

Department of Computer Science  
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# COMS30121 - Image Processing and Computer Vision

[www.cs.bris.ac.uk/Teaching/Resources/COMS30121](http://www.cs.bris.ac.uk/Teaching/Resources/COMS30121)



Seminar Week 03

## Frequency Domain

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# Challenge: Interpretation of the Power Spectrum

You are given a number of image pairs that show the same content in the spatial domain and the frequency domain. Discuss these pairs and find the relationships between the characteristics of the image and its frequency representation. Comment specifically on how the following spatial elements and properties are represented in the power spectrum:

- a) Ideal sine waves in the image, their spatial frequency and their orientation
- b) line structures, edges and their orientation
- c) shift of elements
- d) rotation of elements
- e) location of elements
- f) scaling of elements
- g) contrast
- h) effects of low pass
- i) effects of high pass
- j) power randomization

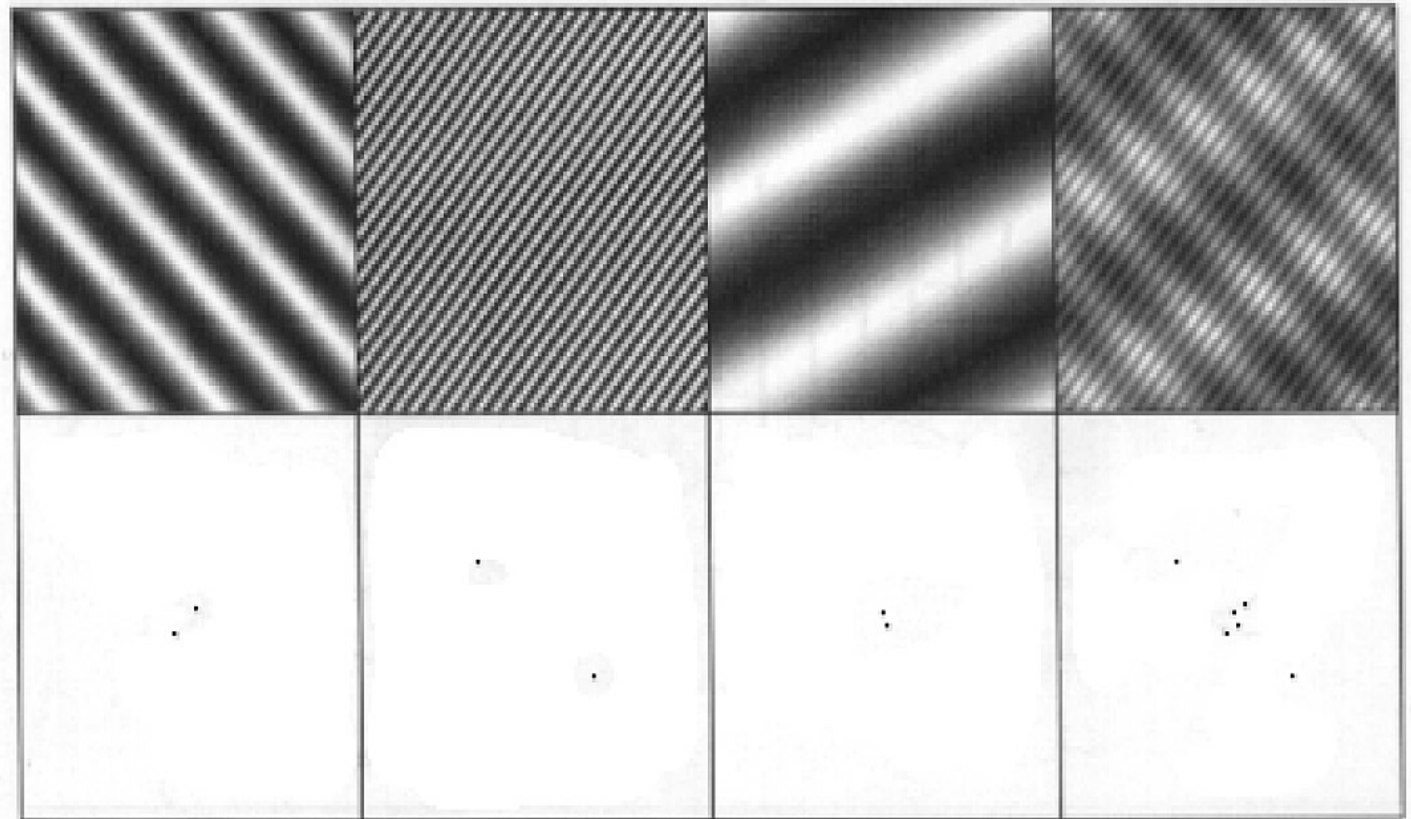


Image Pairs 1,2,3 and 4

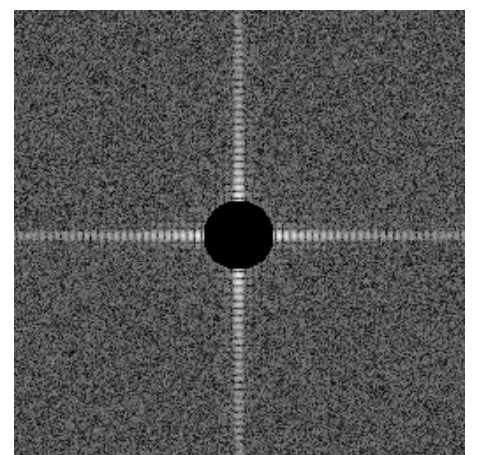
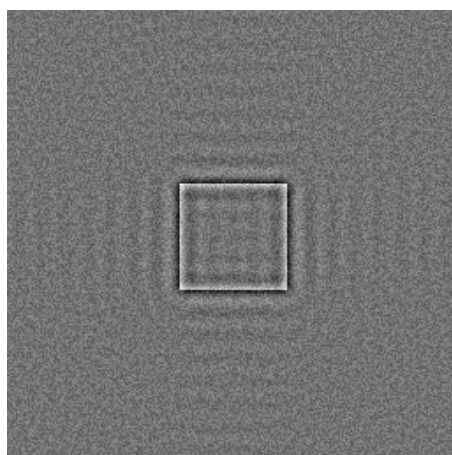
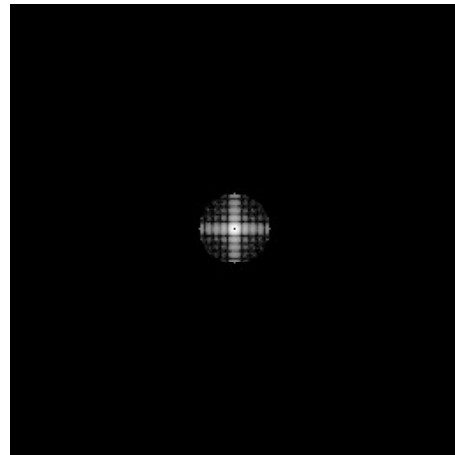
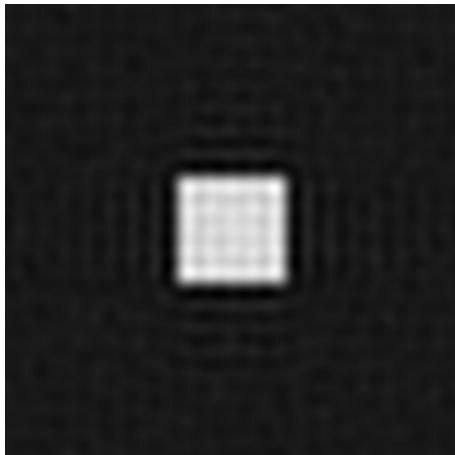
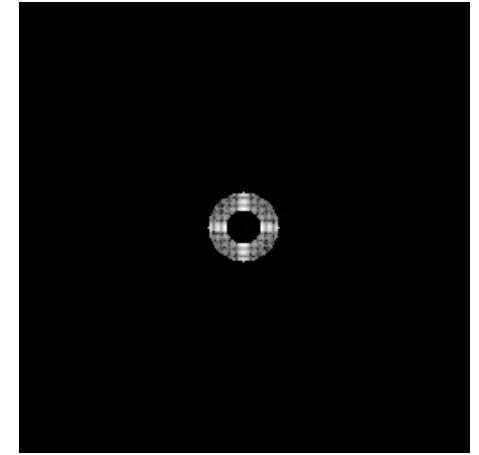
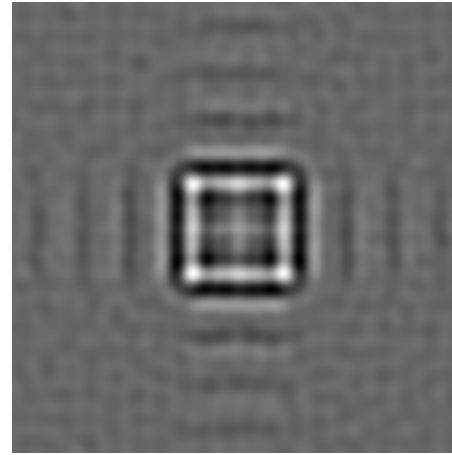
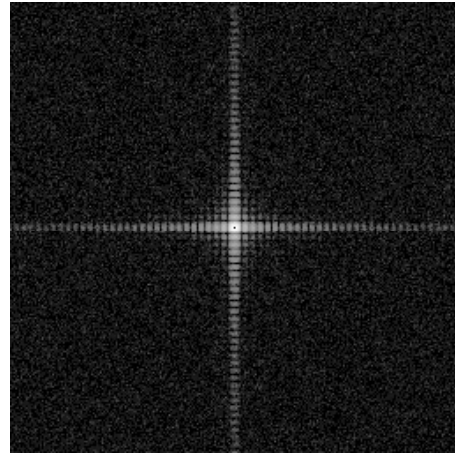
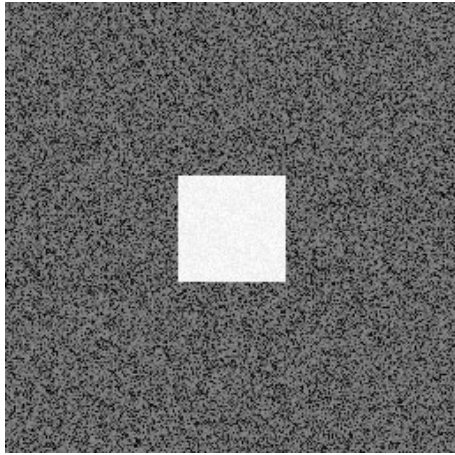
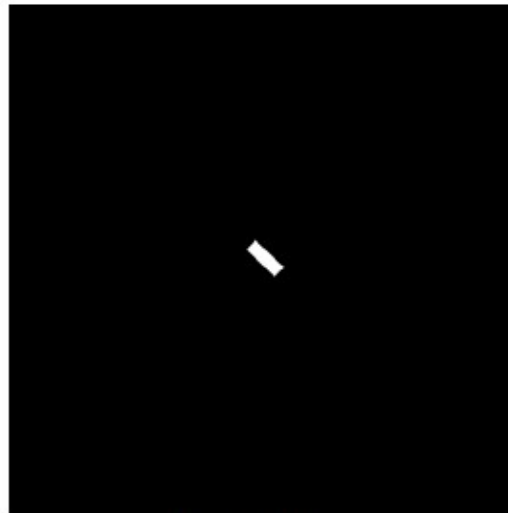


