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SURVEY ON IMAGE FUSION AND SEGMENTATION OF MULTIFOCUS IMAGES

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Abstract

The most difficult task in the segmentation of the image is to obtain the segmentation by avoiding almost all the noises within less span of time. The AMG is used for increasing the time step and SFM will be used in decreasing the computation domain. In this technique the number of iterations will be less when compared to the existing systems. The integration of medical images with multimodal Medical Image Fusion (MIF) problem, employing Improved DT-CWT (Dual Tree Complex Wavelet Transform) and a Discrete Optimization Method is to introduce a new approach to fuse panchromatic image and multi-spectral images.In image fusion, two approaches used namely Spatial and Transform.DT-CWT discrete optimization method is remarkably better than the other fusion method.

Keywords: Image Fusion, DT-CWT, MIF, Algebraic multi grid(AMG), Sparse Random field method(SFM) when we have to separate the tissues of the brain which are present inside. In this method that complexity will be reduced in separating the tissues of the brain image by separating the foreground and the background.

[1] K.Srilatha, "Multifocus Image Fusion Using Improved Dual Tree Complex Wavelet Transform and Discrete Optimization Method", Journal of Engineering and Applied Sciences, Volume 9 (10-12): 414-421, 2014.

This study deals with the integration of medical images with multimodal Medical Image Fusion (MIF) problem, employing Improved DT-CWT (Dual Tree Complex Wavelet Transform) and a Discrete Optimization Method is to introduce a new approach to fuse panchromatic image and multi-spectral images. In image fusion, two approaches used namely Spatial and Transform. In Spatial fusion, it reduces structural distortions. But,

wavelet transform affect the absence of shift invariance and low directional selectivity. These two disadvantages are overcome by Improved DT-CWT (Duel Tree Complex Wavelet Transform) and the problem as a discrete multilevel

optimization of an energy functional that balances the offerings of three conflicting terms: a squared error of both MRI and CT Image which giving out strong MRI/CT edges and a prior which favours smooth results by encouraging neighbouring pixels to have similar fused-image values and introduce a transparency-labelling formulation which decreases the computational load. The proposed Improved DT-CWT discrete optimization method is remarkably better than the other fusion method.

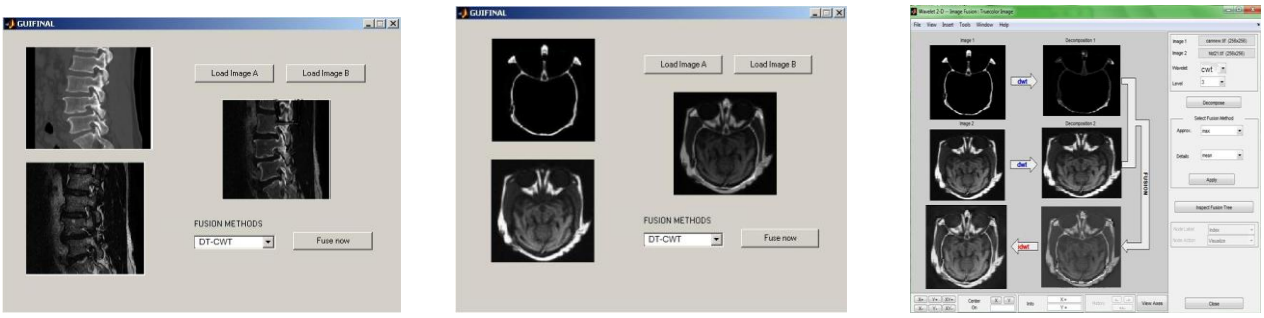


Figure.1. Fused Images

Quality Indices / Medhods	Average Gradient	Edge Intensity	Entropy	Standard Deviation
DWT	3.958	41.9148	3.801	91.89
HARR DWT	4.11	43.7982	3.99	97.001
Improved DT-CWT	4.209	45.01	4.286	100.982

Table.1

[2] Rajeshwar Dass, Priyanka, Swapna Devi, "Image Segmentation Techniques", in IJECT Vol. 3, Issue 1, Jan-Mar 2012

In this paper, we propose the technique of edge segmentation which means we detect the edges of the images. The edges of the images will be segmented. One more advantage is that we can differentiate the fore ground and the background of the image by using the novel approach algorithm. In the previous papers , it is difficult for the segmentation of image before the recognition , compression etc.., but in this paper the image will be segmented to proceed with further compression such that the segmenting will be very easy to be done . The foreground and the background also can be separated by using this novel approach algorithm

