

Homework 1 (Due:3/13)

(A) Given a grayscale image I ,

Step 1: Use the dithering matrix D_2 to generate an array D of image size by repeating D_2

$$D_2 = \begin{bmatrix} 0 & 128 & 32 & 160 \\ 192 & 64 & 224 & 96 \\ 48 & 176 & 16 & 144 \\ 240 & 112 & 208 & 80 \end{bmatrix}$$

D

D_2	D_2	D_2	D_2
D_2	D_2	D_2	D_2
D_2	D_2	D_2	D_2
D_2	D_2	D_2	D_2

Step 2: Threshold image I by

$$I'(i, j) = \begin{cases} 255 & \text{if } I(i, j) > D(i, j) \\ 0 & \text{if } I(i, j) \leq D(i, j) \end{cases}$$

Step 3: Show images I and I'

(B) Extend to $n = 4$ gray values

1. $255 / 3 = 85$

2. $Q(i, j) = [I(i, j) / 85]$

3. $D_1 = \begin{bmatrix} 0 & 56 \\ 84 & 28 \end{bmatrix} \Rightarrow_{\text{extend}} D$

4. $I'(i, j) = Q(i, j) + \begin{cases} 1 & \text{if } I(i, j) - 85Q(i, j) > D(i, j) \\ 0 & \text{if } I(i, j) - 85Q(i, j) \leq D(i, j) \end{cases}$

5. Scale values of I' so that its values are in $[0, 255]$ for displaying