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# MULTIPARAMETER DIAGNOSIS IMAGE CREATION IN NSCT DOMAIN USING IMAGE FUSION

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**Abstract -** *This paper presents the multipara meter diagnosis image creation in NSCT (Non-subsampled Contourlet Transform) using Image Fusion. The fusion is done to minimize different errors between the fused image and the input images. In medical field, the edges and outlines are the important features rather than the other information. Hence we have to preserve the edge-like features [1]. As we know, the image with higher contrast contains more edge-like features. In this, a new scheme is used called as non-subsampled contourlet transform to specify more important details [2]. It is used to improve the edge information of fused image by reducing the distortion. This transformation helps to decompose the image into finer and coarser details and finest details will be decomposed into different resolution.[3] The pixel and decision level fusion rule will be applied selected for low frequency and high frequency and in these rule we are following phase congruency and directive contrast.[4] The fused contourlet coefficients are reconstructed by inverse NSCT. Based on the comparison with other schemes, this method is much more effective [5]. For medical diagnosis, doctors usually observe the images manually and fuse them in the mind. The goal of image fusion is to obtain useful information from CT/MRI multimodality images. By this method we can get more information and also satisfactory Entropy, Contrast, Mean, Variance, PSNR (Peak- Signal-to-Noise Ratio) and less MSE (Mean square error)[6].*

**Keywords: Multimodal medical image fusion, Phase Congruency, Multipara meter Diagnosis, non-subsampled Contourlet transform.**

## 1. INTRODUCTION

At first, the source images must be pre-processed to get the same resolution. After the pre-processing, the source images are decomposed by the NSCT to get many different coefficients, including high-frequency coefficients and low-frequency coefficients [1]. The inverse NSCT is used to fuse the high-frequency coefficients and the low-frequency coefficients together to get the fused image [7].The spectrum and background information of the image are all included in the low-frequency coefficients through the NSCT while the detail information is in high-frequency coefficients [3].

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## 2. METHODOLOGY

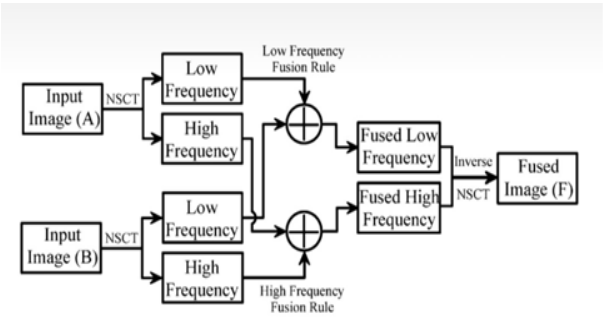



Fig:1-Non-subsampled Contourlet transform

**Low-frequency coefficients fusion algorithm:** Using the NSCT Part, we know that the image is divided into 2 components-fine and coarse components. In NSCT, the low frequency components are given to decompose the coarse part and high frequency components are given to decompose the finer details in the image. [5].

**High Frequency Coefficients Fusion Algorithm:** In the high frequency images, there is much more detailed information of the pixels such as boundaries and intensity. So we have to adapt local energy map rule to calculate the pixel value and so on [8].

## 3. BLOCK DIAGRAM

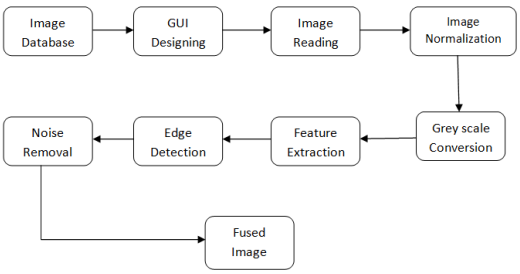
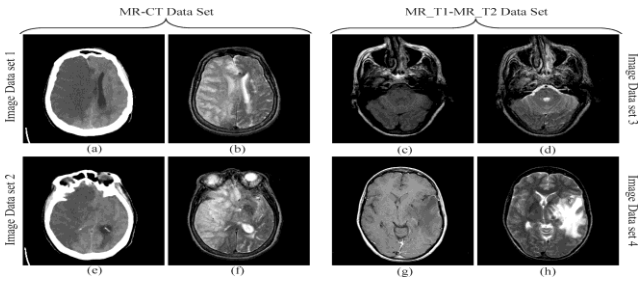



Fig 2-Block Diagram of Image Fusion using NSCT

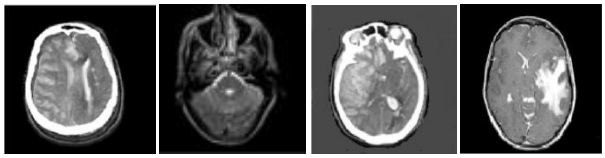
First of all, Medical image database containing both the CT and MRI Images of the same patient is obtained.GUI(Graphical User Interface) is designed which is a human-computer Interface which helps us to access the program easily after which the image is read[11]. Normalization of the images is necessary to get the images into same resolution. It is necessary to convert the images into grey scale so we used grey scale conversion. If there is a tumor detected in the image then the area which is having tumor becomes the ROI (Region of Interest)[13]. This region of interest comes under the Feature Extraction part. After that comes the Edge detection in which the boundaries within the images are detected using Sobel Operator after which we apply the NSCT to divide the image into two parts-Low frequency and High frequency. By using the inverse NSCT we get the fused image [10].