The segmented images are shown in the following. The images which are taken for segmentation is natural images

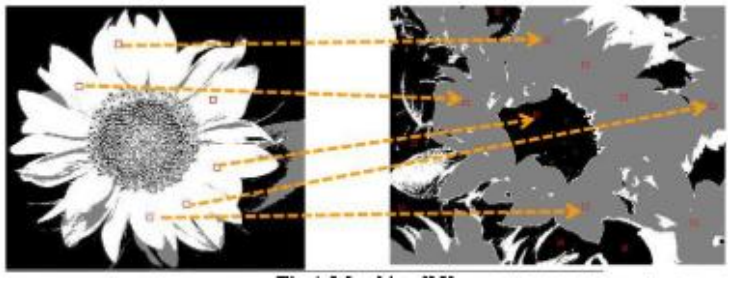


Figure:2

Figure 2 is the example of detecting the edges of the given image. In this the foreground and background is separated.

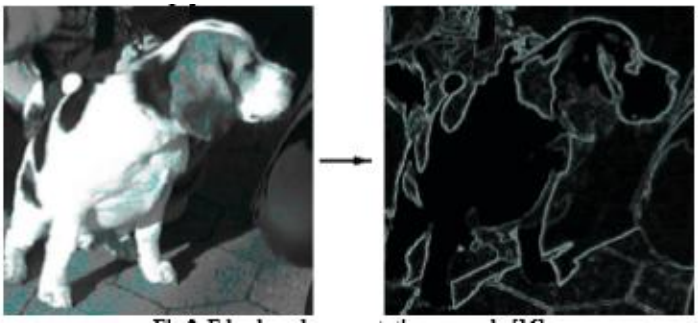


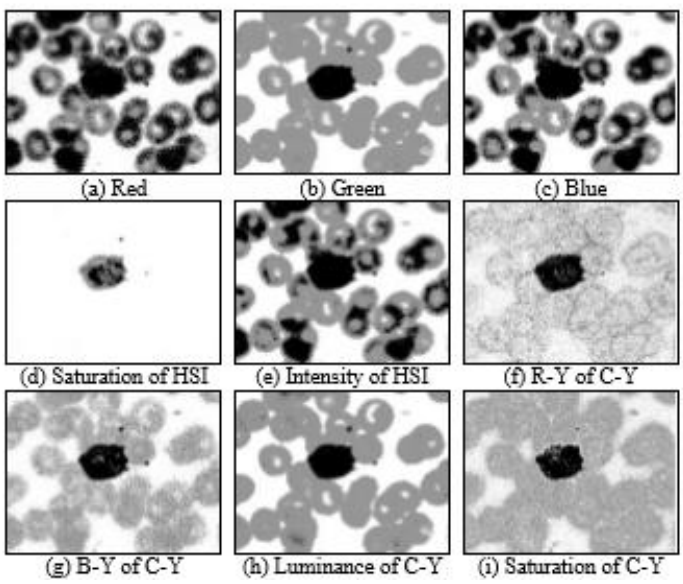
Figure:3

Figure 3 is the other example image in which the natural image is taken for the segmentation process. The edge detection is done as well as the foreground and background of the image is separated

[3] J. Cox-Singh, T. M. E. Davis, K. S. Lee, S. S. G. Shamsul, A. Matusop, S. Ratnam, H. A. Rahman, D. J. Conway, and B. Singh, Plasmodium knowlesi malaria in humans is widely distributed and potentially life threatening, Clinical Infectious Disease, Vol.46, No.2, 2008, pp. 165-171. - Colour Image Segmentation Approach for Detection of Malaria Parasites Using Various Colour Models and k-Means Clustering

In this paper proposed a method which is used to detect the malaria in human body. Since many people have been deceased in several areas around the world due to malaria, it is very important to detect the person who is being effected with malaria. In this segmentation process, the color segmentation is done in which we can detect the color of blood which is infected with malaria. The three major tissues which can be indicated in the malaria scanning image is 1.Parasites 2.Normal RBC's i.e., Red blood cells 3.Background. First the stretching of the image will be done where the image can be obtained clearly and then the k-clustering algorithm will be applied to separate the infected area from the background which is present. Now the color detection will be done and the color will be applied to the segmented image hence the area which is infected can be found out.