Image Pairs 5 and 6

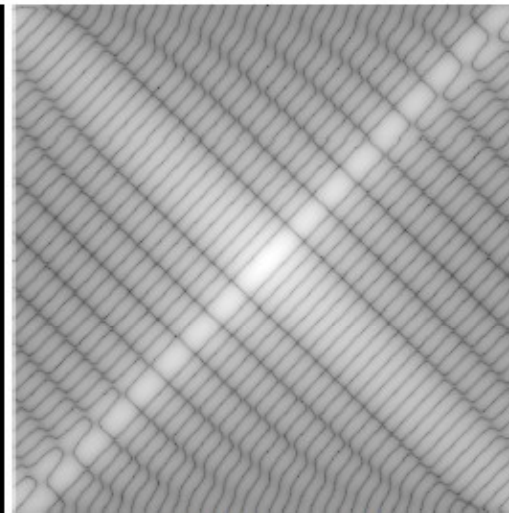
Image Pairs 7 and 8



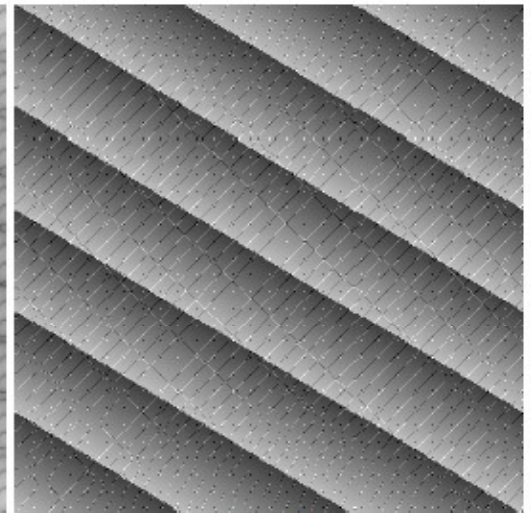
## Image Group 9



(a) Rectangle Image

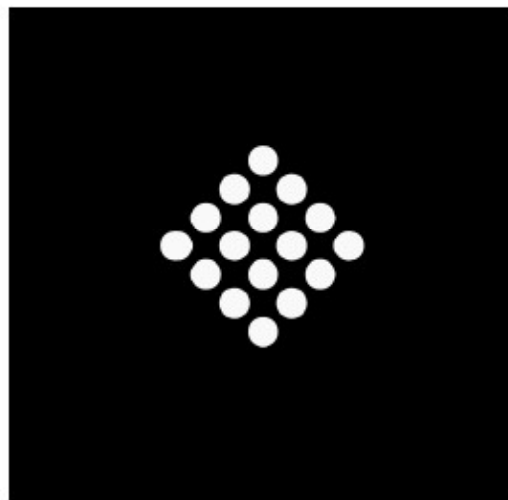


(b) FFT magnitude

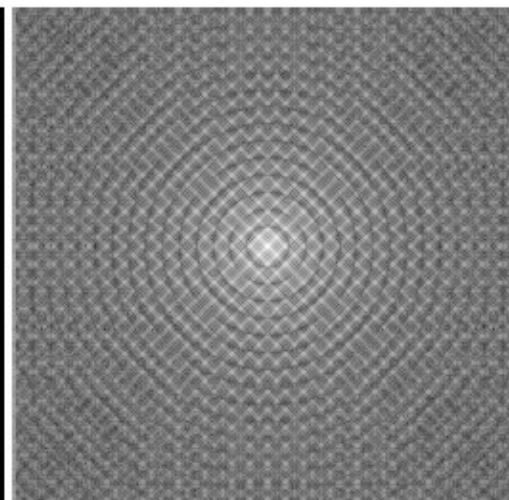


(c) FFT Phase

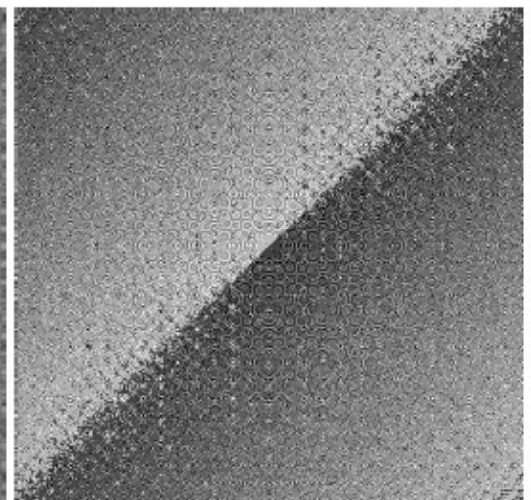
