

Multi-Modal Medical Image Fusion

Problem Statement :

Image Enhancement using multimodality image fusion: As an effective way to integrate the information contained in multiple medical images with different modalities, medical image fusion has emerged as a powerful technique in various clinical applications such as disease diagnosis and treatment planning. In this project, a new multimodal medical image fusion method in wavelet is proposed.

Introduction :

The image fusion process is defined as gathering all the important information from multiple images, and usually form a single resultant image. By the help of this fusion we can get better result, if we compare the result with previous images, or we can say that the result is an image that has a higher information content compared to any of the input images. Medical image fusion covers a broad number of hot topic areas, including image processing, computer vision, pattern recognition, machine learning and artificial intelligence. And medical image fusion has been widely used in clinical for physicians to comprehend the lesion by the fusion of different modalities medical images.

Motivation :

The motive of the image fusion project is for undertaking medical field research. Also to learn about new areas of image fusion where this project helps us to construct images more appropriate, higher resolution and understandable for both humans as well as machine perception. Earlier the patients had difficulty understanding MRI and CT scans. A multi modal

image fusion scheme is introduced based on two-scale image decomposition and sparse representation. In the proposed scheme, the source multi modal images are first processed through filter technique to improve contrast so that the intensity distribution is improved for better visualization. Images of different modalities include PET, CT and MRI. One input image will have high spatial resolution and low spectral information and another image will have high spectral resolution and vice versa. The aim of medical image fusion is to have a single image having both spatial and spectral resolution. Most commonly used transform domain methods like wavelet transform are applied to extract more specific information from the source images. The enhanced multi modality images are then decomposed into two components: the approximation and detail layers.

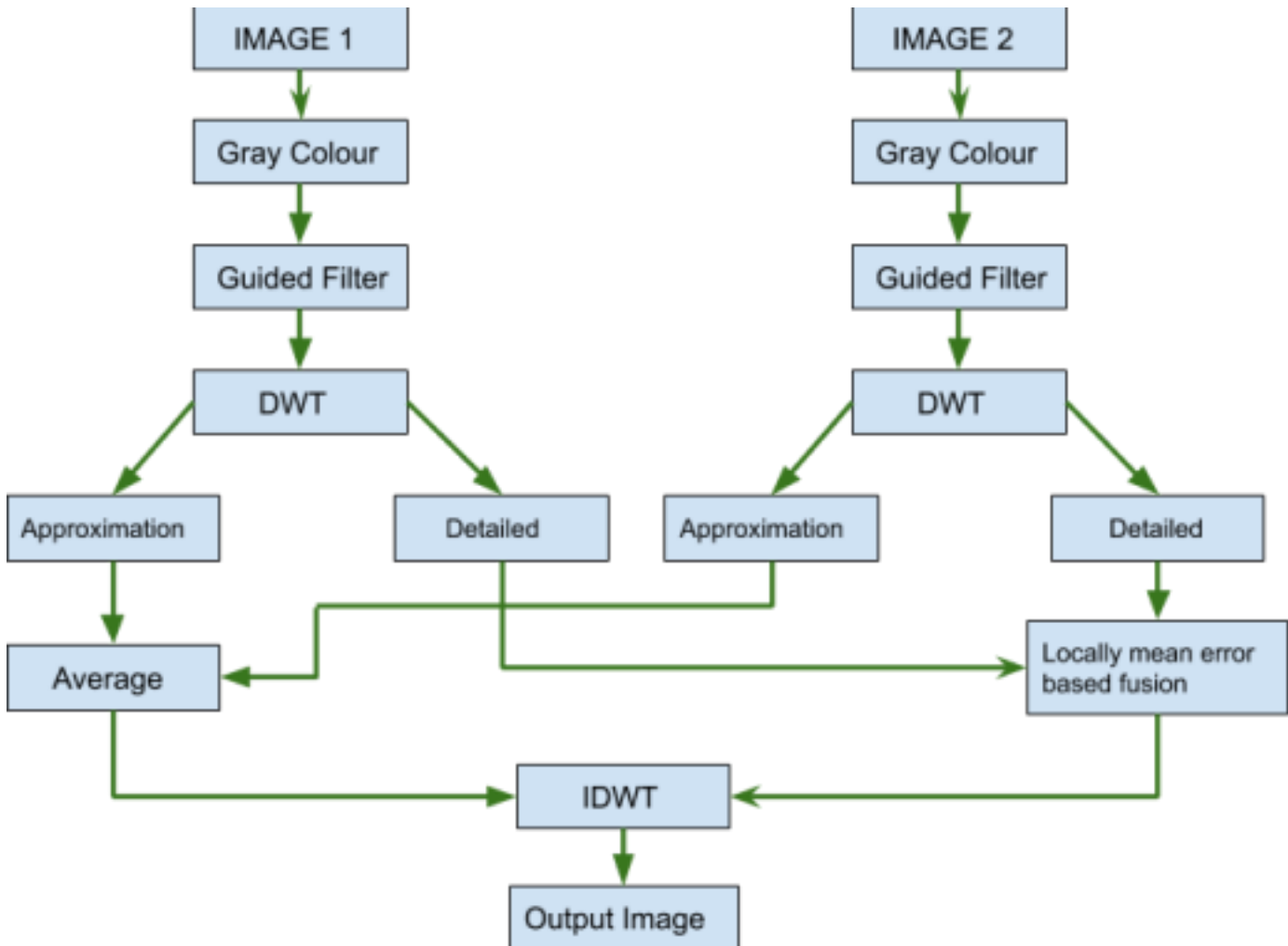
Experimental result in the field of medical image fusion are characterized by

- (1) image decomposition and image reconstruction
- (2) image fusion rules
- (3) image quality assessments
- (4) performing qualitative and quantitative analysis

Methodology :

- Matlab
- Image Processing Toolbox Package
- Wavelet Toolbox Package
- Fusion Technique
- Quality Measurement

Flowchart



Linear Contrast Enhancement :(By using Linear Equation)

$$Y = A(X) + B$$

WHERE 'A ' IS CONTRAST FACTOR
 'X' IS IMAGE
 'B' IS BRIGHTNESS FACTOR

