CS 663

Assignment 5

Qs 5 - Report

Shubham Lohiya, Prathamesh Bele, Latika Patel

QS 6.

The first kernel given is as k1 = [0 1 0 ; 1 −4 1 ; 0 1 0]
Here, N = 201. We zero pad k1 to get a new k1 which is an NxN matrix.

Hence, DFT(k1) at a particular frequency (u, v) is given as:

DFT1(u, v) = 2 * exp(− j2 π (u + v)(N + 1) 2N){cos(2 π u N) + cos(2 π v N) − 2}

Similarly, for the kernel k2 = [−1 −1 −1 ; −1 8 −1 ; −1 −1 −1] with N=201, the DFT(k2) of the padded kernel k2 at frequency (u, v) will be given as the equation :

DFT2(u, v) =
2*exp(− j2 π (u + v)(N + 1) 2N){4−cos(2 π u N)−cos(2 π v N)−cos(2 π (u + v) N)−cos(2 π (u − v) N)}

An ideal high pass filter would have a frequency response that is has low values at low frequencies. Both the plot have circular contours. However, kernel k2 has sharper gradient than. So k2 sharpens better than k1 as the cutoff frequency changes as the shape of filter changes. At the end frequencies, they both attain parabolic chape, with k2 forming a type of paraboloid structure with almost constant magnitude. Therefore, k2 is better high pass than the kernel k1.