EEE 5347 Image and Video Compression and Network Communication

Final Project

Project Tasks
Implement the following image compression and communication system:

Encoder

1. Read a 512×512 grayscale image;
2. Apply 5-level subband decomposition using the (5, 3) wavelet;
3. Quantize the DWT coefficients using a step size of q;
4. Apply prediction to the lowest frequency subband;
5. Scan the lowest-frequency suband using raster scan. Scan the high-frequency subbands using zero-tree scan and EZT symbols. So, the output will be a 1-D sequence of non-zeros, zeros, EZT symbols. For non-zeros, use the (size, amplitude) representation.
6. Zeros, EZT symbols, and sizes are to be encoded with Huffman coding.
7. Record the encoding bit rate $R(q)$;

Networking Transmission

8. Write a socket network communication module to send the compressed image data to the receiver.

Decoder

9. Use the Huffman decoder to decode the bit stream.
10. Apply inverse scan to reconstruct the subbands;
11. Apply inverse quantization;
12. Apply inverse DWT to reconstruct the image;
13. Computer the PSNR $D(q)$;
14. Plot the R-D curve;

Submission

1. The final submission will include two executable modules: the encoder and the decoder.
    a. Bitrate = imageEncoder(orgImageFileName, quantizationStepSize). It will produce the bit stream "image.bit";
    b. PSNR = imageDecoder("image.bit", quantizationStepSize, orgImageFileName)
2. A 4-5 page final report to describe what have been implemented in the project and the R-D curve (by changing the step size q) performance evaluation results on at 3 images;
3. Upload source code in "LASTNAME-FIRSTNAME-source.rar"; Do not include the executable.
4. Final project demo.