WAVELET BASED IMAGE FUSION

Project team members

Name
Saiprakash L Shetty
Akash Yadav

ABSTRACT

- The objective of image fusion is to combine information from multiple images of the same scene. The result of image fusion is a new image which is more suitable for human and machine perception or further image-processing tasks such as segmentation, feature extraction and object recognition.

- Over the past decade, a significant amount of research has been conducted concerning the application of wavelet transforms in image fusion.

- In this project we are demonstrating the image fusion using wavelet transform with max and average rules.

ALGORITHM

The algorithm of image fusion using DWT(Discrete Wavelet Transform) described in the following steps

1. Size of inputs images:

Given a two dimensional images (example, image A, image B) it is necessary to convert it into the same size a power of two square forms.

2. Computation of two dimensions DWT:

In this step, the two dimensional Discrete Wavelet Transform should be applied to the resized two dimensional images.

ALGORITHM

3. Fusion rule:

The most used of image fusion rule using wavelet transform is maximum selection, compare the two coefficients of DWT of the two images and select the maximum between. While the lowpass subband is an approximation of the input image, the three detail subbands convey information about the detail parts in horizontal, vertical and diagonal directions. Different merging procedures will be applied to approximation and detail subbands. Lowpass subband will be merged using simple averaging operations since they both contain approximations of the source images.
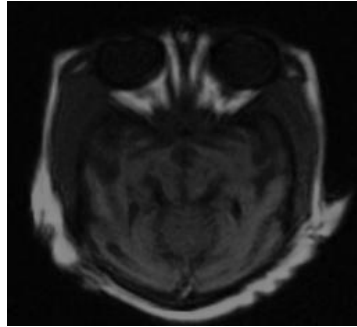
4. Inverse discrete wavelet transforms:

After selected the fused low frequency and high frequency bands, fused coefficient is reconstructed using the Inverse fast discrete wavelet transform to get the fused image which represent the new image.
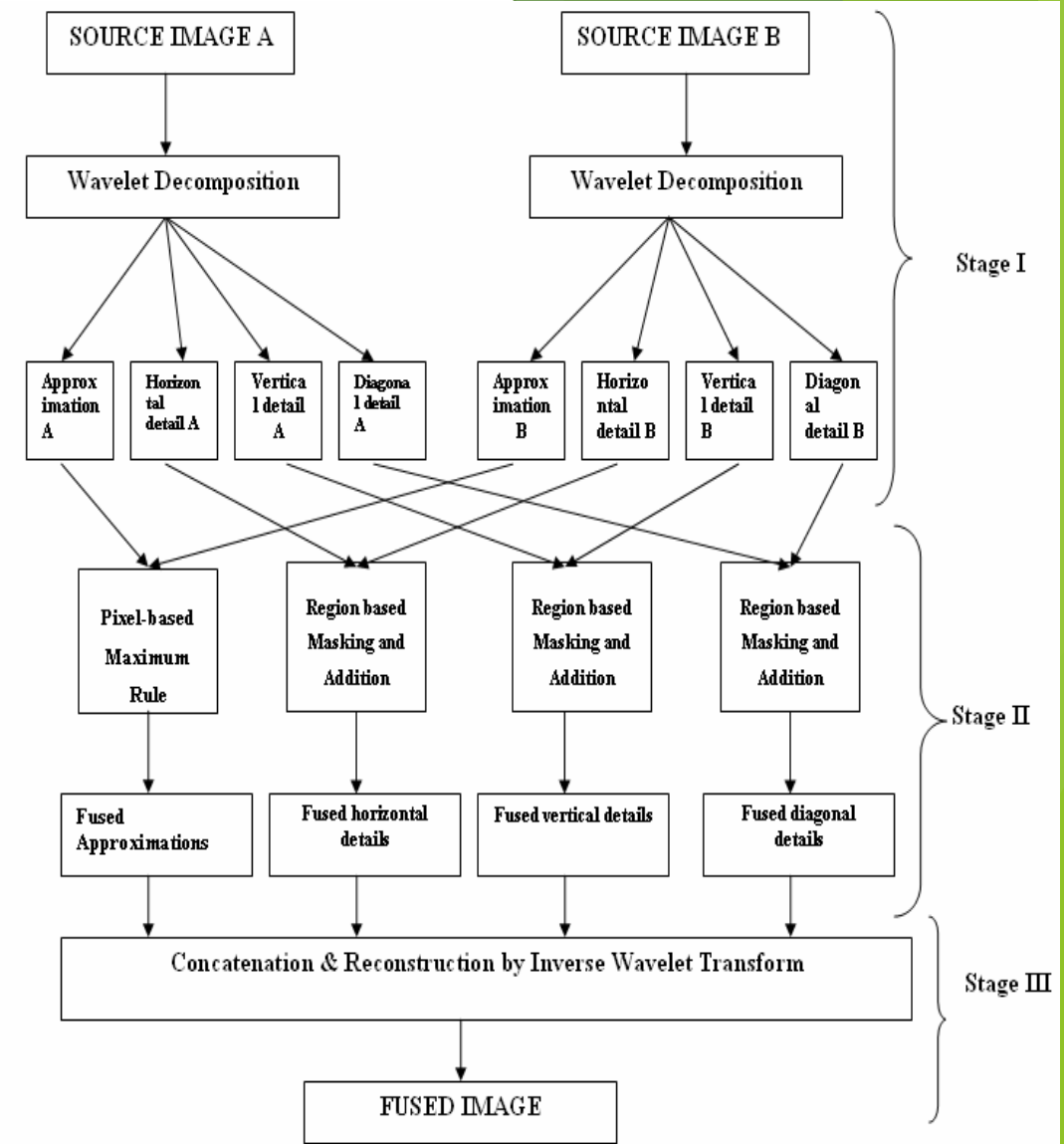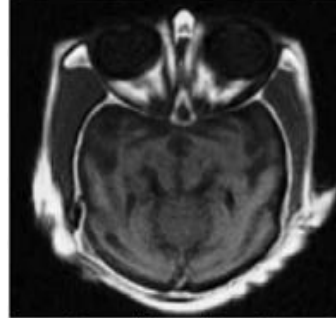
WORKING:
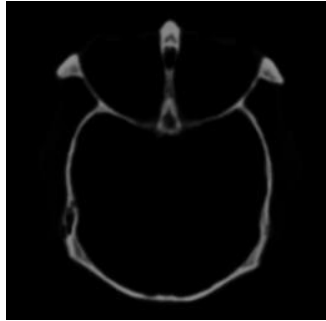
PERFORMANCE EVALUATION:

$$MSE = \frac{\sum_{i=1}^{M} \sum_{j=1}^{N} [S(i,j) - F(i,j)]^2}{MXN}$$

$$PSNR = 10 \log_{10} \left(\frac{255^2}{MSE} \right)$$

MSE: Mean Square Error
PSNR : Peak Signal to noise ratio
S : Source Image
F : Fused image

Literature Survey

1) Pattern Recognition ,Volume 37 Issue 9, September 2004, Pages 1855-1872

    Authors : G Parajes, JM De La Cruz

2) M. Sasikala and N. Kumaravel, "A comparative analysis of featurebased

    image fusion methods," Information Technology Journal,6(8):1224- 1230,
    2007.