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BRAIN TUMOR DETECTION BY USING CNN AND VGG-16

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ABSTRACT

Medical science has incredibly grown and become Successful in modern years. Technology is altering the world of medicine. The main objective of our project is to detect the brain tumour by using Convolutional Neural Network(CNN) and VGG16. A Convolutional Neural Network is a classification of deep neural networks. CNN is mainly used for Image Processing ,by which we will capture the image and compress it. VGG is the simple yet easy model in the CNN. VGG-16 incorporates sixteen nineteen deep layers, a crucial CNN model comes to the notion if one wishes to use an off-the-shelf model for a task. Our paper intends to locate out the brain tumour with the utilization of VGG-16, by using Convolutional Neural Network model. The performance will be evaluated on accuracy.

Keywords: CNN, VGG-16, Accuracy, Classification, MRI, DNN.

I. INTRODUCTION

Artificial Intelligence comes under the domain of science co-operated with the idea of designing a machine which can learn by itself without any person's interference. Because of ML, humans can design machines which can think like humans and can learn from the experiences like human do. Many of the practical examples we are seeing today like solving various optimization complications, Classifying huge digitized data and getting required pattern, self-driving cars depending on natural language processing and deep learning. The existence of more layers and model is deeper, then the overall performance will be higher. Different deep learning algorithms are Multi-layer Preceptron Neural Network, Convolutional Neural Network, Recurrent Neural Network, long Short-term Memory, Deep Boltzmann Machine(DBM), Deep Belief Networks to function on sequential Data(signals and text), Recurrent Neural Networks are there. Now a days super computers are widely used for editing and analysing the image of a given patient and using the image, it changes the dimensions and analyses the given input of the user by using Convolutional Neural Network. This Convolutional Neural Network plays a key role by using different data set and compress the image in to computer format so that it can process the data by using artificial intelligence and using different layers such as

1. Convolutional layer: this layer preserve the characterstics of the image.
2. Pooling layer :this layer reduces the dimensions of the given data, which can avoid the over-fitting.
3. Fully connected layer:It forms the last few layers in CNN network.

We use VGG-16 model from the CNN .This Visual Geometry Group was a very simple and has a great depth. This has 2 models with 16 and 19 layers of deep datasets. VGG is an object-recognition model that supports up-to to 19 layers. We use this various datasets and use for image-recognition architectures.

II. METHODOLOGY

CNN MODEL:-

CNN is an Convolutional Neural Network. CNN model will detect the Tumor and differentiate the type of Tumor. CNN is a deep learning algorithm which take input image and process the image and differentiate the one image from another. It has four layers, i.e.; Convolutional layer, Pooling layer, Flattening layer, Fully connected layer. Those four layers performs the four different operation on the input image.

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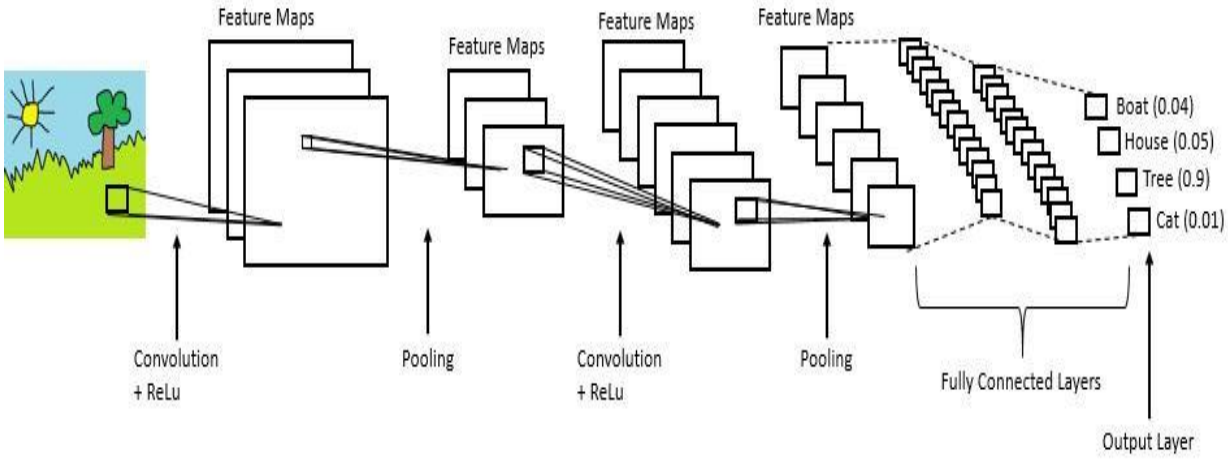


