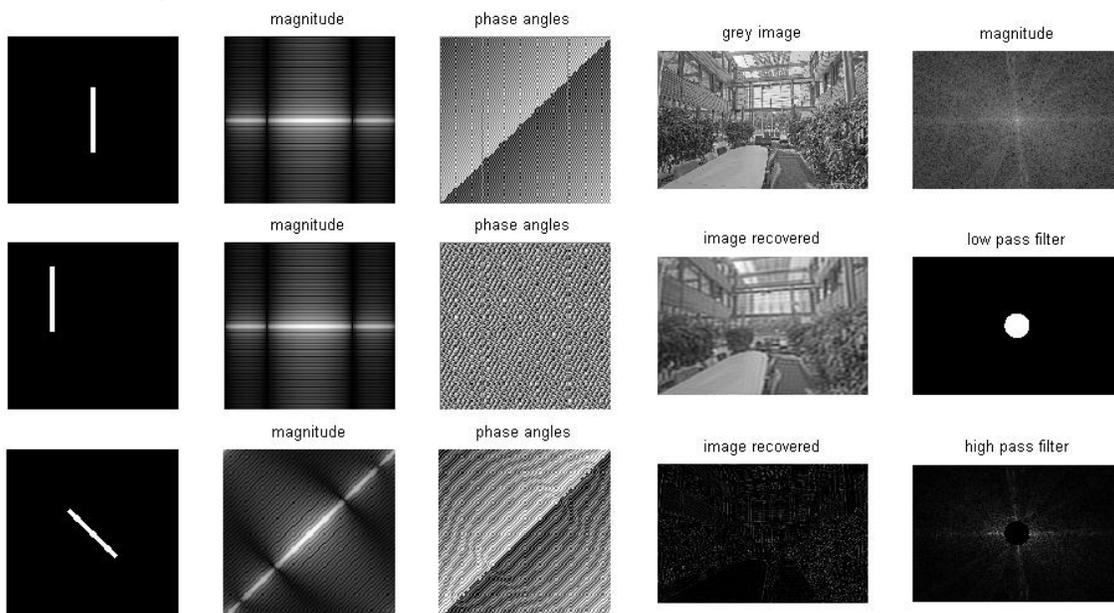


Introduction to Image Processing Lab4

Frequency domain analysis

Fourier transform is perhaps the most important concept in signal processing area. In this lab, we will do experiments to see its characteristics.

1. Generate a binary image with black background and a white rectangular lies in middle of it. Perform Fourier transform to this image and display its magnitude and phase angles respectively.
2. Translate the white rectangular to another position or rotate it by 45 degrees. Perform the Fourier transform again and display its magnitude and phase angles respectively. Compare the results with the original image.
3. Load the 'Atrium2.jpg' which was used in previous labs to the workspace, and see what does its magnitude looks like. Perform low pass filter or high pass filter directly to the magnitude, then transform them back and see the results.



Tips:

1. Use `fft2` or `ifft2` function to perform the Fourier transform or the inverse Fourier transform. Note that the output of Fourier transform is a complex number. Use `real` or `imag` to obtain its real and imaginary part. Use `abs` or `angle` to get its magnitudes and phase angles.
2. The raw output of `fft2` function places its low frequency components in the corners. Conventionally we prefer to place these low frequency components in the middle of image. You can use `fftshift` function to achieve this.
3. The value of low frequency magnitudes and high frequency magnitudes usually differ by several orders. To make them comparable in one image, we usually display its `log` map.