Homework 6 Sol

Thursday, May 20, 2021 8:20 AM

1. No. First, $F = \frac{G}{H}$. But beyond $[D_0 - \frac{W}{2}, D_0 + \frac{W}{2}]$ $H = 0$, cannot use H to divide G.

Second. G will lose some information of outside of $[D_0 - \frac{W}{2}, D_0 + \frac{W}{2}]$

2. a) $G = (F + N)H = (1 + F)H$

$|H_1(u,v)|$ and $|H_2(u,v)|$ both decrease as u and v increase. But $H_2(u,v) = \sqrt{H_1(u,v)}$ and $|H_1(u,v)| < 1$

Which means $|H_2(u,v)|$ decreases slower than $|H_1(u,v)|$.

So $H_1(u,v)$ reduces more noise

b) To judge whether a filter blur the image more or less. we just need to check how it reduces the HIGH frequencies.

Because H_1 decreses faster,

$H_1(u,v)$ blurs the image more.

3. $g(4,3) = f(5,1)$

$g(4,11) = f(5,9)$

$g(9,9) = f(9,9)$

$g(10,1) = f(10,1)$

$x'(x,y) = C_1x + C_2y + C_3xy + C_4$

$y'(x,y) = C_5x + C_6y + C_7xy + C_8$

$$\begin{cases} 4 = 5C_1 + C_2 + 5C_3 + C_4 \\ 4 = 5C_1 + 9C_2 + 45C_3 + C_4 \\ 10 = 10C_1 + 9C_2 + 90C_3 + C_4 \\ 10 = 10C_1 + C_2 + 10C_3 + C_4 \end{cases}$$

$C_1 = 1.2 \quad C_2 = 0 \quad C_3 = 0 \quad C_4 = -2$

$x'(x,y) = 1.2x - 2$

$$\begin{cases} 3 = 3C_5 + C_6 + 5C_7 + C_8 \\ 11 = 5C_5 + 9C_6 + 45C_7 + C_8 \\ 9 = 10C_5 + 9C_6 + 90C_7 + C_8 \\ 1 = 10C_5 + C_6 + 10C_7 + C_8 \end{cases}$$

$C_5 = 0.4 \quad C_6 = 1 \quad C_7 = 0 \quad C_8 = 4$

$y'(x,y) = 0.4x + y + 4.$