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BRAIN TUMOR SEGMENTATION USING TWO PATH CNN

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Abstract: The brain is the most important organ in the human body which controls the entire functionality of other organs and it also helps in decision-making. It is also responsible for performing daily voluntary and involuntary activities in the human body. The accurate and exact segmentation of brain tumors is difficult to obtain. In particular, we can use the two-way neuronal convolution networks by using Image Processing. Image Processing is the process of transforming an image into a digital form and performing certain operations to get some useful information from that image itself. Brain tumors can be located everywhere in the brain by their definition, in virtually every form, size, and comparison. It uses neural networks to gain insights from the image data on its own, segments the image into multiple slices, and gives them as input to the neural network. This Paper explores the image with an automated learning system that uses versatile CNN (Convolution Neural Network) and effective CNN. This focuses on the creation of a modern network model, loss feature, data improvement and training and learning to increase the efficiency of brain tumor segmentation. It provides an automated segmentation of brain tumors dependent on deep neural convolution networks. The resulting segmentation method is very quick and 90 percent effective.

Key Words: Brain, Image Processing, Segmentation Brain Tumor, Convolution neural network

1. INTRODUCTION

The human brain is the command centre for the nervous system and it enables thoughts, memory, movement, and emotions.The tumor is a fibrous mesh of unwanted tissue growth inside our brain that accumulate in an unconstrained way. At age of 15 about 3,540 children get diagnosed with a brain tumor. The appropriate way of understanding the importance of brain tumor and its stages is an important task for the medical professionals that helps them to prevent and to carry out the steps in curing the illness. The neural network can acquire the knowledge by using data set which is applied on learning process. In this Paper Artificial Neural Network and Convolutional Neural Network is used in the classification of healthy brain and tumor brain. Artificial Neural Network works like a human brain nervous system, on the basis a digital computer is connected with large amount of interconnections and networking which makes neural network to train with the use of simple processing units applied on the training set and stores the experiential knowledge. It has different layers of neurons which is connected together. In CNN convolutional defines the name of mathematical linear operation. The dimension of the image is reduced at each layers of CNN without the loss of information needed for training. Different processing like convolve, maxpooling, droupout, flatten and dense are applied for creating the model. This paper focuses on creating a self defined architecture of ANN and CNN model and finally the performance of ANN and CNN is compared when applied on brain tumor MRI dataset.Neural Networks are used for the classifying normal brains and tumor brains. An artificial neural network which is composed of several processing units, whose operation is quite simple. These units are usually connected by communication channels that are associated with a certain weight. These units only perform operations on their local data, which are inputs received by their connections. The intelligent behavior of an Artificial Neural Network comes from the interactions between the network's processing units. There will be an input and output layer, while there can be any number of hidden layers. In the learning process, weight and bias are added to each layer's neurons depending upon the input features and previous layers for hidden layers and output layers. A model is trained based on the activation function applied to the input features and the hidden layers where more learning takes place to reach the expected output.

2. LITRETURE SURVEY

We are providing a dual, deep learning architecture that simultaneously addresses the registration and segmentation of tumors, relax within the tumor projected regions, and simultaneously provides displacement and segmentation charts. The Markov Random Field (MRF) method for tumor segmentation and tandem image identification was planned to be used. We first present a hybrid, deep-learning system with very positive findings in two publicly accessible brain MRI datasets .Find two separate patients Source S and Guide R along with tumor field descriptions (SSEG and RSEG) for a pair of medical volumes. During the preparation, the network uses S and R source information and outputs the segmentation of the brain tumor and G as the optimal transition of the elastic, which project or map the source volume to the reference volume. The goal is to find the ideal transformation for translating the S source into the volume comparison R.

