CHAPTER 7

CONCLUSION AND FUTURE WORK

7.1 SUMMARY OF THE PRESENT WORK

This thesis has proposed and analyzed three major image processing applications namely Image Fusion, Image Denoising and Image Compression. A detailed literature survey is performed in order to attain an in-depth understanding of the importance of above said image processing applications and the possible solutions suggested by researchers along with their limitations. Comprehensive simulations has been carried out for the proposed schemes using wavelet, Ridgelet, Curvelet, Contourlet transforms and wavelet based transforms.

The proposed fusion algorithm achieves significant results. A comparative study has been made among the wavelet, ridgelet, curvelet and the contourlet fusion algorithms. The result shows that the application of contourlet proves to be advantageous based on the values of PSNR and RMSE. This shows that the contourlet fusion algorithm is better compared to the above mentioned algorithms. Similarly a comparative study has also been made among the wavelet based ridgelet, wavelet based curvelet and wavelet based contourlet transforms for fusion algorithm. The result shows that the application of wavelet based contourlet transforms proves to be advantageous based on the values of PSNR and RMSE. This shows that the wavelet based contourlet fusion algorithm is better compared to the wavelet based ridgelet transform and wavelet based curvelet transform algorithms.
The results obtained by the proposed hard thresholding algorithm have the exact reconstruction property and it is not suffer from visual artifacts. A contourlet transform can be designed to be a tight frame, which implies robustness against noise due to quantization and thresholding. Because of this property, contourlet can be used in image denoising and water marking. As images scale up, the asymptotic theory which suggests that curvelet outperform wavelets and ridgelet may become increasingly relevant. Comparing with all transform curvelet transform has high PSNR with good visual perception. Thus the wavelet based transforms had been proved with the higher PSNR values given along the snapshot. Hence the PSNR values will be good in curvelet transform and also wavelet based curvelet has the high PSNR values.

This is a world of images. There is hardly to find a world without the presence of images. And as a result of this Image compression the uploading and the downloading of images could be performed at blasting speeds. Thus as a whole compression have been done in various technical aspects as performing compression using three different types of transforms as the Wavelet, Curvelet, Contourlet and the Ridgelet Transforms. In addition to this the compression is also done by the linking process as the Wavelet Based Curvelet Transform. Thus as the final comparison result can conclude to the fact that the Ridgelet Transform forms the best compression in the separate transform comparing the Wavelet, Curvelet, Contourlet and the Ridgelet Transforms. The Compression Ratio (CR) and the Peak Signal to Noise Ratio (PSNR) is less in Wavelet based Curvelet transform, and it increases in Wavelet based Contourlet transform and better Compression Ratio and Peak Signal to Noise Ratio are obtained in Wavelet based Ridgelet transform. Hence the image is compressed to a greater extent and noise is greatly reduced in Wavelet based Ridgelet transform. The Root Mean Square Error (RMSE) is also less in Wavelet based Ridgelet transform. Hence it may
conclude that the Wavelet Based Ridgelet Transform is the best transform as compared with the other transforms which gives better image quality and reconstruction.

7.2 SCOPE FOR FUTURE WORK

On the basis of the investigation carried out in the present research, the following suggestions are presented for further research and it would be beneficial to concentrate on the following issues in future work.

- The proposed system can be extended to other biomedical images.
- The proposed system can be extended to other standard and general images.
- The proposed system can be extended with PET and CT images (Giesel et al 2009).
- The proposed system can be extended to other transforms like bandelet (Beibei Song et al 2007).
- The proposed system can be extended by comparing the performance of other filter combinations for pyramidal and directional decomposition. For better compression ratio pyramidal vector quantization (PVQ) can be added.