BRAIN TUMOR DETECTION USING DEEP LEARNING

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Agenda

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- FLOWCHART
- MASKING
- DEEP NEURAL NETWORKS
- ACCURACY

ABSTRACT

- More than 79,000 new cases of primary brain tumors are diagnosed this year, nearly 17,000 people will lose their battle with a brain tumor.Early stage of detection is important.
- Detection of brain tumor could be done under the medical equipment called Magnetic Resonance Imaging (MRI)
- In this project we have used a Deep Learning architectures CNN (Convolution Neural Network) generally known as NN (Neural Network) ,VGG 16(visual geometry group) and RESNET50 (residual network) Transfer learning to detect the brain tumor.

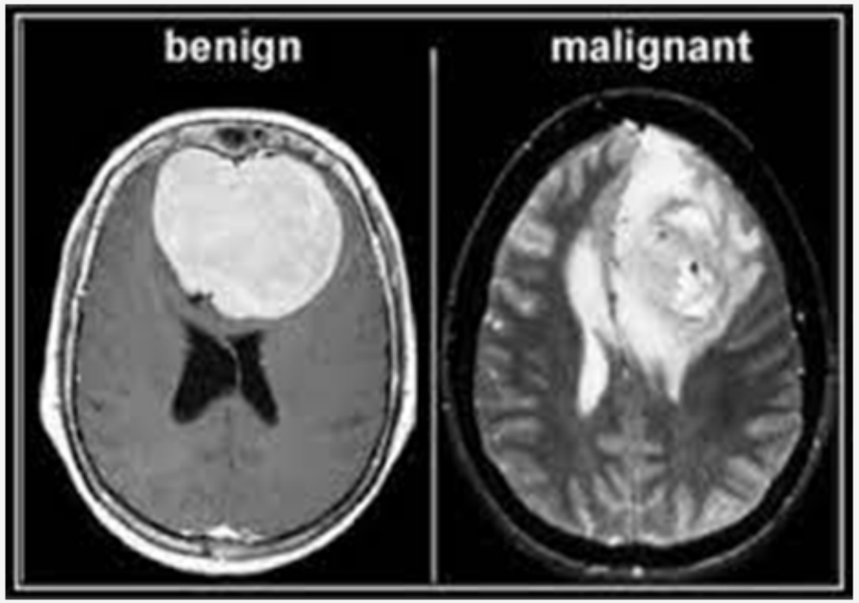
INTRODUCTION

What is Tumor?

- Tumor is a solid or fluid filled mass of abnormal tissues.
- The brain tumours are classified into mainly two types: Primary brain tumor (benign tumor) and secondary brain tumor (malignant tumor).

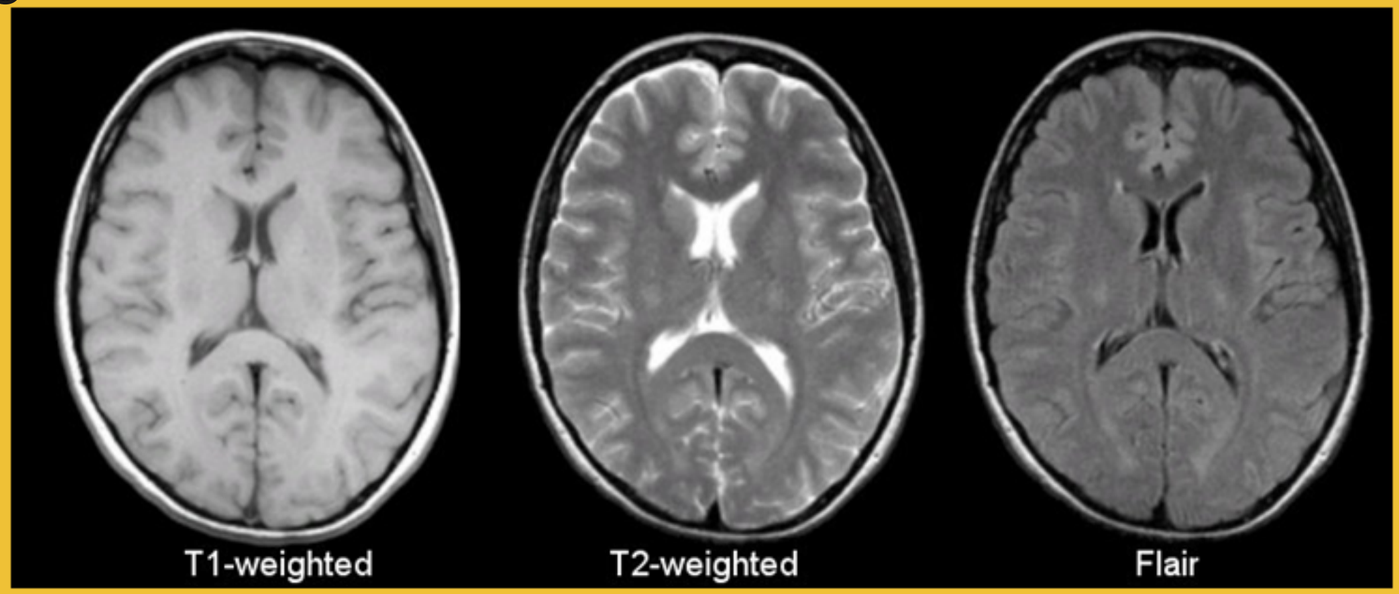
Symptoms:

- Headaches that gradually become more frequent and more severe
- Unexplained nausea or vomiting
- ·Difficulty with balance



MAGNETIC RESONANCE IMAGING (MRI)

- MRI images have a better quality as compared to other medical imaging techniques like X-ray and computer tomography.
- MRI is good technique for knowing the brain tumor in human body.
- There are different images of MRI for mapping tumor induced Change including T1 weighted, T2 weighted and FLAIR (Fluid attenuated inversion recovery) weighted.

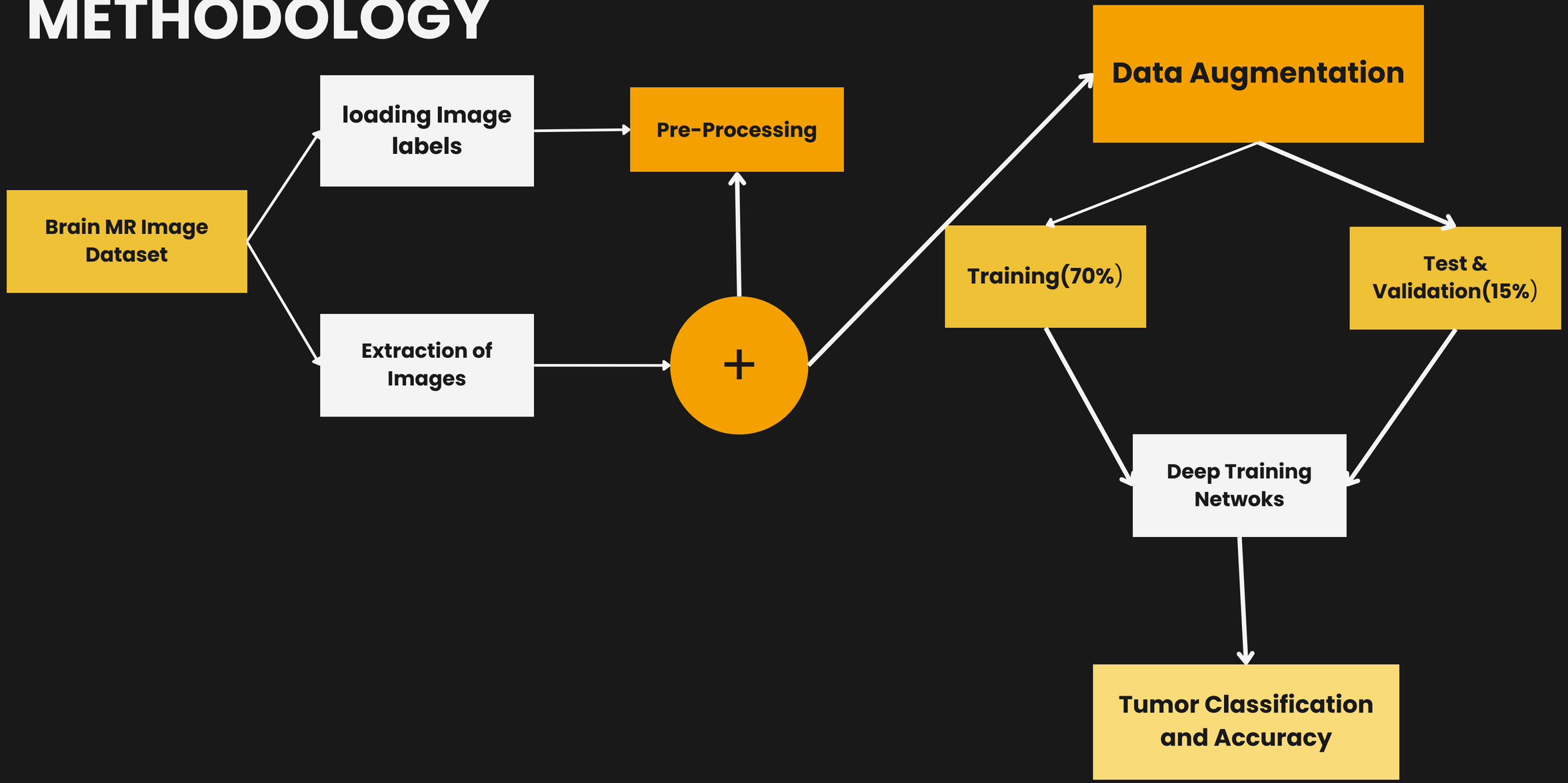