## 4. RESULT

Here we have taken a database of four sets of CT/MRI images wherein the information in each set is different according to the level of severity of tumor.




(a)



(b)

Fig-(a) Image Database containing different level of severity of brain tumor

Fig-(b) Fused images

| IMAGES | PSNR | CONTRAST | ENTROPY | MEAN | VARIANCE | MSE | TUMORSIZE | LEVELOFSEVERITY |
|---|---|---|---|---|---|---|---|---|
| Data set 1 | 11.9126 | 9.43 | 2.23 | 1.2584 | 726.04 | 4.90 | 000 | 0 |
| Data set 2 | 11.9917 | 10.09 | 1.23 | 7.9391 | 740.32 | 5.65 | 235 | 1 |
| Data set 3 | 12.10975 | 11.79 | 2.173 | 10.058 | 775.185 | 6.388 | 326 | 2 |
| Data set 4 | 12.895 | 19.47 | 2.19 | 20.523 | 789.66 | 9.325 | 528 | 3 |

**Table - EVALUATION FOR FUSED MEDICAL IMAGE**

The above table gives the comparison of various parameters for different dataset of images. Here in each dataset the presence of tumor is in different stages starting from level 0 to level 3. Using the feature extraction we concentrate on a particular region of interest which in our case is tumor. By using this method we have calculated the area in which tumor is present and based on that area we have determine the level of severity.

## 5. CONCLUSION

In this paper, Multiparameter Diagnosis is done for the medical images using the Nonsubsampled contourlet Transform. With the help of fusion, more information is preserved within the images. The low- frequency band and high frequency bands are first of all differentiated and then they are once again fused to get the fused image.In our experiment, two groups of CT/MRI and two groups of MR-T1/MR-T2imagesarefused using NSCT.The proposed method can carry the information with less distortion than the wavelet transform and it does not provide any problem to the human visual system. These statistical assessment findings agree with the visual assessment. Further, in order to show the practical applicability of the proposed method, four clinical example area ls considered which includes analysis of diseased person's brain with different states of tumor.

## REFERENCES

[1] F. Maes, D. Vandermeulen, and P. Suetens, "Medical image registration using mutual information," *Proc. IEEE*, vol. 91, no. 10, pp. 1699–1721, Oct.2003.

[2] G. Bhatnagar, Q. M. J. Wu, and B. Raman, "Real time human visual system based framework for image fusion," in *Proc. Int. Conf. Signal and Image Processing*, Trois-Rivieres, Quebec, Canada, 2010, pp.71–78.

[3] A. Cardinali and G. P. Nason, "A statistical multiscale approach to image segmentation and fusion," in *Proc. Int. Conf. Information Fusion*, Philadelphia, PA, USA, 2005, pp.475–482.

[4] P. S. Chavez and A. Y. Kwarteng, "Extracting spectral contrast in Landsat thematic mapper image data using selective principal component analysis," *Photogrammetric Eng. Remote Sens.*, vol. 55, pp. 339–348,1989.

[5] A. Toet, L. V. Ruyven, and J. Velaton, "Merging thermal and visual imagesbyacontrastpyramid,"*Opt.Eng.*,vol.28,no.7,pp.789–792, 1989.

[6] V. S. Petrovic and C. S. Xydeas, "Gradient-based multi resolution image fusion," *IEEE Trans. Image Process.*, vol. 13, no. 2, pp. 228–237, Feb.2004.

[7] H. Li, B. S. Manjunath, and S. K. Mitra, "Multi sensor image fusion using the wavelet transform," *Graph Models Image Process.*, vol. 57, no. 3, pp. 235–245,1995.

[8] A. Toet, "Hierarchical image fusion," *Mach. Vision Appl.*, vol. 3, no. 1, pp. 1–11,1990.

[9] X. Qu, J. Yan, H. Xiao, and Z. Zhu, "Image fusion algorithm based on spatial frequency-motivated pulse coupled neural networks in nonsubsampled contourlet transform domain," *Act aAutomaticaSinica*, vol. 34, no. 12, pp. 1508–1514, 2008.

[10] G.BhatnagarandB.Raman, "A new image fusion technique based on directive contrast," *Electron.Lett.Comput.Vision ImageAnal.*, vol.8, no. 2, pp. 18–38, 2009.

[11] Q. Zhang and B. L. Guo, "Multifocus image fusion using the non- subsampled contourlet transform," *Signal Process.*, vol. 89, no. 7, pp. 1334–1346,2009.

[12] Y. Chai, H. Li, and X. Zhang, "Multifocus image fusion based on features contrast of multiscale products in nonsubsampled contourlet transform domain," *Optik*, vol. 123, pp. 569–581,2012.

[13] G.Bhatnagar and Q.M.J.Wu,"An image fusion frame work based on human visual system in framelet domain," *Int. J. Wavelets, Multires., Inf. Process.*, vol. 10, no. 1, pp. 12500021–30,2012.