## Image Group 10



(a) Dots Image



(b) FFT magnitude

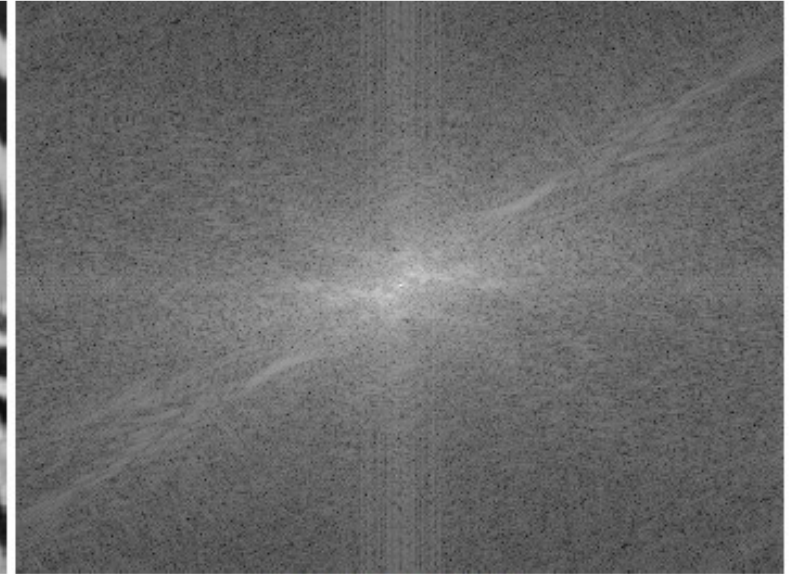


(c) FFT Phase

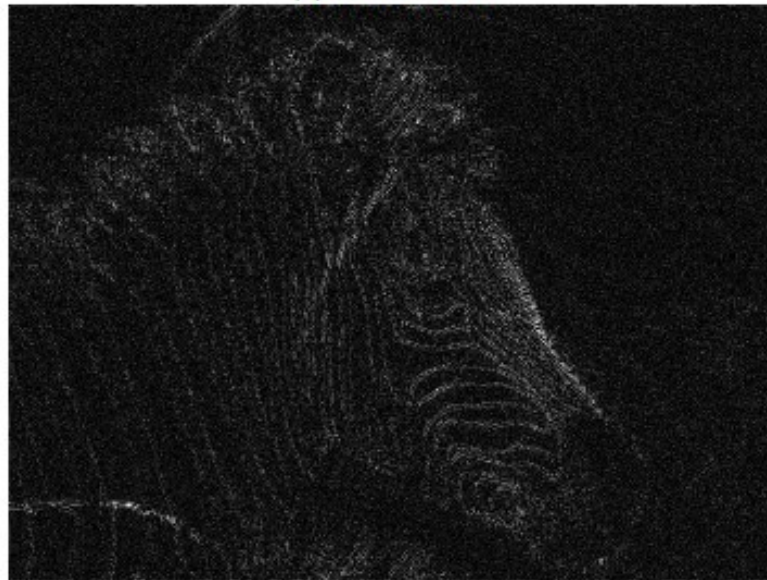
## Image Group 11



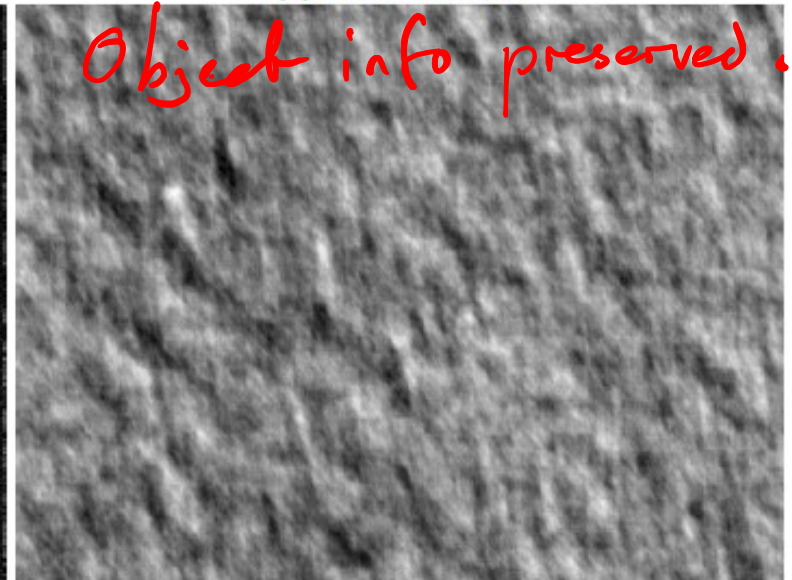
(a) Zebra Image



(b) FFT magnitude



(c) FFT with power component randomised



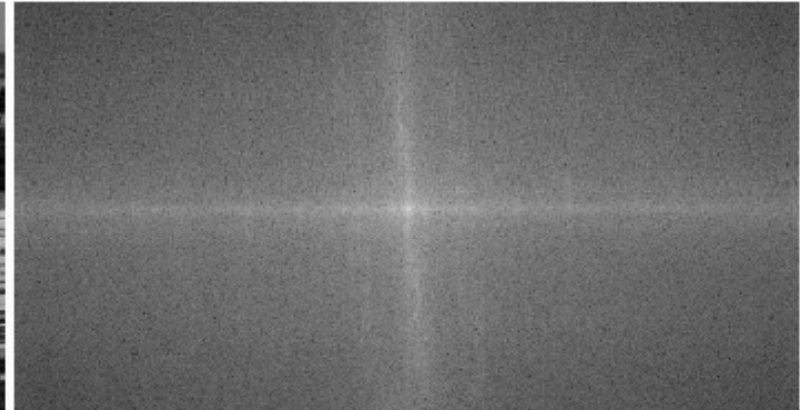
