

FUSION OF DIFFERENT MEDICAL SENSOR USING LOCAL LAPLACIAN PYRAMID TRANSFORM

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Abstract - The Objective of project is to enhance the quality of medical sensor images for human perception and computerized image processing. The major anxiety about different medical sensor images is not providing comprehensive and accurate information. So this project aims to overcome the problems mentioned above by introducing local Laplacian pyramid transform (LLP) and adaptive cloud model (ACM). The project is classified into three groups. First, the input images like MRI and PET are decomposed into various levels using F-LLP. Second, fusion of two different approximate images is involved using ACM. Finally, reconstruction of original image will be performed by I-LLP.

The assessment of medical image quality will be performed by different parameters like RMSE, PSNR, SD, MI and Entropy, cross entropy

Key Words: local laplacian pyramid transform, adaptive cloud model, image fusion.

1. INTRODUCTION

MULTIMODAL sensor medical image fusion is the process of merging multiple medical images from a single imaging sensing modality or multiple imaging sensor modalities with limitation information, such as low spatial resolution or lack of functional information. Multimodal sensor medical images are roughly divided into two groups: anatomical images and functional images. Anatomical images (such as magnetic resonance imaging (MRI) and computed Tomography (CT)) provide high-spatial-resolution anatomical morphology of organs, but they cannot represent functional changes in the organs. On the other hand, functional images (such as positron emission tomography (PET) and single photon emission computed tomography (SPECT)) can obtain information about the metabolism of organs. Owing to their low resolution, functional images cannot display anatomical details of organs and lesions. To overcome the defects of various imaging techniques, multimodal sensor medical image fusion methods have been proposed to construct a fused image including both anatomical and functional information.

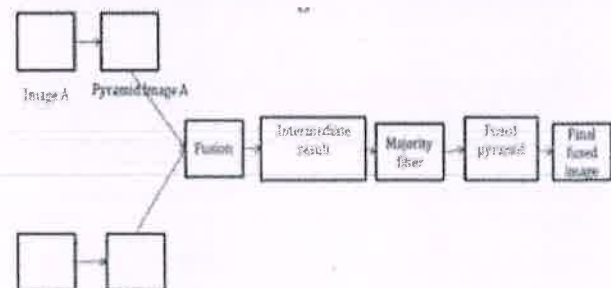
1.1. Pyramid Transformation

The basic idea is to construct the pyramid transform of the fused image from the pyramid transforms of the source images and then fused image is obtained by taking inverse pyramid transform. Here are some advantages of pyramid transform:

1. It can provide information on the sharp contrast changes and human visual system is especially sensitive to these sharp contrast changes.
2. It can provide both spatial and frequency domain localization Several types of pyramid decomposition are used or developed for image fusion such as

- Laplacian Pyramid
- Ratio of low pass pyramid
- Gradient Pyramid

A Laplacian Pyramid Image pyramid is a multiresolution analysis model. The Laplacian Pyramid implements a pattern selective approaches to image fusion, so that the composite image is constructed not a pixel at a time.. The basic idea is to perform a pyramid decomposition on each source image then integrate all these decomposition to form a composite representation and finally reconstruct the fused image by performing an inverse pyramid transform. Schematic diagram of the Laplacian Pyramid fusion method is shown in figure



Laplacian Pyramid used several modes of combination such as selection or averaging. In the first one the combination process selects the component pattern from the source and copies it to the composite pyramid, while discarding the fewer patterns. In the second one, the process averages the sources patterns.