Department of Electrical Engineering and Computer Science

CIS 465 Multimedia
Fall 2021

Assignment 1
(Due date: 09/13/21)

1. Write Python program to perform the data encoding and decoding task as explained in the next page. You may use the same 2D matrix as input to your program.

2. Use your program from part 1 and create a function that accepts any input size of a 2D matrix data and returns 2D encoding output whose size is same the input size.

What to turn in:

Submit your work through **Blackboard** as **one single** folder including:

- An `HTML` file called `index.html` that links to the overall summary of your answers (screenshot of part 1 output).
- A folder called `CIS_465` that includes all files, program codes along with the supported files, dataset needed to reproduce your code (if any), etc.

Notes:

- Late submissions will receive a penalty of 10% per day up to two days.
- No material will be accepted after two days past the deadline.
- Email submissions will not be accepted.

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For each element, we need to get its 3×3 neighbors (e.g. 5 in the red circle and its neighbors as in the red box). Then:

1. Subtract that element of interest (X) from its 8 neighbors.
2. Sign 1 to the values that are greater than or equal 0 and 0 for the values that are less than 0.
3. Concatenate the 8-bit binary code as the example bellow (starting from the element in the red circle which will be at the first bit from the right and following the arrows).
4. Convert that binary code to decimal.
5. Substitute that decimal code instead of the element of interest (X).
6. Repeat for all elements.

0	3	2	5	4	7	6	9	8
3	0	1	2	3	4	5	6	7
2	1	0	3	2	5	4	7	6
5	2	3	0	1	2	3	4	5
4	3	2	1	0	3	2	5	4
7	4	5	2	3	0	1	2	3
6	5	4	3	2	1	0	3	2
9	6	7	4	5	2	3	0	1
8	7	6	5	4	3	2	1	0

Note that: The above steps (1-5) must be applied for each pixel of the input image.

Example: