Homework 2 – Fourier Transform

PART I – handwriting homework

- **Derive the Fourier transform pair for an image (2D DFT).**

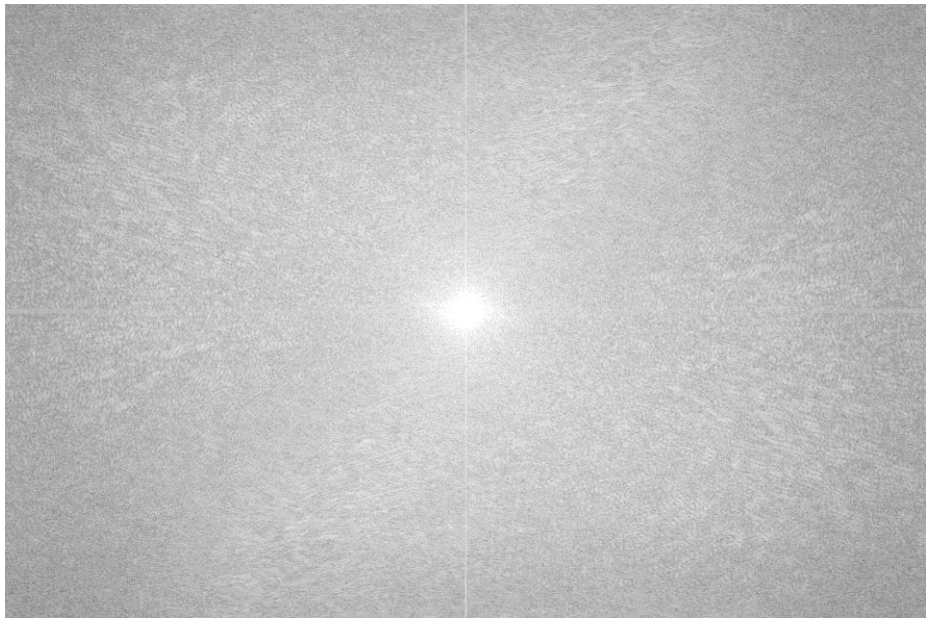
PART II – coding homework

- **Show the frequency domain representation of an image (i.e. the frequency magnitude spectrum).**
- **The DC-value (i.e. F(0,0)) should be displayed in the center.**
- **Do not directly call the high level Fourier transform function in any well-developed library.**
- **Implement in python 3.**
- **Do not copy/paste other's code.**

Example

Input

Output



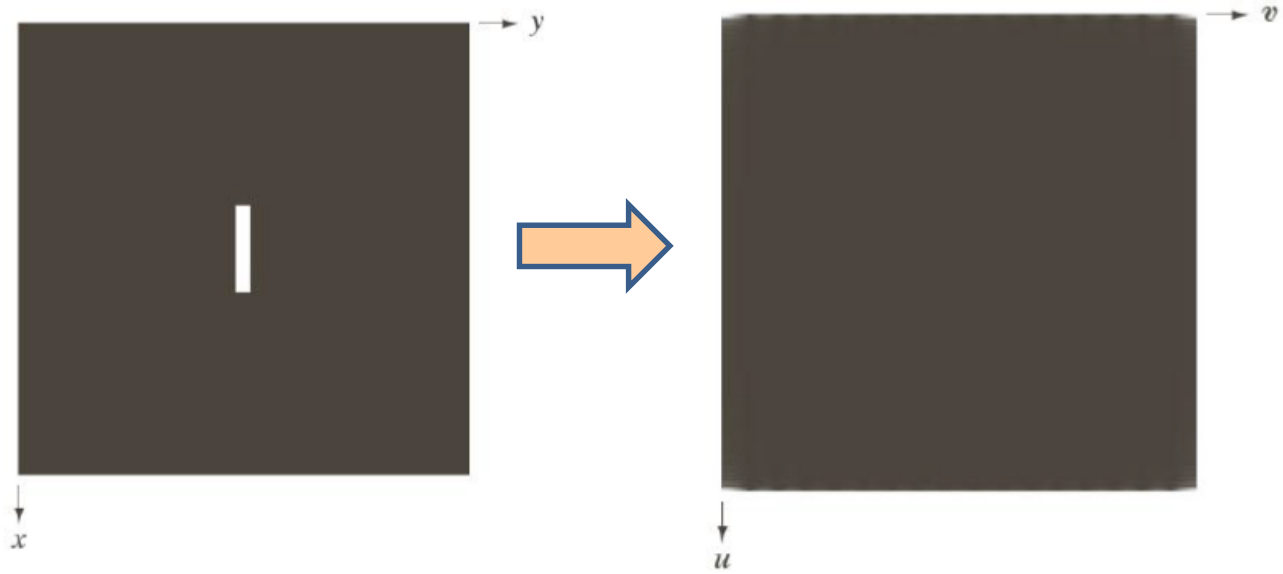
Rules

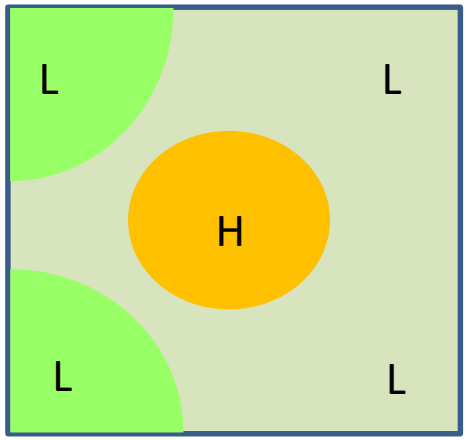
- **Deadline: 2019/11/1 23:55**

  NO LATE SUBMISSION
- **Upload file: Your_Student_ID.py**
- **Get the input image from the command line.**
- **Name your output image with Your_Student_ID.**
- **The output image should be saved in the folder same as your python file.**
- **I'll use all grayscale images(single channel) to test your code.**

2-D DFT

$$\mathrm{F}(u,v) = \frac{1}{MN}\sum_{m=0}^{M-1}\sum_{n=0}^{N-1} f(m,n)\, e^{-j2\pi(\frac{um}{M}+\frac{vn}{N})} \qquad \mathrm{f}(m,n) = \sum_{u=0}^{M-1}\sum_{v=0}^{N-1} F(u,v)\, e^{j2\pi(\frac{um}{M}+\frac{vn}{N})}$$





- If you have any question about this homework, please e-mail to lynn97.ee08g@nctu.edu.tw