Win, S. Choomchuay, K. Hamamoto, M. Raveesunthornkiat, "Detection and Classification of Overlapping Cell Nuclei in Cytology Effusion Images Using a Double-Strategy Random Forest", Applied Sciences, 8(9), p.1608, 2018