Fourier tranform and Wiener filter

PROBLEM

Load any image in grayscale. Ideally if this is an image with some repeating or periodicity in it. Peform following operations using OpenCV API:

1. Get the discrete Fourier transform of the image. Show the real and imaginary images. Show the logarithm of 1 (one) plus magnitude image.

2. Apply some smoothing to the image. Try to deconvolve the image using Wiener filter. Show the result. What if you misspecify the bandwidth? Try noisy and noiseless versions of the filter with different noise-to-signal ratios.

REFERENCES

Some theoretical material on filtering operations in given by [1, pp. 132–144].

In OpenCV discrete Fourier transform can be done by `dft` function. You can also find the function `magnitude` useful for this task.

There is no Wiener filter in OpenCV API, so you are supposed to implement it yourself.

References

[1] Richard Szeliski. Computer Vision: Algorithms and Applications. — Springer, 2010. — URL: http://szeliski.org/Book/