VISVESVARAYA TECHNOLOGICAL UNIVERSITY,

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A PROJECT REPORT

ON

"Brain Tumor Segmentation using Convolutional Neural Networks in MRI Images"

Submitted By

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Submitted in partial fulfillment for the award of Degree of,

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IN

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Under the Guidance of

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CERTIFICATE

This is to certify that the Project entitled "**Brain Tumor Segmentation using Convolutional** *Neural Networks in MRI Images*" *has been successfully completed by*

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The bonafide students of Department of Information Science and Engineering, Alva's Institute of Engineering and Technology in partial fulfillment for the award of BACHELOR OF ENGINEERING in **DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING** *of the* **VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI** *during the year 2016–2017. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of Project work prescribed for the Bachelor of Engineering Degree.*

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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. Thus, treatment planning is a key stage to improve the quality of life of on cological patients. 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.

The proposed system introduces 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. It is 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.

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