iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 4 **Issue:** VIII **Month of publication:** August 2016

DOI:

www.ijraset.com

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Volume 4 Issue VIII, August 2016
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

Wavelet Enhanced Fusion for Brain Tumor Detection Based On Stationary Wavelet Transform

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Abstract: Image processing is an active research area in which medical image processing is a highly challenging field. Medical image fusion techniques are used to show the inner parts of the human body for medical diagnosis.Image fusion helps in the extraction of suspicious regions from the medical images.In this paper we have proposed fusion of CT image and MRI image using stationary wavelet transform algorithm with local directional pattern and spatial frequency analysis which avoids the unwanted regions that can undoubtedly be formed after fusion of brain CT and MRI image for detection of tumour location.

I. INTRODUCTION

Medical imaging plays vital role in the diagnosis of brain tumour which is a abnormal cells that grows in the human body. In order to extract more accurate information high resolution techniques are need such as MRI and CT. This multimodality images usually provide commendatory and periodically antipathetic information. For example, CT image can provide dense structures like bones and implants with less distortion, but it cannot analyze physiological changes, while the MRI image can provide normal and pathological soft tissues information, but it cannot support the bones information. In this case, only one type of image may not be sufficient to provide accurate clinical requirements for the physicians. So this techniques has become propitious and very challenging area in recent years.The main objective of image fusion is to integrate commendatory as well as redundant information from several images to get a fused image output. Therefore, the output image should contain the more accurate description of the scene than any other source images.Initially in existing system edge details are lossed due to blocking artifacts and it has high spatial distortion.It is the biggest drawback in the existing system.

II. PROPOSED SYSTEM

These problems are overcomes in the proposed system. In the proposed system using the Stationary Wavelet Transform (SWT) algorithm which is designed to overcome the lack of translation-invariance of the Discrete Wavelet Transform(DWT). Translation-invariance is achieved by removing the downsamplers and upsamplers in the DWT. Even though there are acceptable wavelet based fusion works today, many of them concerned on remote images, multifocus images, while less work has been done for medical image fusion. In recent years SWT has been applied for different image processing applications. The edges are embellished with high sharper resolution by using SWT which is similar to DWT, but it never uses downsampling, hence the subbands will have the similar size as the source image. Because of down sampling in DWT it causes information loss such as hides the boundaries of the tumour. That is why SWT is developed to minimize the loss.

The SWT is an inherently redundant scheme as the output of each level of SWT contains the same number of samples as the input – so for a decomposition of N levels there is a redundancy of N in the wavelet coefficients.

III. ARCHITECTURE DIAGRAM

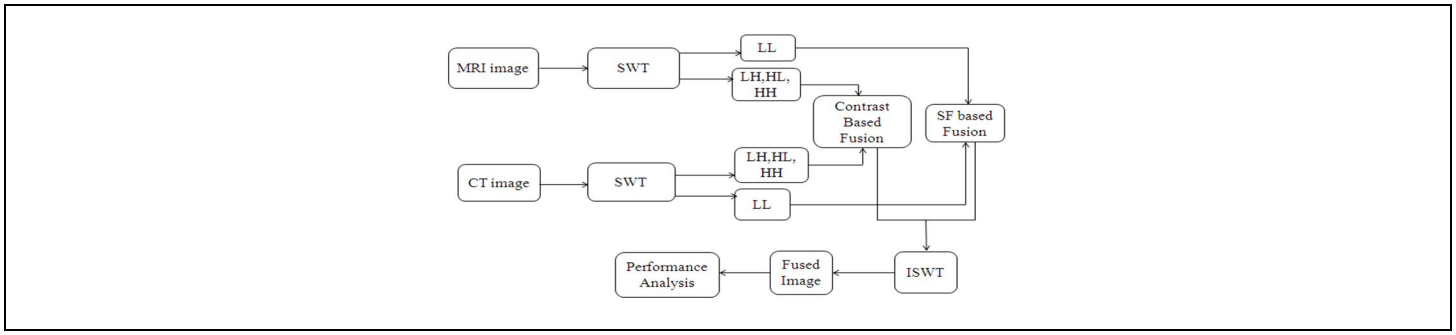


Fig 1 System Architecture for proposed system

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IV. STATIONARY WAVELET TRANSFORM

In this module the source images would be enhanced through Stationary Wavelet Transform .It is a local transformation from time to frequency domain and decomposes the image into different sub band images, namely, LL, LH, HL and HH.

V. SPATIAL FREQUENCY FUSION

This fusion technique is based on gray level mappings, where the type of mapping used is depends on the criterion chosen for enhancement. This module helps to fuse the low frequency sub bands, it contains the clear information of the input images. It fuses the image based on the pixel value of the image

VI. CONTRAST BASED FUSION

This helps to fuse the high frequency sub bands such as LH, HL and HH. It contains the edge information of the input images. It fuse the Image by Maximize method i.e., it compares both the input image and which has more contrast is taken for Fusion Image.

VII. INVERSE STATIONARY WAVELET TRANSFORM

The Inverse Stationary Wavelet Transform disentangles a image into the spatial area from a representation of the information more qualified to compaction. ISWT-based unraveling shapes the premise for current picture and video decompression benchmarks.