3. SYSTEM IMPLEMENTATION:

EXISTING SYSTEM:

The Existing system uses manual segmentation method of the MRI datasets. It also uses Rule Mining for manual segmentation. They have a lengthy process of using data mining tools to extract the rules from the MRI images. This makes them useful but at the same time makes them hard to create. Manual Segmentation of data is done by Normal Mapping, Confidence learning, Correction of image and shape. Texture features are extracted from the MRI Scans because, tissues are difficult

to classify just using shapes. The texture features are converted into spatial information. Finally using Association Rule Mining, the rules are derived from the images and finally are used for classification. In the existing system, experimental results are evaluated on publicly available datasets to verify the robustness of algorithm. In overcoming the limitations of existing methods, enhancement and segmentation have significance in tumor detection.

PROPOSED SYSTEM:

The working of the system starts with FDG. FDG is a widely used PET tracer in brain images. Nevertheless, FDG-PET images have limitations. The limitation is an inability to differentiate between necrosis radiation and a recurrent high-grade (HG) tumor. The proposed work's main goal is to speed up the QFS-convergence Net's and make it appropriate for computerized segmentation of the brain lesions without the need for any learning/supervision. An MRI scan is used to completely analyze different body parts, and it also helps to detect abnormalities in the brain at earlier stages than other imaging modalities Preprocessing is a critical task to extract the requisite region. 2D brain extraction algorithm BEAFMRIB software library and BSE are used for non-brain tissue removal.

DATASET COLLECTION:

Initally, we collect a dataset for our brain tumor segmentation. After the collection of the dataset, we split the dataset into training data and testing data. The training dataset is used for prediction model learning and the testing data is used for evaluating the prediction model.

PRE-PROCESSING OF DATA:

Data pre-processing is an important step in the creation of an Image Processing model. Initially, data may not be clean or in the required format for the model which can cause misleading outcomes. In preprocessing of data, we transform the data into our required format. It is used to deal with noises, duplicates, and missing values of the dataset. Data pre-processing has the activities like importing datasets, splitting datasets, attribute scaling, etc. Preprocessing of data is important for improving the accuracy of the model.

SELECTION OF MODEL:

Selecting a suitable image processing algorithm to train the model, such as Deep Learning algorithms, Convolution neural network algorithms, and Artificial neural networks. While Comparing the performances of different algorithms and cchoosingthe one that provides the best outcomes. It involves evaluating different models based on their performance metrics, accuracy and selecting the best one for the specific task. Validate the model using the testing data and to improve the model's accuracy.

DETECTION OF BRAIN TUMOR:

For Classification of the images or data various image processing algorithms are used like Deep Learning algorithms, Convolution Neural Network Algorithms, Image Clustering, Pattern recognition and ANN algorithms. Comparative analysis is performed among algorithms and the algorithm that gives the highest accuracy is used for the detection or prediction of brain tumor. Once the model is trained and validated, deploy it in a web application or mobile app that can be used by the Medical Professionals.

4. SYSTEM ARCHITECTURE

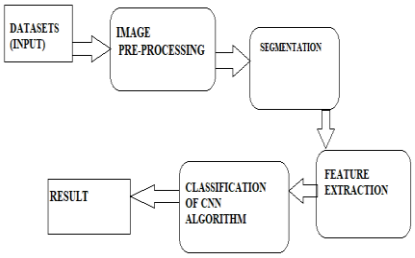

Fig -1: System Architecture

The architecture for brain tumor segmentation using image processing involves collecting the MRI images, collection of the datasets, preprocessing the images by using data mining rules.pre processing techniques also includes registration, background removal,normalisation.Next, the segmentation process and feature extraction process are done for visualizing and prediction by using convolution neural networks algorithms, deep learning algorithms and evaluating the models performance by using the datasets.

5. CONCLUSION

The Accurate brain tumor detection is still very demanding because of tumor appearance, variable size, shape, and structure. Although tumor segmentation methods have shown high potential in analyzing and detecting the tumor in MRI images, still many improvements are required to accurately segment and classify the tumor region. It will be helpful for the researchers to develop an understanding of doing new research in a short time and correct direction. The deep learning methods have contributed significantly but still require a generic technique. These methods provided better results when training and testing are performed on similar acquisition characteristics however, a slight variation in the training and testing images directly affects the robustness of the methods.