DATASET DESCRIPTION

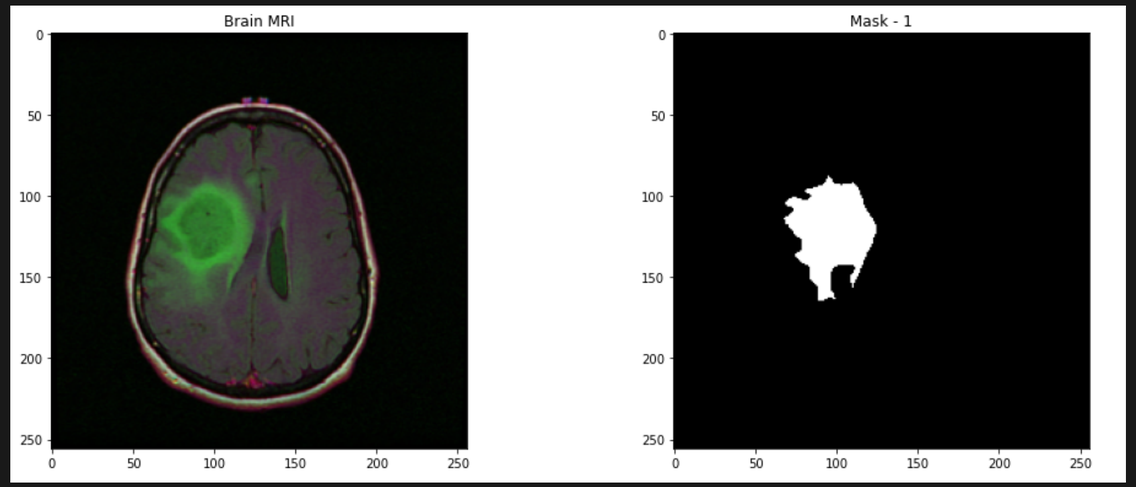
Lower Grade Glioma(LGG) Segmentation Dataset:

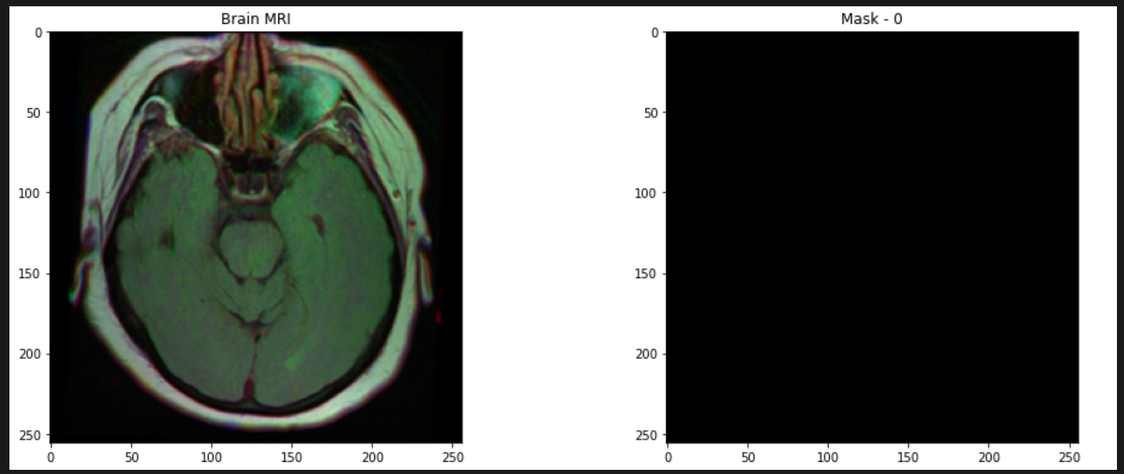
- This dataset contains brain MR images together with manual FLAIR abnormality segmentation masks.
- The images were obtained from The Cancer Imaging Archive (TCIA).
- They correspond to 110 patients included in The Cancer Genome Atlas (TCGA) lower-grade glioma collection with at least fluid-attenuated inversion recovery (FLAIR) sequence and genomic cluster data available.

