Tutorial 3
Image Dittering and Data Transmission

CS4185 Multimedia Technologies and Applications

1. One method to recover UDP datagram loss is to add a parity block to every n blocks of multimedia data. Assuming n=3, add the parity block for the following 3 blocks of data, using add parity. What is the overhead for this example?

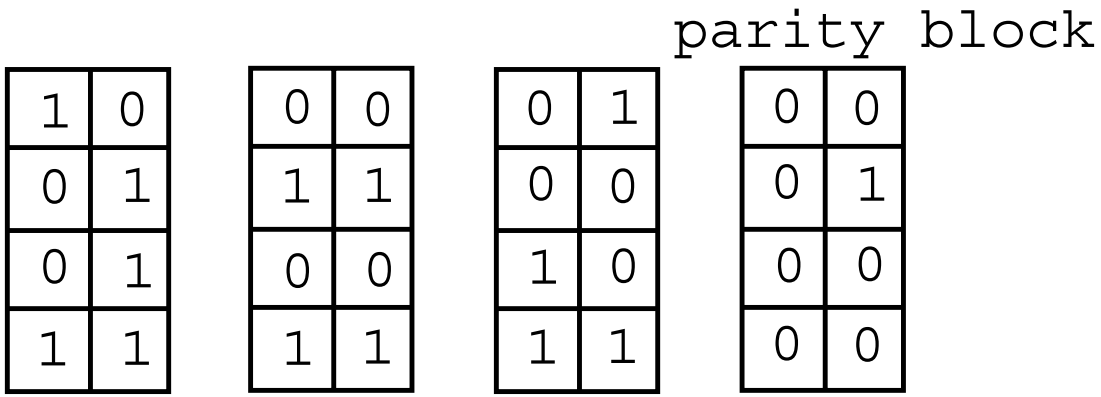
1	0
0	1
0	1
1	1

0	0
1	1
0	0
1	1

0	1
0	0
1	0
1	1

2. Given an 8-bit grayscale input image of 2x2 in resolution $\begin{bmatrix} 152 & 60 \\ 125 & 240 \end{bmatrix}$, show the steps to obtain the output dithered binary image, using the dithering matrix: $\begin{pmatrix} 0 & 4 & 2 \\ 3 & 1 & 5 \end{pmatrix}$.

1. **One method to recover UDP datagram loss is to add a parity block to every n blocks of multimedia data. Assuming n=3, add the parity block for the following 3 blocks of data, using add parity. What is the overhead for this example?**



The overhead is: an addition of 33% of the original file size.

2. Given an 8-bit grayscale input image of 2x2 in resolution $\begin{bmatrix} 152 & 60 \\ 125 & 240 \end{bmatrix}$, show the steps to obtain the output dithered binary image, using the dithering matrix: $\begin{pmatrix} 0 & 4 & 2 \\ 3 & 1 & 5 \end{pmatrix}$.

A 3x2 matrix produces a total of 7 levels of pixel patterns: P0 - $\begin{bmatrix} B & B & B \\ B & B & B \end{bmatrix}$, P1 - $\begin{bmatrix} W & B & B \\ B & B & B \end{bmatrix}$, P2 - $\begin{bmatrix} W & B & B \\ B & W & B \end{bmatrix}$, P3 - $\begin{bmatrix} W & B & W \\ B & W & B \end{bmatrix}$, P4 - $\begin{bmatrix} W & B & W \\ W & W & B \end{bmatrix}$, P5 - $\begin{bmatrix} W & W & W \\ W & W & B \end{bmatrix}$, P6 - $\begin{bmatrix} W & W & W \\ W & W & W \end{bmatrix}$, with threshold values: 37, 73, 110, 146, 182, 219, respectively.

Hence, we have: P0 (0–36), P1 (37–72), P2 (73–109), P3 (110–145), P4 (146–181), P5 (182–218), P6 (219-255)

After thresholding, the input image becomes: $\begin{bmatrix} P4 & P1 \\ P3 & P6 \end{bmatrix}$.

By substituting the pixel patterns into the thresholded image, we have:

$\begin{bmatrix} W & B & W & W & B & B \\ W & W & B & B & B & B \\ W & B & W & W & W & W \\ B & W & B & W & W & W \end{bmatrix}$. This represents the output dithered binary image.