MAT JOURNALS

Journal of Signal Processing
Volume 5 Issue 2

Brain Tumor Detection using Image Fusion

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DOI: *http://doi.org/10.5281/zenodo.3271308*

Abstract

It is critical to distinguish mind tumor at correct time in cerebrum tumor determination. We are utilizing picture combination for CT and MR Images. Image combination is use to get more data for cerebrum tumor determination. Resultant combined image of CT and MRI pictures will improve exactness of tumor discovery. For noise limiting and improving the picture quality we utilize discrete wavelet change strategy. It upgrades Image quality. Here we are utilizing Image fusion and morphological method for expanding picture quality. Segmentation used to identify tumor area precisely and demonstrate about developing zone of tumor.

Keywords: *Magnetic Resonance Image (MRI), CT Scan, DWT, Segmentation, Morphological.*

INTRODUCTION

For Brain tumor discovery it is imperative to feature significant element of CT and MR pictures. It is conceivable just through picture fusion.Image combination is a standout amongst the most regularly utilized strategies in restorative finding. It fusestheCT and MRI mind pictures to give significant data inside combined picture. Medical imaging image fusion, usually involves combining information of multi modalities such as magnetic resonance image (MRI), computed tomography (CT), positron emission tomography (PET), and single photon emission computed tomography (SPECT). [1]

CT images which are used to ascertain the difference in tissuedensity and MRI provide an excellent contrast betweenvarious tissues of the body.CTimages signify the difference in tissue density depending upon the tissues abilityto reflect the X-rays, while MRI images provide contrastbetweendifferent soft tissues.These features makeCT and MRI more suitable for the detection of tumor. [12] Wavelet transforms is a new area of technology. In frequency domain these method is used for de noising and preserving the actual signal.Wavelets allows images and patterns to be decomposed into elementary forms at different positions and scales.[2]

We use denoising method to improve the image quality.Image denoising is use to remove noise from image without affecting the quality of the image.Extraction of noise is very important for image enhancement. We will remove noise without affecting the edges. Image noise should be reduced to get better edge detection. Brain images may contain noise. Therefore we have to use accurate process to remove noise from brain images.

METHODOLOGY

MRI & CT Images affected by different noise. Here preprocessing unit remove noise and convert MRI and CT image into RGB.We use DWT for image enhancement. CT and MRI enhance image fused together to get new fused image.

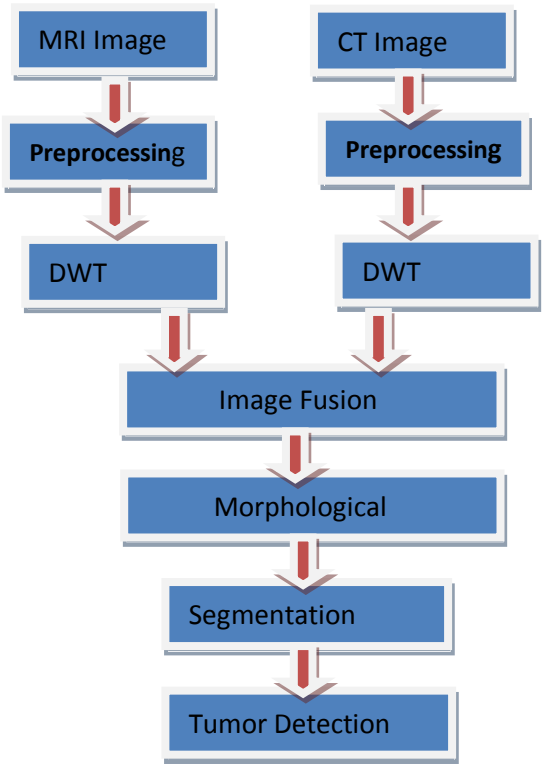


Figure 1: *Brain tumor detection process.*

Morphological image processing is use for increasing image intensity. Image segmentation used to highlight tumor portion and indicate about growing area of tumor. Fig. 1 shows the block diagram of brain tumor detection. It comprises of a preprocessing unit , wavelet disintegration blockand intertwined picture is gotten after combination process. Preprocessing is a procedure to expel the clamors from the info pictures. It is additionally used to change over the heterogeneous picture into homogeneous picture. X-ray and CT pictures are inclined to be influenced by commotion in advanced imaging which can happen during picture transmission and digitization. Picture combination utilizing wavelet plan disintegrates the source pictures MRI and CT into guess and nitty gritty coefficients at required dimension utilizing DWT. RGB to Gray image shown in fig 2