METHODOLOGY



MASKING





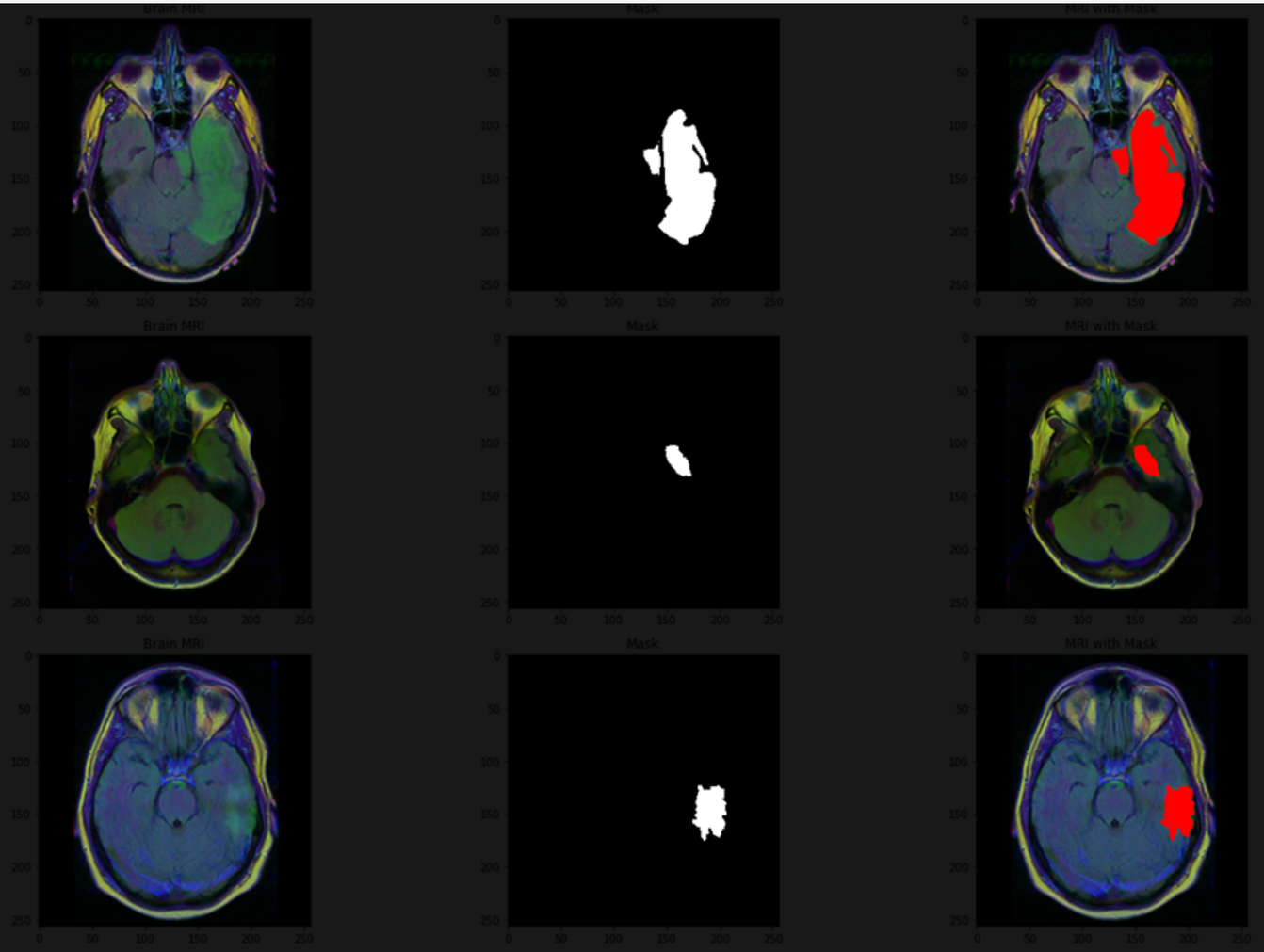
MASK-1

Image with Tumor

MASK-0

Image without Tumor

Highlighting Tumor



SPLITTING THE DATA

Spliting the Data to 70 % for training and 15% for testing and validation:

```
Found 2118 validated image filenames belonging to 2 classes.
Found 907 validated image filenames belonging to 2 classes.
Found 904 validated image filenames belonging to 2 classes.
```

