Brain tumor classification using CNN

Shyam Pandav[1], Devashish Nannaware[2], Prathamesh Kadam[3]

School of Computer Engineering and Technology

MIT Academy of Engineering, Alandi(D), Pune

INDIA

1svpandav@mitaoe.ac.in,

2dmnannaware@mitaoe.ac.in,

3ptkadam@mitaoe.ac.in

***Abstract* --**

These papers mainly focuses on brain tumor detection using various techniques i.e Soft computing techniques, Neural Network, KNN (K-nearest neighbour), ANN (Artificial Neural Network). Brief description was given about stages of brain tumor, extraction of features. Classification used for to know tumor stages. The problem for classification was it is very complex to train CNN model from scratch so they have used pre-trained model to build their model. By doing this lot of time saved and also it is very time consuming process. In one of the paper the extraction of texture features in the detected tumor has been achieved by using Gabor filter. Which gives good result over the others.

***Keywords* --** brain tumor, Neural Network, ANN, model, pre-trained, feature, etc.

I. INTRODUCTION

It is estimated that worldwide, more than 12 million new cancer cases occur every year and more than 7 million people will die from it (that is about 21,000 cancer deaths a day).[1] Brain cancer is among the most aggressive ones with a survival rate after 5 years of less than 25%. So, its very necessary to detect that cancer in pre-stages due to which life expectancy can be increased.

In day to day life scenario many people are unaware of the brain tumor. If any case one of the person may having tumor in brain. Initially there are no such symptoms. If he/she going for checkup there having some processing time for declaring person having tumor or not. It also more harmful for that person.

First we should know what is tumor. Tumor is uncontrolled growth of cells which harmful to human being. There are two main types of brain tumor. First is benign (low grade) another is malignant (high grade). Malignant is spread rapidly which causes immediate death.

Most of the hospitals having MRI machine which used for detection of brain tumor. To diagnosis wants the team of expert doctors. To help that doctor to sort images using our model helps to remove human error in sorting images. It doesn't mean that it predict 100% of images but it helps rapid diagnosis and reduce time to analyze piles of MRI images.

II. LITERATURE REVIEW

H.B. Nandpuru et al. [3] present the method for brain tumor classification. The brains MRI are classified into the normal and cancerous using SVM a supervised machine learning technique. Firstly, the texture, symmetrical and gray features were extracted. The proposed classifier gives 84% accuracy

El-Dahshan et al. [4]. The brain MRI is an input to the system; features were extracted by discrete wavelet transform, reduced by principal component analysis technique and classify by using feed forward back propagation artificial neural network (FF- BPNN) and KNN. Using these classifiers gives an accuracy of 99% on both training and testing datasets.

Hong Men, et al. [5] present two machine learning algorithm neural network and SVM for classification of brain MRI. They used two kind of support vector machine based on polynomial kernel and radial basis function for different parametric values. The result of this experiment indicates that the support vector machine method is superior to the neural network algorithm.

III. RELATED WORK

1) Data Collection :-

We collect MRI images from kaggle. We use labeled data that is making two folder of positive and negetive brain tumor images.

2) Data Augmentation :-

Importing all required libraries using Tenserflow backed. We make more copied of given images. Which helps to increase the accuracy of the model. In that data augmentation process. We done the same number of copies that is positive and negative images of brain tumor. It helps to increase variance of model.

3) Data Processing :-

In order to crop the part that contains only the brain of the image, I used a cropping technique to find the extreme top, bottom, left and right points of the brain.

4) Load Up Data :-

First we read image from folder then crop the part of the image representing only the brain. After that we resize the image in standard resolution. Then apply normalization because we want pixel values to be scaled to the range 0-1. Lastly append image to X and label to Y.

5) Splitting of Data :-

As we know we split data into 80% training and 20% for testing phase.

6) Train the Model :-

We start training our model with 10 epochs. If we increase number of epochs which may increase accuracy but slow the computation of model.

IV. OUR METHOD

The existence of a variety of types of tumors and the cause of brain tumors is unknown but their occurrence is associated with an abnormal growth of cells inside the skull which may lead to serious impairments and/or life-threatening conditions because of their character and the limited space of the intracranial cavity. Research shows that people affected by brain tumors die due to their inaccurate detection [1]. So, to overcome this one of the system that is used consists of mainly four modules: pre-processing, segmentation, Feature extraction and classification.

Second approach used that was Computer-aided detection or diagnosis (CAD). It effectively detects tumor in the brain as well as used for early detection on cancerous. CAD is nothing but the procedures in medical science that assists the doctor in the interpretation of medical images. The approach used i.e. Gabor representation has been shown to be optimal in the sense of minimizing the two dimensional uncertainty in space and frequency. In this paper, a brain tumor detection method using pre-processing, Gabor feature extraction and BPN classification was proposed.

Third approach uses KNN classification. They explain the voxel feature representation used, how KNN classification was performed using the user interaction labeled data and which spatial label dependency models we investigated.

V. CONCLUSIONS

This research discuss about detection of brain tumor using convolution neural network. CNN is used to reduce computing power and complexity.

The system help doctor(neurosurgeon, neurologist etc.) to classify brain tumor (Medulloblastom, Glioma, Craniopharyngioma etc.) from MRI images with high accuracy and low complexity.

The experiment result shows the classification accuracy of 89.9%. using CAD model. It is essential to use large number of patient's data which will further improve the accuracy of the system. Soft computing method achieve the optimum result in the shortest time.

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