QoS and Multimedia TD1: Digital Image representation

Excersice 1

Considering that we have a 4 bit image with 10x10 resolution that generated using this expresion

$$I(x, y) = (x * y) mod 16$$

and $ x,y € [0,10] $

1. Generate the image I
2. give the right interval that values can be on pixels
3. Calculate the storage size of I
4. Propose the good way to implement this transformation on the image - using Algorithms-

- horizontal mirroring on the image matrix I
- Increase the brightness of the image matrix I by adding 5 to each pixel value
- Flip the image matrix I to the right (rotate by 90 degrees clockwise)
- Change the image matrix I to a binary image. Set a threshold of 8, where all pixel values greater than or equal to 8 become 1, and the rest become 0.

Excersice 2

Considering that we have a color image with 32x32 pixels, with each pixel represented in 24 bits (8 bits each for red, green, and blue channels).

1. how many color we can represent using this pixel byte size?
2. Calculate the size of the color image in bytes.
3. Propose the good way to implement this transformation on the image - using Algorithms-

- Convert the image to Gray Scale image.
- downscaling the image using the mean bilinear interpolation.

4. how many Gray degrees we can represent on a Gray scale pixel?
5. Calculate the size of the grayscale image after resizing to 16x16 pixels. Provide the size in bytes.