(d) FFT with phase component randomised



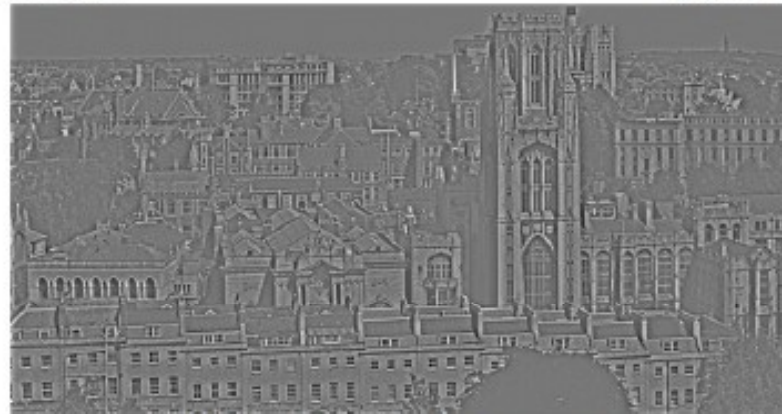
## Image Group 12



(a) Bristol Image



(b) FFT magnitude

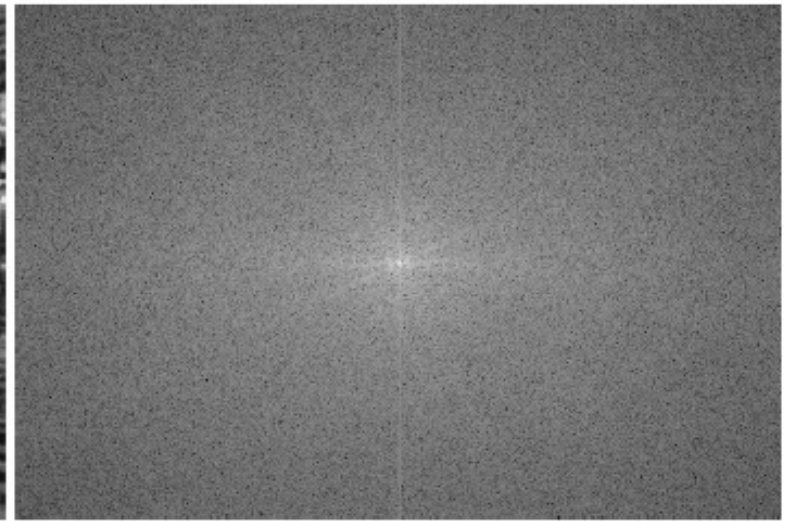


(c) Bristol image after high pass filter

## Image Group 13



(a) Natural Image



(b) FFT magnitude



(c) Natural image after low pass filter