Final Report: Transform Coding in JPEG

Due Date: 6/25/2012

Transform Coding in JPEG

- For this final project report, you will study the effect of different 8×8 orthonormal matrices on JPEG compression efficiency
- In JPEG, 8×8 Discrete Cosine Transform (DCT), is used to transform the image data into transform domain for de-correlation and energy compaction
- Any 8×8 orthonormal transform can be used to replace the DCT transform in JPEG; you should select and analyze at least 3 orthonormal transforms other than the DCT for your report

Source Code of JPEG Codec

- Please download the open source JPEG codec from the following website:

  http://code.google.com/p/jpeg-compressor/

- Note that, the key files for the JPEG encoder is jpge.cpp and the decoder is jpgd.cpp. All other files are only for I/O of different raw image formats and testing.
  - You can write a small program by yourself to invoke jpge.cpp and jpgd.cpp for experiments in this report.

Test Images for Experiments

- There are many test image databases on Internet. One famous image database is:

  http://sipi.usc.edu/database/database.php?volume=misc

  - These images are in TIFF format. You can use xnview to convert them to an simpler raw data format, say ppm, for your experiments.

- Note: you can use any images of your choice (or even shoot your own images) for this report

Hand-in for the Homework

- Please write a final report (unlimited pages):
  - Describe the flow of the two C files: jpge.cpp and jpgd.cpp
  - Describe the three (or more) orthonormal transforms you have selected (or designed by yourself); explain why these transforms are selected and what kind of image data can be encodeded well using these transforms
  - Conduct some experiments comparing your transforms against DCT on different types of images
- Grading is based on
  - Your report