$G(u,v) = H(u,v) * F(u,v)$

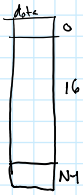
↓

$g(x,y)$

Assignment 2

N points complex → 1_D FFT → N complex numbers

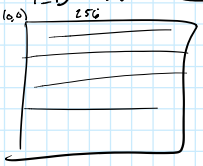
four1(data, n, isign) — isign: 1 or −1



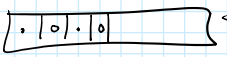
make sure to copy data into spectrum

→ four1(spectrum-1) ← -1 to fool it which auto increments

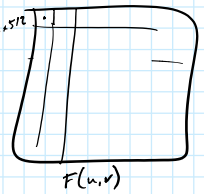
1_D → 256 → complex part is 0



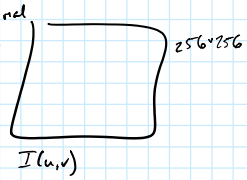
algorithm expects complex numbers

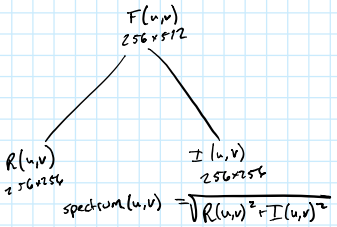


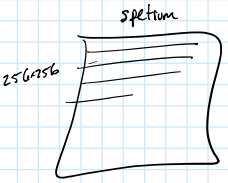
512 comes from complex part



take real







→ before anything happens normalize intensities to 0-255

Normalizing function

$y = \left(\frac{x - min}{max - min}\right) * 255$

pixel = (unsigned char) y

$F(u,v)$ 256×512 → $R(u,v) * H(u,v)$

$F(u,v)$ 256×512 → $I(u,v) * H(u,v)$

$G(u,v)$ 256×512 = four1 → four2(⌊ , ±1) ← 256×512 or 256×256

BW Low Pass

$H(u,v) = \frac{1}{1 + \left(\frac{D(u,v)}{D_0}\right)^{2n}}$ ← at least 2

not centered → subtract $\frac{n}{2}$ from u and v

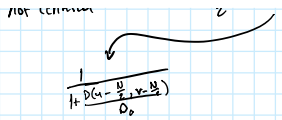
$\frac{1}{1 + D(u - \frac{n}{2}, v - \frac{N}{2})}$

256×512 → 2D Fourier → $F(u,v)$ 256×512

four2(image , 256)

1 → row → column

-1 → column → row



Energy: $\sum_u \sum_v |spect(u,v)|^2$
inside D_0

flip 2 (image, 2)

1 → rows → column
-1 → column → rows