Data Compression 小考 2010/12/22

1. (20%) Do the type-II differential encoding and decoding for the input sequence {5.9, 6.2, 9.7, 13.2, 8, 7.4, 4.2, 1.8}. (in pp. 4 of DPCM)
2. (20%) For the input sequence {5.9, 6.2, 9.7, 13.2, 8, 7.4, 4.2, 1.8}, find the coefficients a_1 and a_2 of the DPCM predictor of order 2. (in pp. 6-7 of DPCM)
3. (20%) Show that the following both equations are separable transforms, i.e. they can be represented as the form shown in pp. 3 of transform coding..

- FDCT

$$S_{vu} = \frac{1}{4} C_u C_v \sum_{x=0}^{7} \sum_{y=0}^{7} s_{yx} \cos\frac{(2x+1)u\pi}{16} \cos\frac{(2y+1)v\pi}{16}$$

- IDCT

$$s_{yx} = \frac{1}{4} \sum_{u=0}^{7} \sum_{v=0}^{7} C_u C_v S_{vu} \cos\frac{(2x+1)u\pi}{16} \cos\frac{(2y+1)v\pi}{16}$$

  - where

$$C_u, C_v = \frac{1}{\sqrt{2}} \text{ for } u, v = 0$$

$$C_u, C_v = 1 \text{ otherwise}$$

4. (20%) Please explain that, in pp. 5 of Vector quantization, how to obtain the codebook with size 4.

5. (20%) Find the code stream for the 63 input AC descriptors {0,0,0,4,0,0,-14,0,0,0,..,0}. (in pp. 30 of JPEG)