REFERENCES

[1]. Raheleh Hashemzehi Seyyed Javad Seyyed Mahdavi Maryam Kheirabadi Seyed Reza Kamel 2020 Detection of brain tumors from MRI images base on deep learning using hybrid model CNN and NADE Elsevier B.V. on behalf of Nalecz Institute of Biocybernetics and Biomedical Engineering of the Polish Academy of Sciences Online Publication.

[2]. Javeria Amin Muhammad Sharif Mudassar Raza Mussarat Yasmin 2018 Detection of Brain Tumor based on Features Fusion and Machine Learning Journal of Ambient Intelligence and Humanized Computing Online Publication.

[3]. Rajeshwar Nalbalwar Umakant Majhi Raj Patil Prof.Sudhanshu Gonge 2014 Detection of Brain Tumor by using ANN International Journal of Research in Advent Technology 2.

[4]. Fatih Özyurt Eser Sert Engin Avci Esin Dogantekin 2019 Brain tumor detection based on Convolutional Neural Network with neutrosophic expert maximum fuzzy sure entropy Elsevier Ltd 147.

[5]. Fausto Milletari Seyed-Ahmad Ahmadi Christine Kroll Annika Plate Verena Rozanski Juliana Maiostre Johannes Levin Olaf Dietrich Birgit Ertl-Wagner Kai Bötzel, Nassir Navab 2016 Hough-CNN: Deep learning for segmentation of deep brain regions in MRI and ultrasound Elsevier Inc 164 92-102.

[6]. Dena Nadir George Hashem B Jehlol Anwer Subhi Abdulhussein Oleiwi 2015 Brain Tumor Detection Using Shape features and Machine Learning Algorithms International Journal of Scientific & Engineering Research 6 12 454-459.

[7]. Sobhangi Sarkar Avinash Kumar Sabyasachi Chakraborty Satyabrata Aich Jong-Seong Sim Hee-Cheol Kim 2020 A CNN based Approach for the Detection of Brain Tumor Using MRI Scans Test Engineering and Management 83 16580 – 16586.

[8] Komal Sharma Akwinder Kaur Shruti Gujral 2014 Brain Tumor Detection based on Machine Learning Algorithms International Journal of Computer Applications 103 7-11.

[9] J, B. Weaver, X. Yansun, D, Healy, and L. D, Cromwell, "Filtering noise from images with wavelet transforms," Magnetic Resonance in Medicine, voL 21, no. 2, pp, 288- 295, 1991.

[10] Murugesan, M. Dr. (Mrs.). Sukanesh, R “Automated Detection of Brain Tumor in EEG Signals Using Artificial Neural Networks”, IEEE Conference on Advances in Computing, Control, & Telecommunication Technologies,2009. Act 09. Trivandrum, Kerala

[11] M. Murugesan and Dr. (Mrs.).R. Sukanesh “Towards Detection of Brain Tumor in Electroencephalogram Signals Using Support Vector Machines” International Journal of Computer Theory and Engineering, Vol. 1, No. 5, December, 2009.

[12] Pranian Afshar, Arash Mohammadi, and Konstantinos N.Plataniotis, “BayesCap: A Bayesian Approach to Brain Tumor Classification Using Capsule Networks,” IEEE Signal Processing Letters(Volume 27),(2020).

[13] Moumen T.Elmegy, and Khaled M.Abo-El Magad, “A Multiple Classifiers System for AutomaticMultimodal Brain Tumor Segmentation,” in IEEE Access, (2019).

[14] Balakumaresan Ragupathy, and Manivannan Karunakaran, “A deep learning model integrating convolution neural network and multiple kernel K means clustering for segmenting brain tumor in magnetic resonance images,”in Int J Imaging Syst Technol. Wiley Periodicals LLC, (2020).

[15] S. Krishnakumar, K. Manivannan, ”Efective segmentation and classifcation of brain tumor using rough K means algorithm and multi kernel SVM in MR images”, in Journal of Ambient Intelligence and Humanized Computing, Springer (2020).