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**CERTIFICATE**

This is to certify that the project report entitled “**Semantic Segmentation For Brain Tumor MRI Image Segmentation**” submitted by **DEEPAK BUDHWANI , HIMANI SHARMA and MANSI GOYAL** to the **Galgotias** **College Of Engineering & Technology**, Uttar Pradesh in partial fulfillment for the award of Degree of Bachelor of Technology in Information Technology is a bonafide record of the project work carried out by them under my supervision during the year 2017-2018.

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**ABSTRACT**

Among brain tumors, gliomas are the most common and aggressive, leading to a very short life expectancy in their highest grade. Magnetic resonance imaging (MRI) is a widely used imaging technique to assess these tumors, but the large amount of data produced by MRI prevents manual segmentation in a reasonable time, limiting the use of precise quantitative measurements in the clinical practice.So, automatic and reliable segmentation methods are required;however, the large spatial and structural variability among brain tumors make automatic segmentation a challenging problem.

Accurate tumor segmentation is an essential and crucial step for computer-aided brain tumor diagnosis and surgical planning. Subjective segmentations are widely adopted in clinical diagnosis and treating, but they are neither accurate nor reliable. An automatical and objective system for brain tumor segmentation is strongly expected. But they are still facing some challenges such as lower segmentation accuracy, demanding a priori knowledge or requiring the human intervention. In this paper, we propose an automatic segmentation method based on Convolutional Neural Networks (CNN), exploring small 3 3 kernels. The use of small kernels allows designing a deeper architecture, besides having a positive effect against overfitting, given the fewer number of weights in the network. We also investigated the use of intensity normalization as a pre-processing step, which though not common in CNN-based segmentation methods, proved together with data augmentation to be very effective for brain tumor segmentation in MRI images. The final performance shows that the proposed brain tumor segmentation method is more accurate and efficient.

Keywords — Diagnosis, subjective segmentation, autoencoder ,tumor segmentation, Brain tumor segmentation; Brain tumor detection,Computer Aided Diagnosis (CAD); Deep Learning; Stacked Denoising Auto-Encoder (SDAE) ;Stacked Auto-Encoder (SAE).

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**ABBREVIATIONS**

1. SVM Support Vector Machine
2. SDAE Stacked Denoising Auto-Encoder
3. FFNN Feed Forward Neural Network
4. CNN Convolutional Neural Networks
5. FANN Fast Artificial Neural Network
6. MRI Magnetic Resonance Imaging