In the fig 4 which is shown below the malaria image has been taken and the segmented process is done using the different colors as red, green and blue



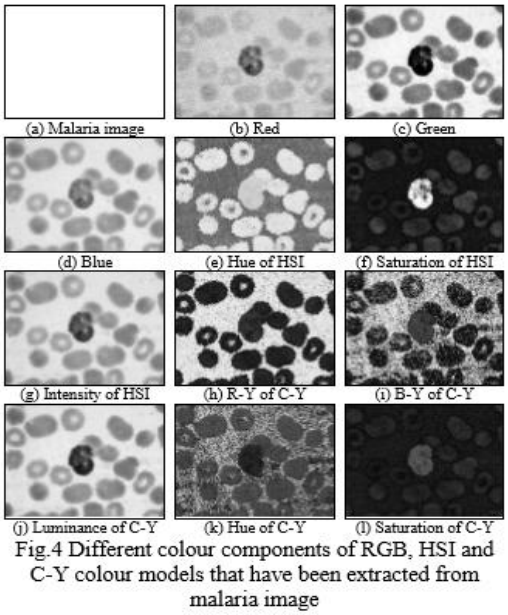


Fig.4 Different colour components of RGB, HSI and C-Y colour models that have been extracted from malaria image

Figure 4

In fig 4 , the image is obtained with the k- clustering algorithm which separates the background from the infected area

[4] N. Alpert, J. Bradshaw, D. Kennedy, and J. Correia, The principal axes transformation: a method for image registration, J. Nuclear Medicine 31 (1990), 1717–1722.- Image registration for MRI

This paper deals with alignment of two images based upon survey of CT scan images of a person having brain tumor . These differences can also be detected by a naked eye . The process of aligning the images to observe the differences is called as image registration . They are commonly used for clinical applications . To study the process in detail we compare two computed tomography (CT) scans of a patient , comparing it with the status of the patient before six months and to the present condition . The growth of the tumor is monitored during the intervening stages are monitored using positron emission tomography(PET) and the differences can be judge through, in the radiologist's head of the change in the tumor volume. The segmentation of the images is done in the following image

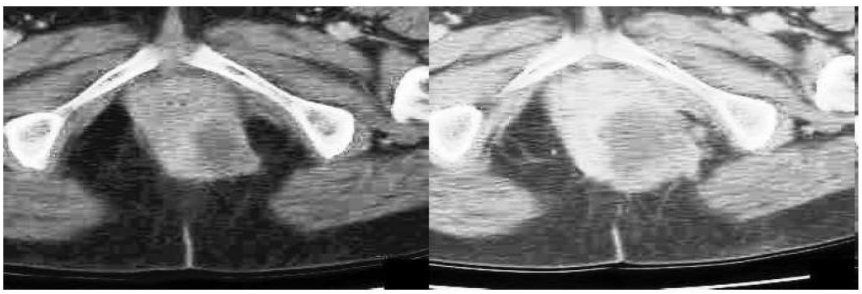


Figure.5 Two CT image of pelvic tumors growth

[5] Barone, P., Fast tissue classification in dynamic contrast enhanced magnetic resonance images, Inverse Problems, 22, 727–747, 2006. - Analyzing Contrast Enhanced MRI Sequences for Mammography

In this paper the dynamic contrast enhanced DCE MRI sequences are processed for mammography . The DCE-MRI is a kind of examination in which is capture the sequence of MRI images and the sequences which are changed will be analyzed . Here the medical imaging techniques will e used for the process . In our case study we use magnetic resources in the place of DCE-MRI for breast cancer scanning . The main issues of this is the accurate registration of the soft tissues which we process it in the physical properties . Here the low quality MRI images will be registered with the change in content so this is not that easy to segment the images . For this process many researches were conducted to make sure about the disasters occurred to the patients due to the powerful radiations foe diagnosis. The rapid emergence of MRI is very

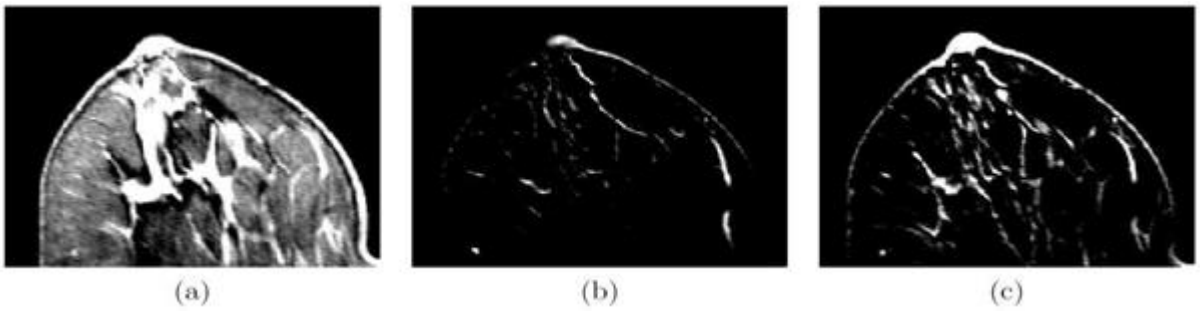


Figure.6 Unregistered images (a) slice form first volume of sequence (b) difference image (c) difference image last sequence image efficient for clinical diagnosis. In this the requirement which is mandatory is intra patient registration.

