Visual Data

Lab 1 – Discrete representation of images

1. Open in Matlab (**`img = imread('<filename>');`**) some image (*lena*), then display it (**`imshow(img)`**) and try to zoom it until you can see single pixels.
   1. What do you see? What is the shape of single points?
   2. Compare these with the same image displayed with windows system ~~image~~ **photo viewer**. What is the shape of pixels?
   3. What is the difference? Why?
2. Open in Matlab two images (*lena, clerk*) and downsample (**`imresize`**) them at various scales (0.5, 0.3, 0.1) with turned on (default) and off antialiasing interpolation ('**`nearest`**' option). What is the difference in aliasing appearance between these images?
3. Reduce number of grayscale levels for *lena* image using Otsu method
   1. 2 colors (**`otsuthresh`**, **`multithresh`**) – with and without adding dither (**`randn`**)
   2. 4 colors (**`multithresh/imquantize`**) – with and without adding dither (**`randn`**)

      Try different variances of noise
4. Reduce number of grayscale levels for *lena* image using EM (**`lloyds/quantiz`**) method.
   1. 2 colors
   2. 4 colors
5. Now lets do a Fourier analysis of both images. For both these images.
   1. Perform Fourier transform **`fo=fftshift(fft2(o));`**
   2. Display their amplitude spectra **`surf(abs(log(o)));`** **Why `abs?` `Why log?`**
   3. Try to locate where might be located fringes on the clerks shirt
   4. Are you able to locate them them spatially from the spectra?
   5. Just have a look at the phase spectra **`imagesc(angle(fo))`**. Can you guess anything of above
6. Using **`blkproc(img,<size_of_block>,<function_handle>)`** obtain local Fourier transform for the clerk image. Are You able to find some of its aspects in spatial locations?

   Home work if You don't manage to it today
7. Try to swap parts of spectra of two images