**Exercise 3 – Continuation of image characteristics (14.November 2017 16h00-17h)**

1. What is the maximum entropy that a 4x4 matrix with 8 gray levels could have?
2. What kind of information about bit-depth does entropy give you?
3. Now let’s apply these calculations from the previous exercise to the images mypeppers9gl.png and myrandom9gl.png with **Matlab**.
   1. First load the image
   2. Visualise the image
   3. Calculate the histogram
   4. Calculate the parameters in the table
   5. Calculate the co-occurrence matrix.

|  |  |  |
| --- | --- | --- |
|  | mypeppers9gl.png | myrandom9gl.png |
| Mean |  |  |
| Variance |  |  |
| Entropy |  |  |

What can you comment about these results?

4.1 Start Matlab

4.2 Load image mypeppers.png (imread).

im=imread(‘mypeppers.png’);

4.3 Check the size of the image matrix (size).

size(im)

4.4 Check pixel values.

im(100,100,:)

4.5 Check information about the image (imfinfo). Is it RGB? What is the BitDepth?

4.6 Visualize the image (imagesc).

imagesc(im)

4.7 Visualize each channel:

im\_red = im;

im\_green = im;

im\_blue = im;

% Red channel only

im\_red(:,:,2) = 0;

im\_red(:,:,3) = 0;

figure, imagesc(im\_red);

% Green channel only

im\_green(:,:,1) = 0;

im\_green(:,:,3) = 0;

figure, imagesc(im\_green);

% Blue channel only

im\_blue(:,:,1) = 0;

im\_blue(:,:,2) = 0;

figure, imagesc(im\_blue);

figure, imagesc(im\_blue+im\_green);

figure, imagesc(im\_blue+im\_red);

figure, imagesc(im\_red+im\_green);

4.8 Convert image to grayscale (rgb2gray)

imgray=rgb2gray(im);

4.9 Visualize and save grayscale in png format (imwrite). Is the datasize of the new image the same?

imagesc(imgray), colormap(gray)

imwrite(imgray,’mygraypeppers.png’,’png’);

4.10 Convert the grayscale image to binary using different threshold values (im2bw) and visualize. Save the new image and check data size.

imbw=im2bw(im); or imbwmanual=(imgray>(max(imgray(:))/2));

imwrite(imbw,’mybwpeppers.png’,’png’);