**Project Praposal**

Brain Tumor Detection Using Deep Learning Techniques

By

Team member1 12333333

Mani Sai Deeraj Marru 11667818

12333333

Team member3 12333333

Team member4 12333333

Team member5 12333333

**Title**

Brain Tumor Detection Using Deep Learning Techniques

**Abstract**

Deep learning methods have advanced so quickly that they have completely changed the field of medical imaging and opened the door to the possibility of early and precise tumor diagnosis. Conventional tumor detection techniques can be labor-intensive and prone to human error since they frequently depend on manual inspection. Brain tumors are serious and devastating diseases, which results in lower life expectancy or death. Accurate diagnosis is very important to extend the lives of the affected individuals. Convolutional Neural Networks (CNNs), a kind of deep learning, provide an automatic and effective substitute. An overview of CNNs' use in the identification of tumor cancers from medical imaging is given in this study. We go over the procedure, which starts with gathering a sizable dataset of annotated medical photos and then involves augmenting the data to boost variability and decrease overfitting.

**Objective**

This project's main goal is to use convolutional neural networks' (CNNs) ability to automatically identify brain cancers from MRI data. Our goal is to create a model that can reliably and quickly identify scans as either tumor-positive or tumor-negative by training a CNN on an extensive dataset of labeled MRI images. With the goal of improving patient outcomes and helping radiologists spot problems early, this project aims to improve diagnosis.

**Background & Data Selection**

Brain tumors are a serious health risk, and treatment results and prognosis can be greatly enhanced by early identification. Conventional detection techniques depend on radiologists manually reviewing MRI images, which may be laborious and prone to human error. Using CNNs to automate this operation might improve efficiency and accuracy. The "Brain tumor Dataset 2," which is given by professor comprises MRI images particularly labeled for the presence or absence of brain It has malignancies, glioma, Pituitary, No tumor images will be taken into consideration for this hypothetical project. This dataset was selected due to its extensive collection of brain MRI images and its specificity to the issue at hand. It contains training and testing dataset images. It has 394 test data images and 2870 train data images.

**Methodology**

**Data Cleaning:** To guarantee that every MRI scan is of the highest caliber, it will be examined. Uncertain or improperly tagged scans will not be accepted.

**Standardization:** To ensure that the model receives inputs of a constant size, all MRI images will be downsized to a uniform dimension in order to preserve consistency.

**Augmentation:** We will use data augmentation approaches to improve the model's capacity for generalization. This covers horizontal flips, brightness tweaks, zooming, and arbitrary rotations. By artificially expanding our dataset, these methods will increase variability and lower the chance of overfitting.

**Model Architecture and Selection:** Our approach will be centered around a specially designed CNN made for MRI images. This will include dropout layers to avoid overfitting, numerous convolutional layers to extract data, pooling layers to minimize spatial dimensions, and dense layers for classification.

**Activation Functions:** Given our binary classification job, we will utilize a sigmoid activation function for the final layer and the Rectified Linear Unit (ReLU) activation function for the hidden layers.

**Model Compilation:** A binary cross-entropy loss function that is appropriate for our binary classification task will be used to construct the model. We will use the Adam optimizer because of its versatility and effectiveness.

**Training Strategy:** The dataset will be divided into three sets: test (10%), validation (10%), and training (80%). The model will be trained using the training set, validated using the test set to assess the model's final performance and adjust hyperparameters to avoid overfitting.

**Batch Size and Epochs:** The model will be trained for a total of 50 epochs with a batch size of 32. Changes will be made in accordance with the performance of the validation set.

**Callbacks:** To ensure effective training, early stopping will be used to cease training if the validation loss does not improve after a predetermined number of epochs.

**Model evaluation**: Accuracy, sensitivity (recall), specificity, and the Area Under the ROC Curve (AUC) will be used to evaluate the model's performance. These measures will offer a thorough understanding of the model's dependability and tumor detection capabilities.

**Confusion Matrix:** To show the model's predictions in comparison to the real labels, a confusion matrix will be created. This will provide information on false positives and false negatives.

