**Segmentation and Classification of Brain Tumor using 3D-UNet and Convolutional Neural Networks**

**ABSTRACT**

Early detection and diagnosis of a brain tumor enhance the medical options and the patient’s chance of recovery. Magnetic resonance imaging (MRI) is used to detect and diagnose brain tumors. However, the manual identification of brain tumors from a large number of MRI images in clinical practice solely depends on the time and experience of medical professionals. Presently, computer aided expert systems are booming to facilitate medical diagnosis and treatment recommendations. Numerous machine learning and deep learning based frameworks are employed for brain tumor detection. This paper aims to design an efficient framework for brain tumor segmentation and classification using deep learning techniques. The study employs the **3D-UNet** model for the **volumetric segmentation** of the MRI images, followed by the **classification** of the tumor using **CNN**s. The loss and precision diagrams are presented to establish the validity of the models. The performance of proposed models is measured, and the results are compared with those of other approaches reported in the literature. It is found that the **proposed work is more efficient** than the state-of-the-art techniques.

**Keywords:** brain tumor segmentation , tumor classification, 3D UNET , CNN , MRI Scan

**Existing methods**

1. Manual prescription from doctor
2. ML algorithms (SVM, KNN)

**Limitations or drawbacks**

1. Manual will take time and cost
2. ML algorithm : accuracy is less

**Proposed Method**

1. Segmentation : 3D UNET [to get the tumor region/location]
2. Classification : DNN (CNN) [type of tumor]

**Advantages :**

1. Less cost and time is required
2. Accuracy is higher
3. Application is user friendly

**3.2 Flowchart for proposed method**

Selection of dataset

Pre-processing

Segmentation

Feature extraction

Classification

Prediction of single image

**Fig. 7 Flowchart of proposed method**

# **CHAPTER 4**

**SOFTWARE AND HARDWARE REQUIRMENT**

**4.1 HARDWARE REQUIREMENTS:**

* System : Pentium Dual Core.
* Hard Disk : 120 GB.
* Monitor : 15’’ LED
* Input Devices : Keyboard, Mouse
* Ram : 4 GB

**4.2 SOFTWARE REQUIREMENTS:**

* Operating system : Windows 10
* Coding Language : python
* Tool : Python
* Database : Brain MRI scan dataset
* Frontend : GUI (**tkinter** library in python)

**4.3 Hardware Interfaces**

Intel Core i5 2.00GHz Processor or each and every other processor and 200 GB min RAM 20GB Hard plate, and mouse is required.

**Software Interfaces**

The Python IDLE is an open-supply web utility that allows you to make and charge records that be essential for stay code, circumstances, portrayals, and story-printed content. Uses encompass realities cleansing and exchange, numerical re-establishment, quantifiable illustrating, realities conviction, framework examining, and divides