VIII. PERFORMANCE ANALYSIS

The quality parameter is computed by MSE and PSNR. The MSE speaks to the normal of the squares of the "mistakes" between our real image and our noisy image. The blunder is the sum by which the estimations of the first image contrast from the corrupted image. Higher the PSNR, the better debased image has been reproduced to coordinate the first image and the better the reconstructive calculation. This would happen in light of the fact that we wish to minimize the MSE between pictures with deference the greatest sign estimation of the image.

MSE and PSNR can be computed by

```
MSE = (1/(m*n))*sum(sum((f-g).^2))
PSNR = 20*log(max(max(f)))/((MSE)^0.5)
```

IX. CONCLUSION

In this letter, another methodology taking into account spatial frequency for fusion of multi-focus images has been proposed in the SWT domain rather than the DCT domain. We assess the execution of the proposed strategy with different assessment measurements and it is found that the execution of fusion in the SWT space is prevalent to that of traditional methodologies in view of SWT and the state of-the-art methods including DCT, DWT, SIDWT, and NSCT, in terms of visual quality and quantitative parameters. In addition, the proposed strategy is to upgrade the straightforwardness and to enhance the exactness and unwavering quality when the source pictures are coded in JPEG format, especially in remote visual sensor systems.

X. FUTURE ENHANCEMENT

In recent years, the fusion techniques are widely used for various purposes under the real time applications such as medical diagnosis.In this paper we discussed about the image fusion technique and presented problem definition with proposed architecture as future roadmap. For future work, we recommend to work on complete analysis and implementation of proposed work and claim efficiency against existing method.

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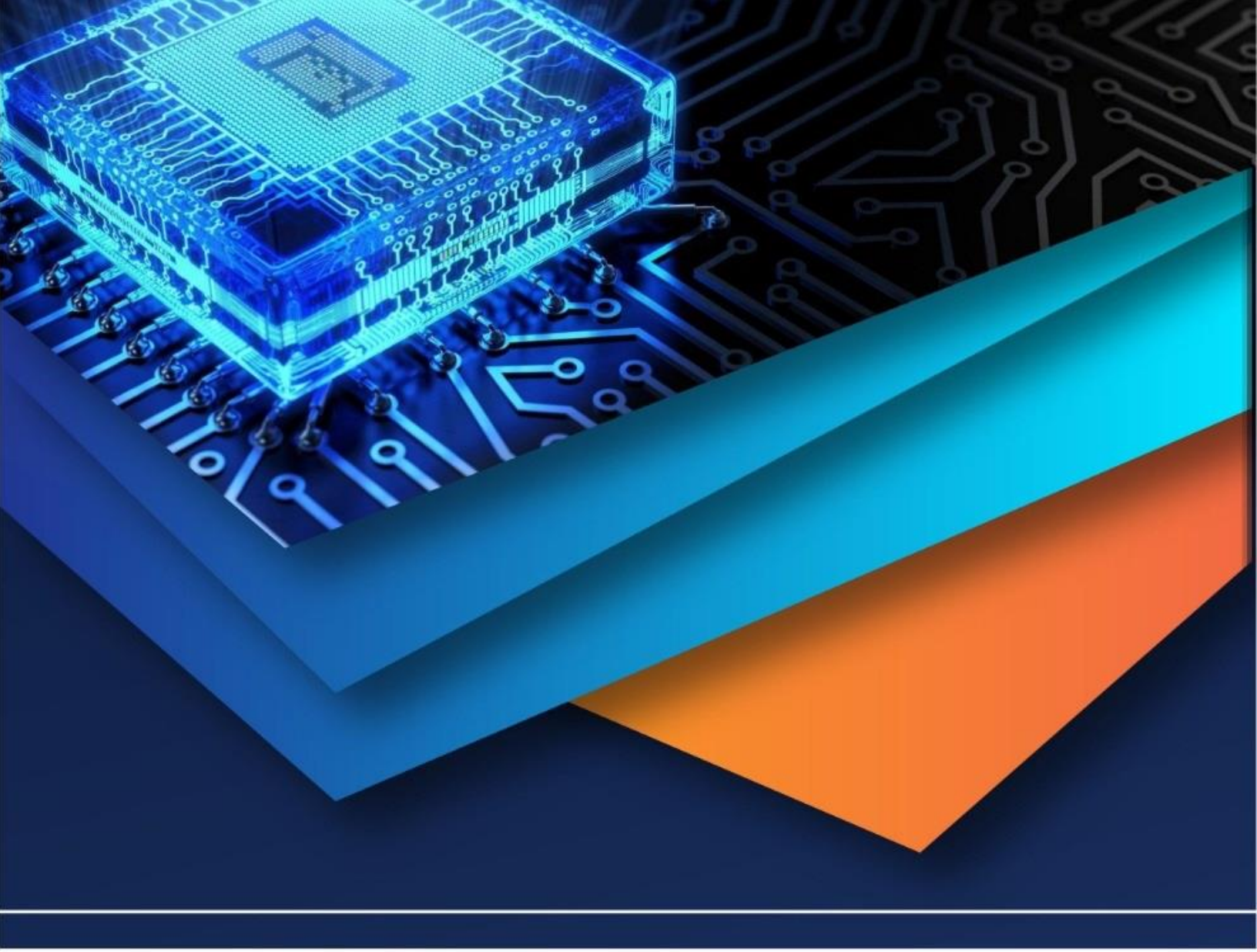
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