**Literature Review**

One potential area of medical imaging research is the use of convolutional neural networks (CNNs) for brain tumor identification in MRI data. Because CNNs can automatically learn and recognize complex tumor patterns, they are gradually replacing traditional image processing approaches, which frequently required human involvement (Zhang et al., 2015). The accuracy of several topologies in identifying brain cancers has been assessed, ranging from basic networks to more complex designs like ResNet (He et al., 2016). Transfer learning has also been investigated to take use of pre-trained models, improving detection accuracy, even as data augmentation approaches have been used to address the lack of labeled MRI datasets (Tajbakhsh et al., 2020). But maintaining these deep learning models' interpretability and dependability still has to be done.

**References:**

1.Brain Tumour Detection Using Deep Learning, Avigyan Sinha @, Aneesh R P $, Malavika Suresh $, Nitha Mohan R\*, Abinaya D\*, Ashwin G Singer\*

2.Efficient framework for brain tumor detection using different deep learning techniques, Fatma Taher1, Mohamed R. Shoaib2, Heba M. Emara2\*, Khaled M. Abdelwahab2, Fathi E. Abd El-Samie2,3 and Mohammad T. Howell

3.DESIGN AND IMPLEMENTING BRAIN TUMOR DETECTION USING MACHINE LEARNING APPROACH, G.Hemanth1, M.Janardhan2,L.Sujihelen3

4.Brain Tumor Detection Using Convolutional Neural Network, Tonmoy Hossain1\*, Fairuz Shadmani Shishir2@ , Mohsena Ashraf3#, MD Abdullah Al Nasim4&, Faisal Muhammad Shah5$

5.Classificatin of Brain Tumors by Machine Learning Algorithms, Gokalp Cinarer, Bulent Gursel Emiroglu

6.Brain Tumor Detection and Classification Using Intelligence Techniques: An Overview, SHUBHANGI SOLANKI 1, UDAY PRATAP SINGH 2, (Member, IEEE), SIDDHARTH SINGH CHOUHAN 3, AND SANJEEV JAIN4, (Member, IEEE)

7.Current Trends on Deep Learning Models for Brain Tumor Segmentation and Detection – A Review, S.Somasundaram, R.Gobinath

8.BRAIN TUMOR DETECTION USING DEEP LEARNING MODELS, Sneha Grampurohit, Venkamma Shalavadi, Vaishnavi R. Dhotargavi

9.A New Model for Brain Tumor Detection Using Ensemble Transfer Learning and Quantum Variational Classifier, Javeria Amin ,1 Muhammad Almas Anjum ,2 Muhammad Sharif ,3 Saima Jabeen ,4 Seifedine Kadry ,5 and Pablo Moreno Ger 6

10.Machine and Deep Learning Approaches For Brain Tumor Identification: Technologies, Applications, and Future Directions, Vikram verma, tajinder kumar Saini

11.Brain Tumor Detection and Classification Using Deep Learning and Sine-Cosine Fitness Grey Wolf Optimization, Hanaa ZainEldin 1, Samah A. Gamel 1, El-Sayed M. El-Kenawy 2,\* , Amal H. Alharbi 3, Doaa Sami Khafaga 3,\*,Abdelhameed Ibrahim 1,\* and Fatma M. Talaat 4

12.Brain Tumor Detection Based on Deep Learning Approaches and Magnetic Resonance Imaging, Akmalbek Bobomirzaevich Abdusalomov \* , Mukhriddin Mukhiddinov and Taeg Keun Whangbo \*

13.Classification of Brain Tumors using MRI images based on Convolutional Neural Network and Supervised Machine Learning Algorithms, Saif Al-jumaili, Adil Deniz Duru

14.An efficient deep learning model to categorize brain tumor using reconstruction and fine-tuning, Md. Alamin Talukder a, Md. Manowarul Islam a,∗, Md. Ashraf Uddin b, Arnisha Akhter a, Md. Alamgir Jalil Pramanik c, Sunil Aryal b, Muhammad Ali Abdulllah Almoyad d, Khondokar Fida Hasan e, Mohammad Ali Moni f,∗

15.Convolutional Neural Network based Brain Tumor Detection, Shraddha S. More1, Mansi Ashok Mange2, Mitheel Sandip Sankhe3, Shwethali Santosh Sahu4