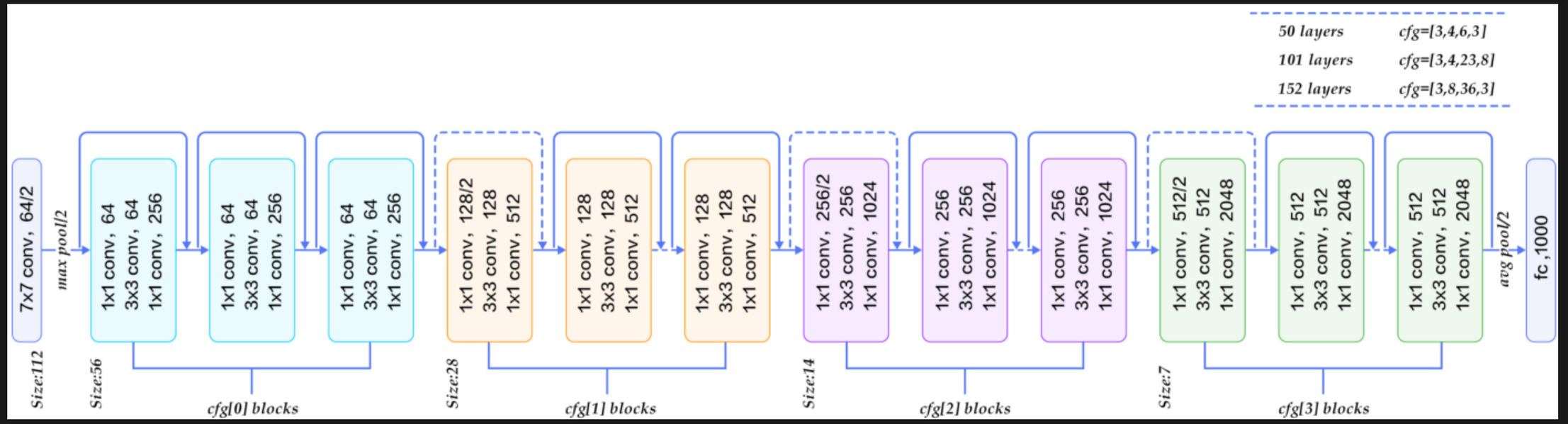
DEEP NEURAL NETWORKS USED

RESNET 50

VGG 16

CNN

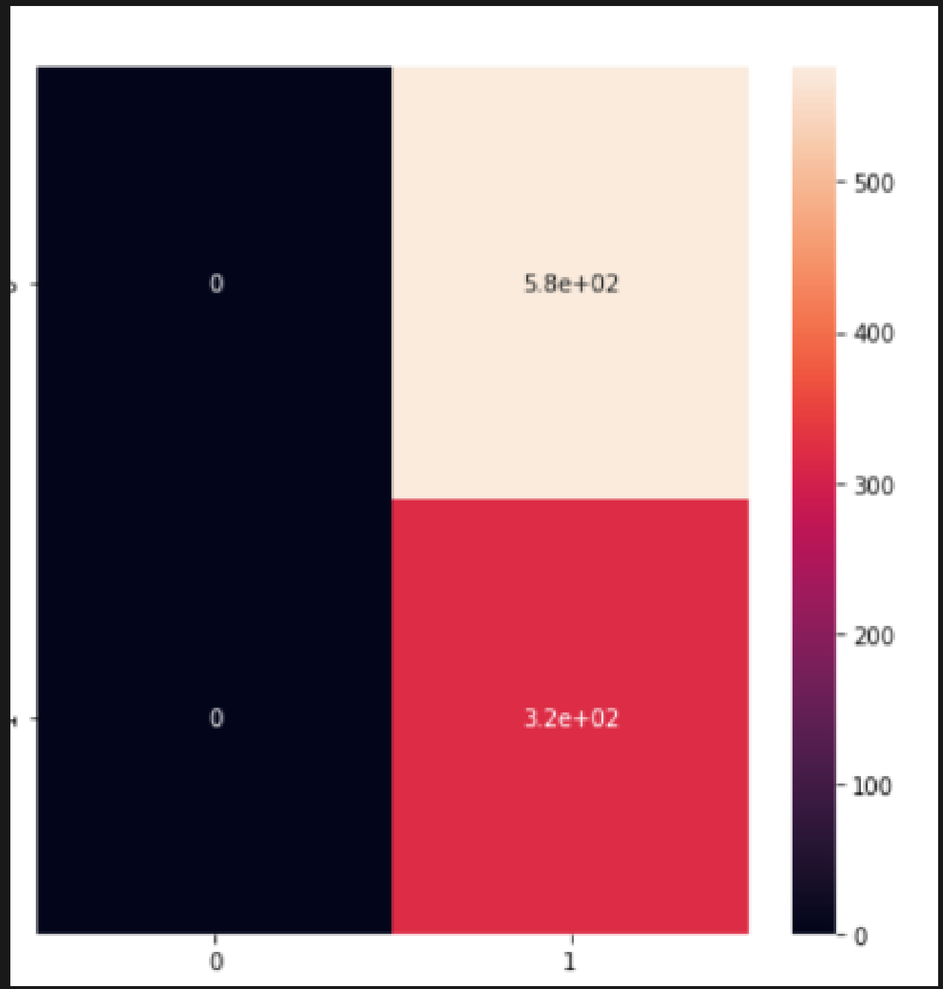
RESNET ARCHITECTURE



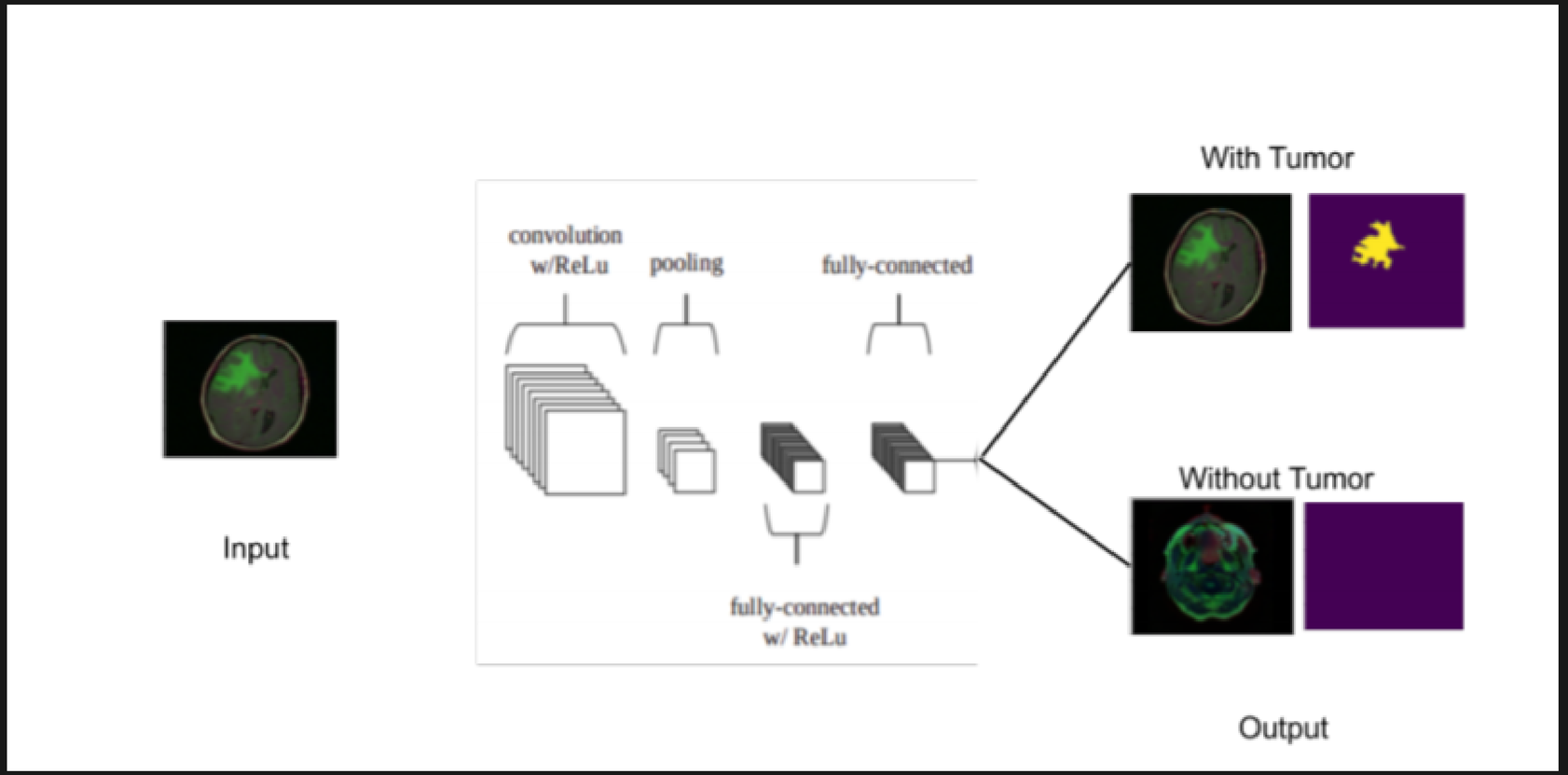
RESNET

```
model_prediction(model_resnet, "Resnet50 Model", test_generator, True)
```

```
56/56 [==============================] - 1670s 30s/step

<ipython-input-161-22124f458371>:10: UserWarning: `Model.evaluate_generat
ion. Please use `Model.evaluate`, which supports generators.
  _,accuracy = model.evaluate_generator(generator=test_generator,steps=le

Resnet50 Model accuracy: 64.2699 %
56/56 [==============================] - 2456s 44s/step

Resnet50 Model accuracy: 35.7143 %
```