Fig 1: Architecture of Convolutional Neural Network

VGG-16:-

Now the result image of CNN model will be given to VGG-16 model. **By using VGG-16 model we will find the Severity range of Tumor.** The VGG-16 means Visual Geometric Group -16, it have 16 convolutional layers . It has fixed size of images of 224 x 224 with three channels i.e; RED GREEN BLUE (RGB).

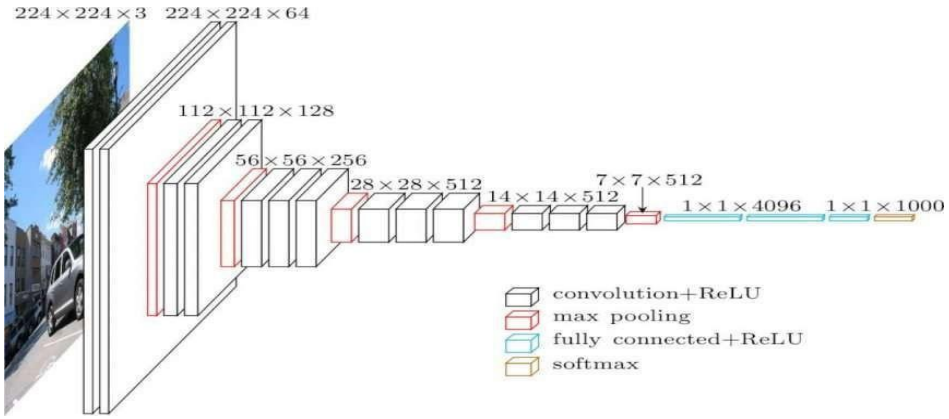
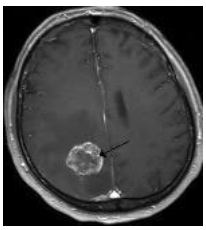


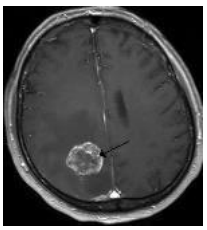
Fig 2: Architecture of Visual Geometric Group

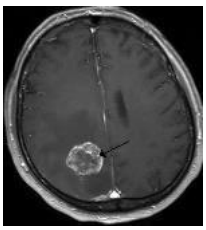
The VGG-16 has convolutional+Relu, max pooling, fully coneccted+Relu, softmax. In this VGG-16 the image will undergoes all this steps and later the image will go to classification, in classification the image is classified into Tumor type and NonTumor type. Then the image will undergoes the Post-Processing. Here the image will be again En-hanced then it will given to Tumor segmentation. In Tumor segmentation the Tumor will be segmented into 3 types ie; low severity range, medium severity range, high severity range.

III. MODELING AND ANALYSIS

At first we give the 100 images , in 100 images, 70 images are used for Training data set and 20 is for Testing data set and 10 is for Validation.


Training


Testing


Validation

Then those images are undergoes by different steps. After completing of Training data sets the image will go under the Pre-Processing, here the image En-hancement will take place. En-hancment is technique for tranfering the low, noise, blur, croping images into better image for better output. Next the image undergoes

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the Extraction process, here the patch will be extracted by weights of the image and then this images will given to CNN. Then the CNN model will be give the image to Prediction model for the Tumor prediction if the Tumor is present or not.

