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BRAIN TUMOUR DETECTION USING DEEP LEARNING

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Abstract:

Nowaday's tumor is second leading cause of cancer. The medical field needs automated, efficient and reliable technique to detect tumor like brain tumor. Detection plays very important role in treatment. If proper detection of tumor is possible then doctors keep a patient out of danger. Various image processing techniques are used in this application. Using this application doctors provide proper treatment and save a number of tumor patients. A tumor is nothing but excess cells growing in an uncontrolled manner. Currently, doctors locate the position and the area of brain tumor by looking at the MR Images of the brain of the patient manually. This results in inaccurate detection of the tumor and is considered very time consuming. A tumor is a mass of tissue it grows out of control. We can use a Deep Learning architectures CNN. The performance of model is predict image tumor is present or not in image. If the tumor is present it return yes otherwise return no.

Keywords — **Medical Image Processing, Brain tumour, MRI, Artificial neural network, CNN, Keras**

I. INTRODUCTION

The human body is made up of many organs and brain is the most critical and vital organ of them all. One of the common reasons for dysfunction of brain is brain tumor. A tumor is nothing but excess cells growing in an uncontrolled manner. Brain tumor cells grow in a way that they eventually take up all the nutrients meant for the healthy cells and tissues, which results in brain failure. Currently, doctors locate the position and the area of brain tumor by looking at the MR Images of the brain of the patient manually. This results in inaccurate detection of the tumor and is considered very time consuming.

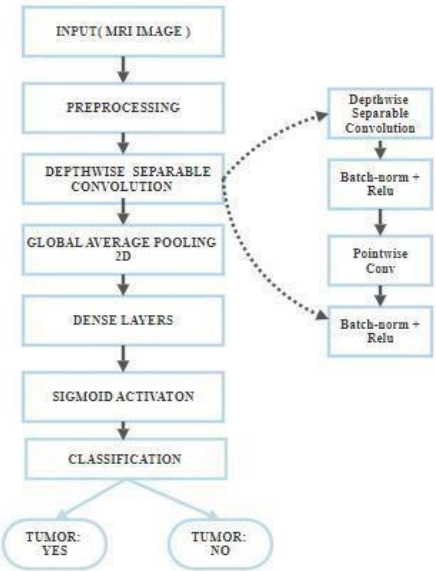
A Brain Cancer is very critical disease which causes deaths of many individuals. The brain tumor detection and classification system is available so that it can be diagnosed at early stages. Cancer classification is the most challenging tasks in clinical diagnosis. This project deals with such a system, which uses computer, based procedures to detect tumor blocks and classify the type of tumor using Convolution Neural Network Algorithm for MRI images of different patients. Different types of image processing techniques like image segmentation, image enhancement and feature extraction are used for the brain tumor detection in the MRI images of

the cancer-affected patients. Detecting Brain tumor using Image Processing techniques its involves the four stages is Image Pre-Processing, Image segmentation, Feature Extraction, and Classification. Image processing and neural network techniques are used for improve the performance of detecting and classifying brain tumor in MRI images.

II. EXISTING SYSTEM

In existing system, we have identified traditional algorithms that are only effective to the initial cluster size and cluster centers. These clusters vary with different initial inputs, then it creates problems in classifying pixels. In the existing, popular fuzzy cluster mean algorithm is used i.e., the cluster centroid value is taken randomly. This will increase the time to get the desired solution. The accuracy and computational speed is less and also the image quality is not clear, therefore we came up with the following proposed system.

III. PROPOSED SYSTEM



A. Dataset collection:

The dataset used is provided by Navoneel Chakrabarty on the Kaggle website which was previously used by various researchers in their research paper. This dataset altogether has 253 MRI images with 98 images of non cancerous type and 155 images of cancerous type.

B. Preprocessing:

Before feeding the MRI images to the proposed structure preprocessing step is performed on the images. In the image preprocessing part first ImageDataGenerator method of keras library is used to Generate batches of tensor image data with real-time data augmentation so that our model gets different types of images. Also the preprocess_input parameter of the Image DataGenerator method of keras library is set to adequate MRIimage to the format the model requires. All the necessary steps of preprocessing including cropping of image, rotation of image, defining brightness range, flipping the image and finding the 4 rectangular boundary coordinates of the cropped image is done inside this ImageDataGenerator method of keras library.

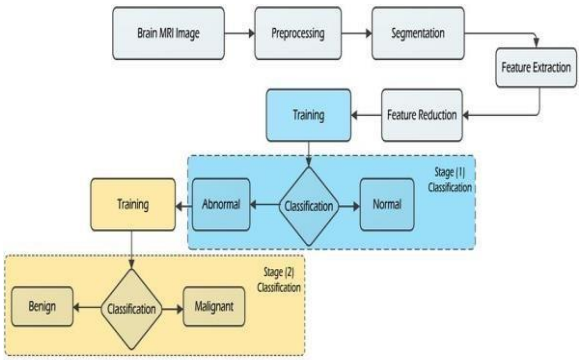
C. Data Modelling:

After we have standardised our entire dataset we have splitted our dataset into training set as well as test set. 80% data is used for training and 20% data is used for testing. Then using Image Data Generator, images are splitted into test and training sets.

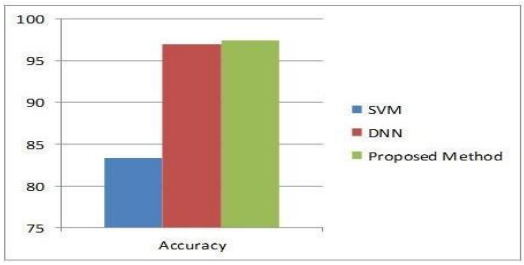
D. Methodology:

MobileNet architecture is an efficient architecture that uses depthwise separable convolutions as shown in Fig. no.2, to construct lightweight deep convolutional neural networks and provides an efficient model. This MobileNet model is saved as a base model & on that base model global average 2D pooling layer is applied. Global average 2D pooling layer minimizes overfitting by reducing the total number of parameters in the model. After this two dense layers with 1024 neurons each are added to the base model with relu activation function so that model can learn more complex functions & classify for better results faster. The result obtained from the previous layer is then passed through another dense layer with 512 neurons with sigmoid activation function, which will classify the image as tumor detected positive(yes) or negative(no). Model is then compiled using binary cross entropy and Adam

optimizer. Binary cross entropy minimises the loss function & Adam optimizer combines the best properties of the AdaGrad and RMSProp algorithms to provide an optimization algorithm that can handle sparse gradients on noisy problems. Atlast base model is trained for 150 epochs so that the model can learn different complex patterns with maximum accuracy of 92%.



IV. RESULTS



V. CONCLUSION

Medical image segmentation is a challenging issue due to the complexity of the images, as well as the lack of anatomical models that fully capture the potential deformations in each structure. This proposed method works very effectively to the initial cluster size and cluster centers. The segmentation is done by using BWT techniques whose accuracy and computation speed are less. This work recommends a system that requires negligible human intrusion to partition the brain tissue. The main aim of this recommended system is to aid the human experts or neurosurgeons in identifying the patients with minimal time. The experimental results show 98.5% accuracy compared to the state-of-the-art technologies. Computational time, system complexity, and memory space requirements taken for executing the algorithms could be further reduced. The same approach can be also used to detect and analyze different pathologies found in other parts of the body (kidney, liver, lungs, etc.). Different classifiers with optimization methodology can be used in future research to improve accuracy by integrating more effective segmentation and extraction techniques with real-time images and clinical cases using a wider data set covering various scenarios.

VI. REFERENCES

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