Brain Tumor Classification and Tumor Localization

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Abstract

Cancer is one of the top causes of death worldwide in the twenty-first century. It resulted in the deaths of 8.2 million people (around 22 percent of all deaths not related to communicable diseases; most recent data from WHO). Cancer have been identified as the uncontrollable development of abnormal cells in any portion of the anatomy. Tumor cells, commonly known as malignant cells, are these diseased cells. There are more nearly 200 different types of cancer. Prostate, lung, breast, brain tumors, leukemia, and colorectal cancer are the most severe cancers. Cancer-related mortality are expected to continue to grow, with an estimated 13.1 million deaths in 2030. (about a 70 percent increase). Furthermore, between 30 and 50 percentage of tumors can now be avoided by avoiding risk factors and using existing evidence-based prevention action. Accurate diagnosis of cancer, as well as appropriate treatment and care for patients who develop cancer, can help to lower the cancer burden. Many cancers have a strong chance of being cured if diagnosed early and treated effectively. As a result, we created a CNN-based object detection system that can detect brain tumors from x-rays of the brain.

Keywords: Deep learning, Computer Vision, Object detection, NN, CNN

1. Introduction

Deep Neural Network is an Artificial Neural Network which is consist of many dense layers and each layer has a set neuron, synapse, biases. Deep Neural Network is a set of many layers in this way. Let's look at a Deep Neural Network. Convolutional Neural Network is very popular for it's fantastic performance in image recognition. Nowadays Convolutional Neural Network uses in Medical Science, Facial Image Recognition, Industrial Material selection, Video Processing through pattern detection. To give the precise

output a strong classifier is needed to detect the tumor. But now it became advanced with various machine learning and deep learning algorithms. Automatic identification of Medical Imaging has now become of great interest. Deep Convolutional Neural Network is very powerful for large-scale image pattern recognition.

1. ***Interest*** - A brain tumor is an abnormal growth of cells within the brain that cause the death of a person. Some tumors can be cancerous thus they needed to be detected earlier before they spread too much on the brain. People are suffering from it without realizing the great danger of its growth. From the MRI image, we can detect the disease earlier before its rapid growth. Accurate analysis of brain tumor images is a key research topic in the medical field. The diagnosis of brain tumor is usually based on imaging the data analysis of brain tumor images. The images obtained are very clear and precise. MRI greatly improves the diagnostic efficiency, avoids the operation of laparotomy exploration. We are going to use different Convolutional Neural networks to classify multi-class disease.
2. ***General aims*** – Cancer Cells Prediction, Brain Tumor Detection, Large-Scale Face Recognition are the very important for medical applications.
3. ***Specific objectives*** – Image Pattern Recognition, Brain Tumor Detection.
4. ***List your research questions*** - How these model and Convolutional Architecture is giving us accuracy it point of interest.

2. Object Dection Model YoloV4

Most present accurate models involve extensive GPUs to train with a large mini-batch size, and doing so with only one GPU is extremely expensive and economical. This issue is addressed in YOLO v4 by creating an object detector that can then be trained on a single GPU with a lower mini-batch size. This require a person 1080 Ti or 2080 Ti GPU to train a super-fast and accurate object detector. You only look once (YOLO) is a faster and more accurate family of one-stage object detectors. It's a cutting-edge model for real-time object detection that can detect several products in a single frame. The YOLO v4 paper was just released and showed good result as compared to other object detectors. With comparable performance, it is

twice as quick as EfficientNet. In addition, when compared to YOLOv3, AP (Average Precision) and FPS (Frames Per Second) in YOLOv4 have increased by 10

3. YoloV4 Working Method

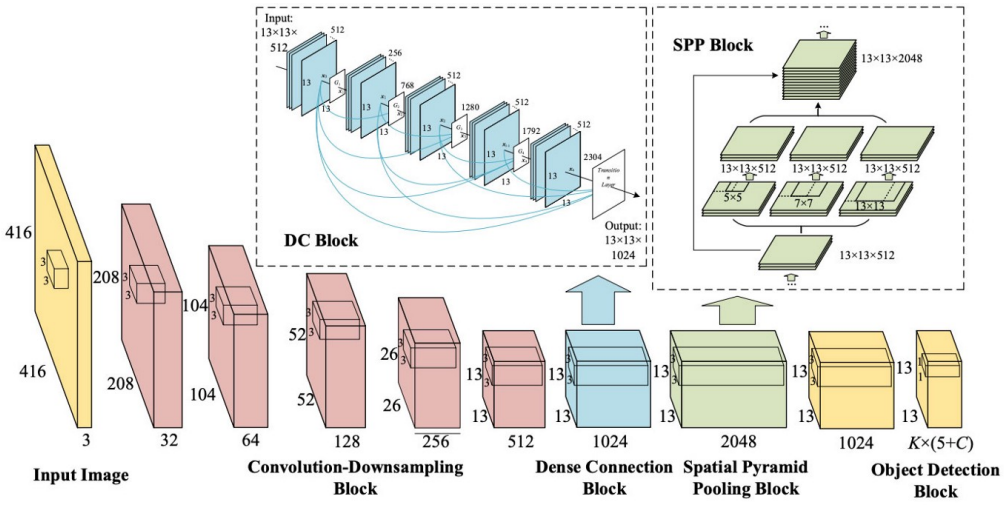

Figure 1: YoloV4 Model

Weighted-Residual-Connections (WRC), Cross-Stage-Partial-Connections (CSP), Cross mini-Batch Normalization (CmBN), Self-adversarial-training (SAT) and Mish-activation, Mosaic data augmentation, DropBlock regularization, and CIoU loss are among some of the features they use to achieve these results.They're called digital features because they should work independent of the computer vision tasks, datasets, or models. That's why, in our Brain Tumor Detection Model, we utilized YOLO v4.

4. Results and Discussion

A brain tumor is a huge problem around the world, since it damages as well as kills many humans every day. As a function, recognizing what is or isn't a tumor is crucial. What is the actual situation of the tumor and what procedures must be followed if the tumor is detected? We will be able

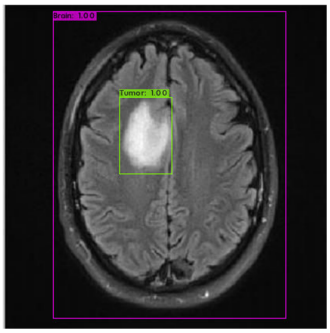

Figure 2: Result 1

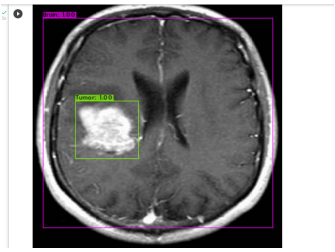

Figure 3: Result 2

to determine the tumor, the type of tumor, and the treatment options for that tumor through our study. It's a completely automated system that will deliver that kind of real - time data. Our software will be user-friendly, and it will work by integrating MRI scans into the software, and the system will deliver those categories of data based on the image.This technique will save the doctor time and effort while also providing more accurate information about the ailment.

5. Conclusion

We tried to explain how the convolutional neural network training could be seen as an very potential classifier. In the traditional image recognition of the brain, tumor classification is performed by using imagesegmentation, Support vector machine, and Deep Neural Network-based classifiers. The complexityis lower than the other networks. Computation time is high and the accuracy seems too low.Improving the accuracy of the Convolutional Neural Network and reducing the training time, anefficient convolution neural network-based classification is introduced in the proposed research work.Convolutional Neural Network is one of the deep learning methods, which contains a sequenceof feed-forward layers.

References