Lab 3, DIP1

Exercise 1

In the following exercise we'll study sin-images and try to calculate the Fourier transform of these. We'll study how the spectrum of an image is changed, when an image is enlarged.

1. Generate an 128*128-sin-image using the formula:

$$x[m,n] = 0.5 \cdot \sin(2\pi(\frac{m}{M}k + \frac{n}{N}l)) + 0.5$$

   Show the image for different values of *k* and *l*. What is the meaning of the values *k* and *l*.

2. Calculate the amplitude spectrum of an image from question 1. Show the spectrum as an image.

3. Enlarge an image using the methods from lab 1 and repeat question 2 for the enlarged images. Try to explain what you see (how would you expect the amp. spectrum to look like?).

4. If there is more time, you may use the command *imrotate()* on an image. How does this change the spectrum?

Excersise 2

In the following exercise we'll study the energy of an image and see how this is distributed in the frequency plane.

1. Implement a MatLab program that shows the energy as a function of the frequency (distance from DC) for your favorite grayscale image. The units on the 2. axis should be % of total energy.

2. Use your program to determine the radius of the disk that contains 99% of the total energy.