CNN ARCHITECTURE



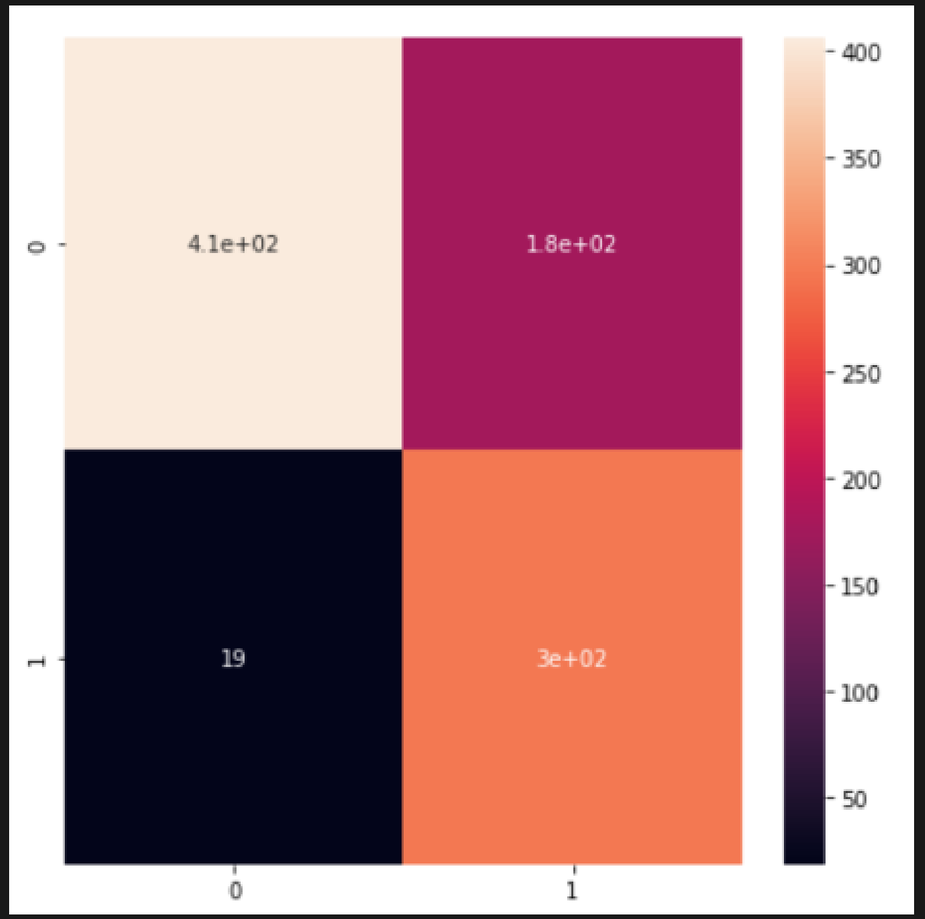
CNN

```
model_prediction(model_cnn, "CNN Model", test_generator,True)
```

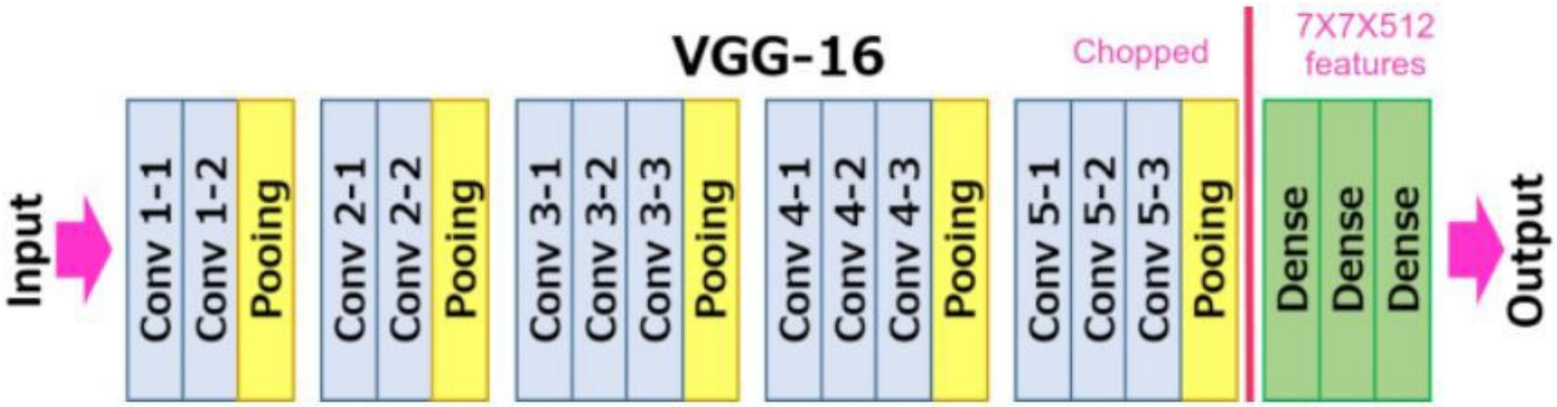
```
56/56 [==============================] - 195s 3s/step
```

```
<ipython-input-91-0052891e7223>:8: UserWarning: `Model.evaluate
n. Please use `Model.evaluate`, which supports generators.
  _,accuracy = model.evaluate_generator(generator=test_generato
```

```
CNN Model accuracy: 82.7434 %
56/56 [==============================] - 192s 3s/step

CNN Model accuracy: 78.3482 %
```



