SEGMENTATION USING CONVOLUTIONAL NEURAL NETWORKS OF BRAIN TUMORS IN MRI IMAGES

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Abstract:

The brain tumor is the deadly disease and will even cause death. The most common tumor is gliomas and the life span for curing the tumor is very short. Thus treatment is the only way to cure it. The magnetic imaging resonance is one of the imaging techniques for detecting the stages of tumors in the brain. Whereas the manual segmentation of MRI will take reasonable time which will not be effective for practical. In order to overcome that, the automatic segmentation of tumor should be implemented. So, the Multimodal Brain Tumor Image Segmentation Benchmark (BRATS) segmentation method is implemented. The BRATS method has very low accuracy rate. To overcome these segmentation problems the Convolution Neural Networks (CNN) is used with small 3*3 kernel is implemented. In this the few steps are followed to do the segmentation preprocessing, patch extraction, CNN and post processing. In the preprocessing the intensity value is detected in the tumor image. The patch extraction is done in the next step and then the CNN segmentation is performed then whether the person have tumor or not is mentioned. The accuracy of the proposed system is high compared to the existing one.

Keywords: Brain tumor, Segmentation, Brain Tumor Image Segmentation Benchmark (BRATS), Convolution Neural Networks (CNN) segmentation.

1. INTRODUCTION



Fig1.Block diagram of proposed system

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Gliomas are the brain tumors with the highest mortality rate and prevalence. These neoplasms can be graded into Low Grade Gliomas (LGG) and High Grade Gliomas (HGG), with the former being less aggressive and infiltrative than the latter. Even under treatment, patients do not survive on average more than 14 months after diagnosis. Current treatments include surgery, chemotherapy, radiotherapy, or a combination of them. MRI is especially useful to assess gliomas in clinical practice, since it is possible to acquire MRI sequences providing complementary information. In the proposed method they have three main steps to be followed they are preprocessing, CNN Segmentation classification and post processing. In this the testing and training of CNN classification can performed in tumor image.

2. SYSTEM OVERVIEW



Fig2.System overview of proposed system

PREPROCESSING:

In the preprocessing stage the input image is taken and the fuzzy clustering is performed to detect the bias corrected image.

The bias correction is done to estimate the intensity normalization of the brain tumor images.

PATCH EXTRACTION:

The patch detection is performed to obtain the patches in the tumor images.

In this process the area region is covered and then the holes are filled. The region crop is done and the patch extraction image is obtained.

Convolution Neural Networks (CNN):

In the Convolutional Neural Networks (CNN) it contains two steps

- Training of CNN
- Testing of CNN

Training of CNN:

Training part is done to with GLCM which will detect the tumor and non tumor part of the brain.

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The texture is detected by grey level co occurrence matrix and the output is displayed in the message box. **Testing of CNN:**

Testing part is done to detect the input image ha tumor or not.

3. RESULTS



(a) & (b)

Fig3: input image of the brain tumor and non tumor



(a)& (b) Fig4: Estimated bias field brain tumor and non tumor

The preprocessing step includes the bias field estimated image.



(a) & (b)

Fig5: Bias Corrected image brain tumor

The Bias Corrected image is obtained to detect the intensity normalization of the brain tumor image.



(a)& (b)

Fig6: Patch extraction with CNN segmentation brain tumor and non tumor

The output contains the patch extraction along with the CNN segmentation

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(a)& (b)

Fig7: CNN training part brain tumor and non tumor



(a)& (b)

Fig8: CNN training part with performance analysis brain tumor and non tumor

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(a)& (b)

Fig9: CNN training part with histogram error detection of brain tumor and non tumor



(a)& (b)

Fig10: message box output of brain tumor and non tumor

CONCLUSION

The image processing has important role in nowadays. It plays vital role in medical application. The proposed system explains the brain tumor detection using CNN segmentation method along with BRATS datasets. The method is more accurate and the training and testing part of the CNN is detected separately. The texture extraction is done using a gray level co occurrence matrix. This system helps to cure the brain tumor detection and to cure the disease in earlier stages.

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