

Chapter 5

Conclusions and Future Works

5.1 Conclusions

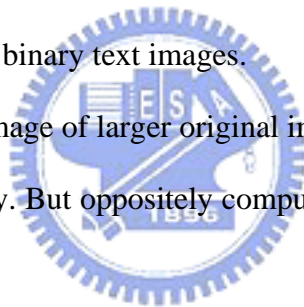
In this paper, we do lots of experiments from different wavelet-based compression systems. The parameters of experiments such as wavelet families (HW, DW, BW, and CW in this paper), filter orders, number of decompositions, compression ratios (10:1, 30:1, and 50:1 in this paper), different image contents, and image resolutions are used to analyze and compare.

From the compression results shown in Chapter 4, we can discover the relations between each parameter and also how some of them involve the others. And the optimal wavelet to some types of images can be found. It can be concluded as:

1. PSNR values of different images will be quite different even we use the same wavelet family, the same number of decompositions, and the same compression ratio. So, PSNR values cannot be used if we want to compare images with different contents.
2. Image quality is better for higher number of decompositions, but the PSNR values will be on the downside if the number of decompositions is larger than the optimal one. Also, larger number of decompositions will cause the coding algorithm inefficiently. Therefore, optimal number of decompositions should be considered about image quality and computational complexity.
3. Larger filter orders do not imply better PSNR values or visual picture quality.
4. Coding performance of images with moderate spectral activity is more

sensitive to the choice of wavelets. So, one way to choose the better wavelet is to select the optimal wavelet applied on images with moderate spectral activity. This wavelet will also cause good results for other types of images.

5. When applying the same wavelet family and the same filter order on the same image, the optimal number of decompositions tends to increase as compression ratio is on the rise, and the optimal number of decompositions tends to decrease as compression ratio is going down.
6. BW2.2 with number of decompositions five gives not only best PSNR values but also best visual picture quality on most images. But DW2 with number of decompositions five is suitable for the images with higher spectral activity. In addition, HW with number of decompositions five is suitable for the pure binary text images.
7. The reconstructed image of larger original image has better PSNR value and visual picture quality. But oppositely computational complexity is relatively high.



5.2 Future Works

No single image compression algorithm can be expected to work well for all kinds of images. In order to select the best wavelet filter to a certain image more accurately, various characteristics of wavelets and various features of images can be analyzed, and then find out the relations between each other. In addition, try to apply different wavelets to different levels to see if there exist optimal wavelet matches for an image.