VGG ARCHITECTURE



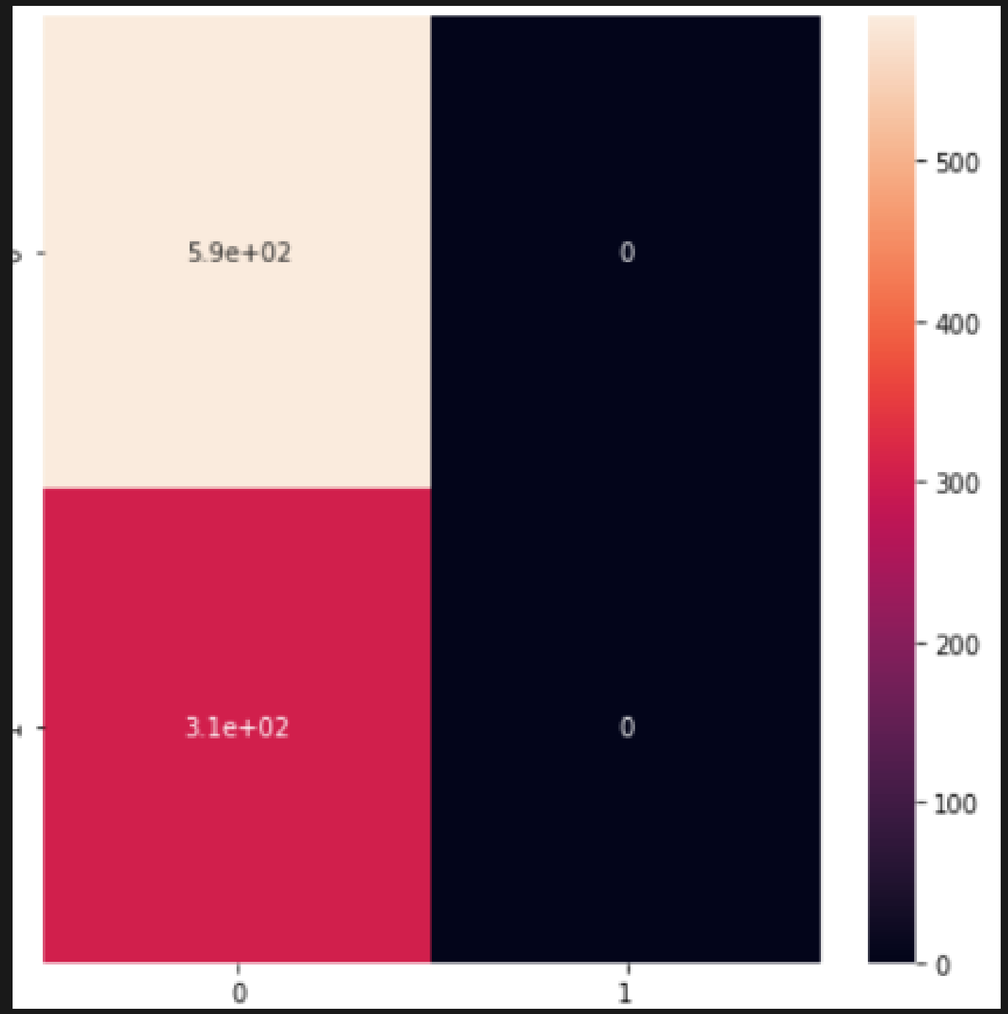
VGG16

```
model_prediction(model1_vgg16, "VGG16 Model 1", test_generator, True)
```

```
56/56 [==============================] - 5114s 91s/step
```

```
<ipython-input-101-bc5b359f8e91>:10: UserWarning: `Model.evaluate_gene
ion. Please use `Model.evaluate`, which supports generators.
  _,accuracy = model.evaluate_generator(generator=test_generator,steps
```

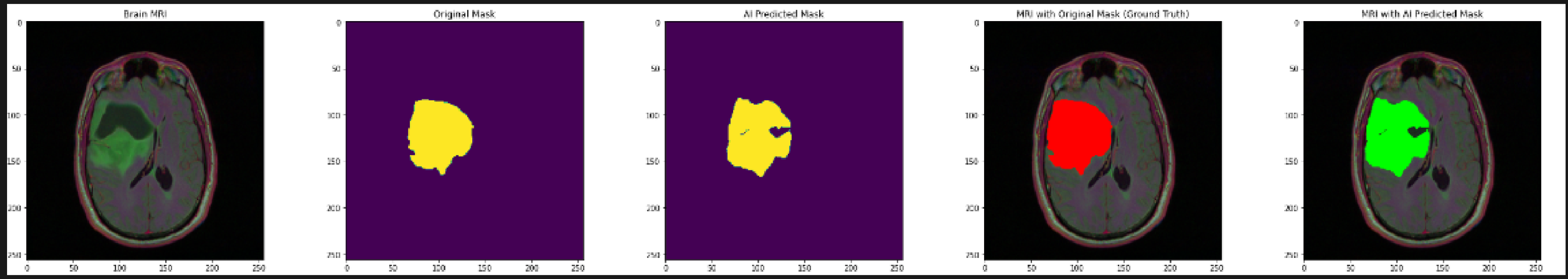
```
VGG16 Model 1 accuracy: 65.9292 %
56/56 [==============================] - 4561s 81s/step

VGG16 Model 1 accuracy: 65.8482 %
```



ACCURACY

Model	Accuracy
RESNET50	36%
VGG16	66%
CNN	79%

PREDICTION


Brain MRI
Original Mask
AI Predicted Mask
MRI with Original Mask (Ground Truth)
MRI with AI Predicted Mask


Thank
you