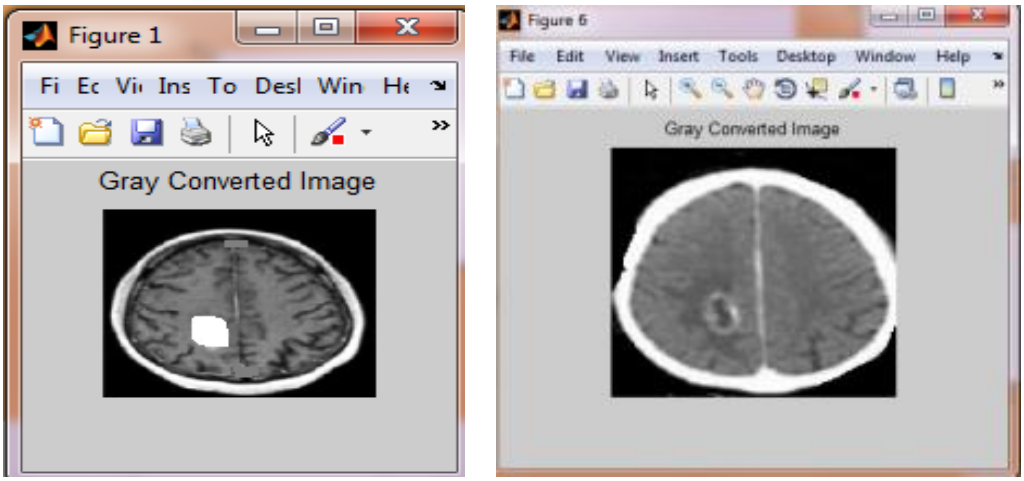


Figure 2: *RGB to Gray MRI and CT.*

EXPERIMENTAL RESULTS

DWT maintain the edges and enhance important value of an image. Enhanced image fused together by fusion method. We are using morphological image processing & image segmentation method for area calculation of tumor.Original MRI and CT image are shown in Fig.3 and Fig.4 respectively.

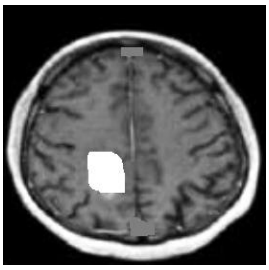


***Figure 3**: MRI Image.*

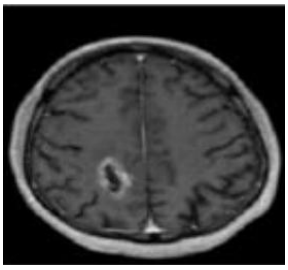


***Figure 4:** CT Image.*

Final Fused image is used for tumor detection. Fused image shown in Fig.5. Result is shown below in Fig.6.

***Figure 5:** Fused Image.*

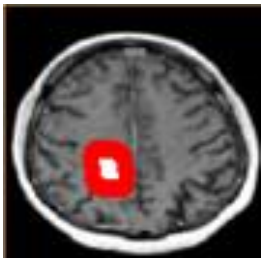
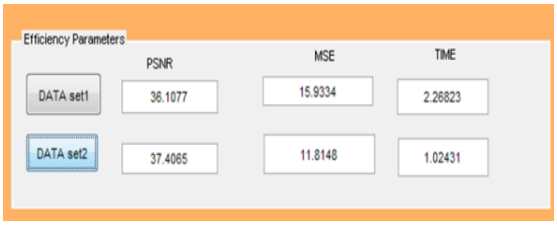


***Figure 6:** Detected Tumor.*

The performance of the fused image is evaluated using different parameters like PSNR, MSE. GUI based analysis of CT and MRI image as shown in Fig. 7.

***Figure 7:** GUI for brain tumor detection.*

Table 1: *PSNR and MSE.*



Accuracy is the measure of successful classification. The accuracy is

$$\text{Accuracy} = \frac{\text{TN} + \text{TP}}{\text{TP} + \text{TN} + \text{FP} + \text{FN}} * 100$$

Where

- TP (True positive): Existing tumor and detected correctly.
- TN (True negative): Non-existing tumor and not detected.
- FP (False positive): Existing tumor and not detected.
- FN (False negative): Non-existing tumor and detected.

CONCLUSION

Brain tumor detection using discrete wavelet transform and fusion able to detect brain tumor accurately and it also determined the position of the tumor in fused image. We get detection result of 96% and sensitivity upto 93%.Here we use different normal or abnormal brain tumor images. We get result accurately. It is very helpful in diagnosis of brain tumor.

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Cite this article as: *Gajendar Kumar, & Chandrashekhar Kamargaonkar. (2019). Brain Tumor Detection using Image Fusion. Journal of Signal Processing, 5(2), 21–25. http://doi.org/10.5281/zenodo.3271308*