

VISVESVARAYA TECHNOLOGICAL UNIVERSITY,
JNANA SANGAMA CAMPUS, BELAGAVI-590 014



A PROJECT REPORT
ON
“Brain Tumor Segmentation using Convolutional Neural
Networks in MRI Images”

Submitted By

Mr. RAKESH B. :4AL13IS027

Mr. SUMANTH S. :4AL13IS031

Mr. VISHNUPRASAD P. :4AL13IS036

Mr. VISHWAS V. :4AL13IS038

Submitted in partial fulfillment for the award of Degree of,

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Under the Guidance of

Ms. KAVERI B. KARI B.E.,M.Tech.

ASSISTANT PROFESSOR



DEPARTMENT OF INFORMATION SCIENCE & ENGINEERING
ALVA'S INSTITUTE OF ENGINEERING AND TECHNOLOGY
MOODBIDRI-574225, KARNATAKA

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ALVA'S INSTITUTE OF ENGINEERING AND TECHNOLOGY

MIJAR, MOODBIDRI D.K. -574225

KARNATAKA



DEPARTMENT OF INFORMATION SCIENCE & ENGINEERING

CERTIFICATE

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

Mr. RAKESH B	: 4AL13IS027
Mr. SUMANTH S	: 4AL13IS031
Mr. VISHNUPRASAD P	: 4AL13IS036
Mr. VISHWAS V	: 4AL13IS038

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.

Ms. Kaveri B. Kari
Assistant Professor
Project Guide

Mr. Jayanth Kumar A. Rathod
Associate Professor,
Dept. of Information Science & Engineering
Alva's Institute of Engineering & Technology
Mijar, MOODBIDRI - 574 225
External Viva

BRUNO P. Fernandes
Alva's Institute of Engg. & Technology,
Mijar, MOODBIDRI - 574 225, D.K

Name of the Examiners

Signature with Date

- 1.
- 2.

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 oncological 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.