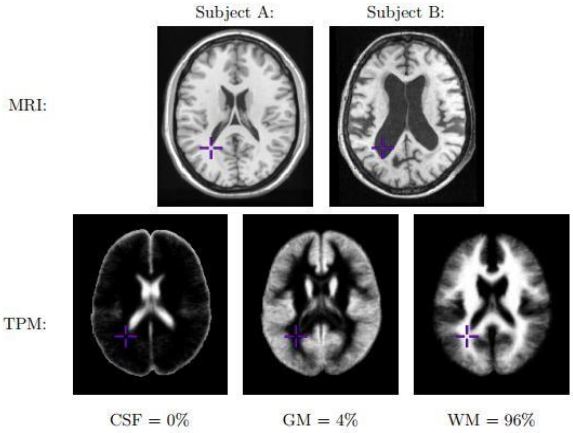


Figure-7.Fused image.

[6]Albertson, M., Hutchinson, J., 1988. Discrete Mathematics with Algorithms. Wiley, New York. - A Fully Automatic and Robust Brain MRI Tissue Classification Method

In this paper , 3g images of brain will be obtained by using the tissue classification method .The separation of the tissues will be very accurate and strong . The process of separating will be in step-by-step manner in which it will start the separation from the prior tissue of the brain. The main tissues which are present in the brain is CSF , grey matter and white matter and the other class used for separation is taken as the background . The background which is mentioned as the other class gives the information about the skin , fat , skull etc..., . The previous methods which are used does not have accurate separation between the tissues of the brain but the 3g image which is presented in this paper separates all the tissues . No tissue will be overlapped with the other tissue

The images which are obtained will be shown in these figures.

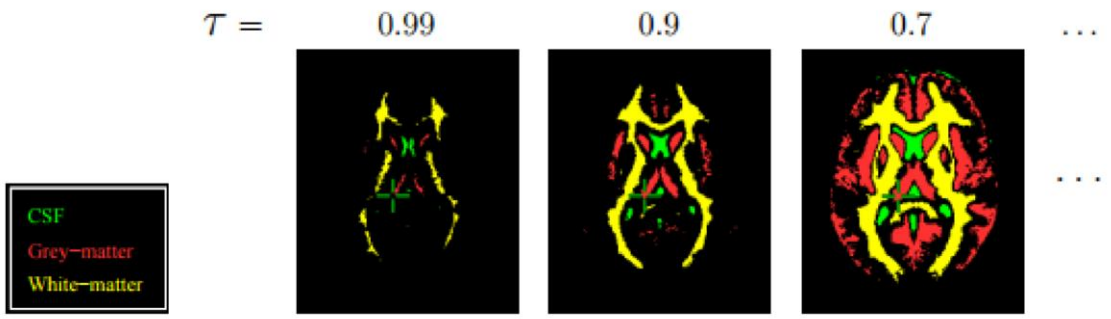


Figure.8 . Images of brain

The image which is shown above will have the separation of all the three tissues i.e.,, CSF, grey matter and the white matter. This fully automation of MRI images has accurate separation of the brain tissues which are obtained in the brain. The 3g images obtained provide more accuracy, clearance and ease to separate the brain tissues. The accuracy will be much more for this proposed system

Conclusion:

The image segmentation and Fusion have a great image in the computer vision. In image fusion process specifically Discrete Wavelet Transform method, DWT Harr and Improved DT-CWT method using Entropy , Standard Deviation Quality Index and Image Metrics have analysed. The proposed fusion method compensates all the limitations of DWT by the implementation of Improved DT-CWT. It also eliminates the ringing artefacts presented in the fused image by assigning suitable weighting to high pass wavelet coefficients and low pass coefficients individually. The normalized

maximum gradient built sharpness criterion for low frequency coefficients improves the background texture data as well as expands the quality of the blurred areas in the fusion end result. The most vital data contents hidden in the high frequency coefficients are also increased up by the carrying out of bilateral sharpness criterion.

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