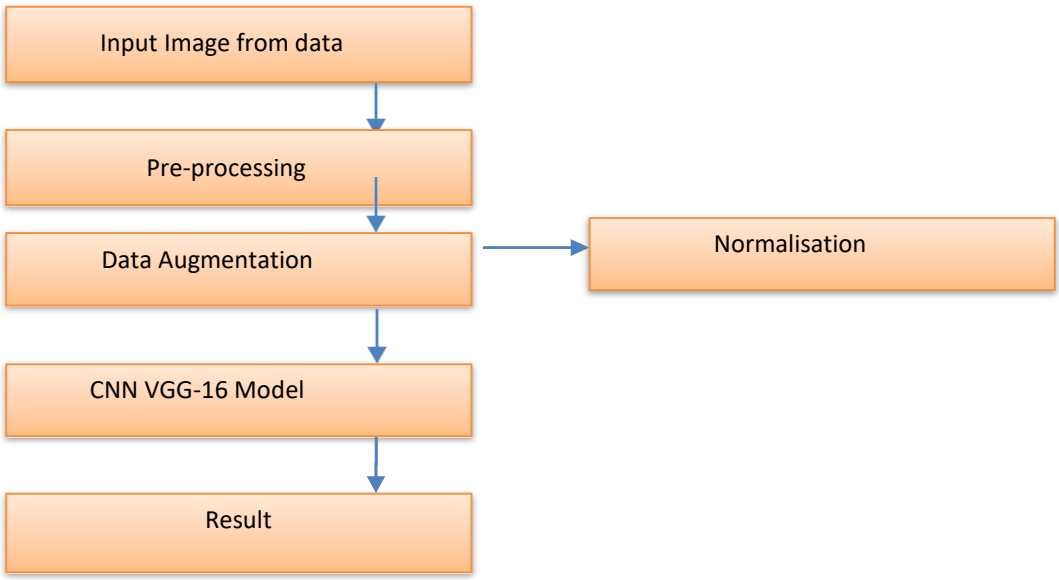
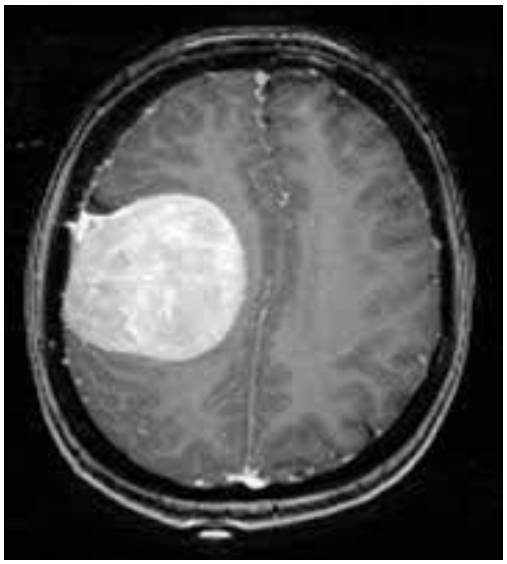
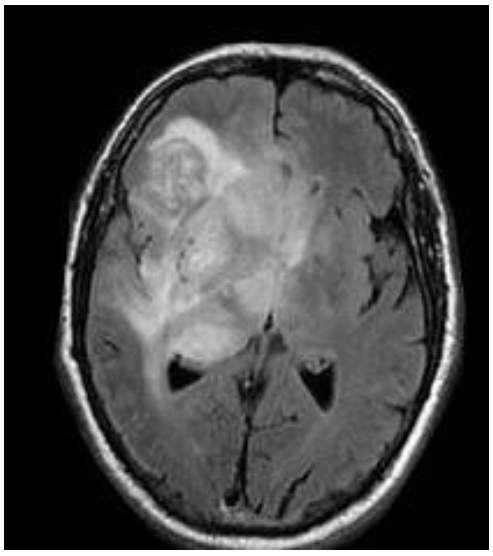


Fig 3: Workflow of the proposed model

IV. RESULTS AND DISCUSSION



TUMOR TYPE



NON TUMOR TYPE

In our result when we given input of Ct scan image it will show whether the image is either tumor or no tumor type, by using cnn and vgg -16 and different filters.

V. CONCLUSION

In this research the proposed system used CT scan image as an input to a multi-layered CNN model. We investigated the capabilities of CNN architectures by building them with small kernels, as opposed to standard deep CNN implementations that use shallow architectures with big filtering algorithms. We also discovered that shallow architectures performed worse even when employing a larger number of feature maps. The system apart from just classifying the brain tumor into yes or no categories, further classifies the tumor into two classes i.e. Tumor and No Tumor. The multi-layered CNN architecture containing convolution, max pool, dropout, fully connected and SoftMax layer. In this section few seed points have been added which can be used by researchers to work further on this topic. An automatic classification system can be built to classify types of

tumors; reinforcement learning can be used instead of the supervised CNN model which will remove the need to update the model every time a new type of tumor is detected. Moreover, the model can be further developed for commercial purposes along with providing more features and privileges for the user.

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