Tut1

When you enter a dark theatre on a bright day, it takes an appreciable interval of time before you can see well enough to find an empty seat. Which of the visual processes discussed in the class is responsible
for this?

Brightness adaptation and discrimination

A CCD camera chip of dimensions 7×7 mm and 1024×1024 sensing elements, is focused on a square, flat area, located 0:5m away. The camera is equipped with a 35mm lens (this is equivalent to the focal length, i.e., 17mm, of the eye in Figure 1). How many line pairs per mm will this camera be able to resolve?

Distance = 0.5m ➔ 500mm
7mm/35mm = h/500mm ➔ h = 100mm -> target size
We have 1024 elements per line
Resolution of 1 line is 1024/100 -> approx. 10 elements per mm
For line pairs we divide by 2 giving 5 line pairs per mm

Tut2

Give a single intensity transformation function for spreading the intensities of an image so that the lowest intensity is 0 and the highest is L−1.

Let f denote the original image. First subtract theminimum value of f denoted $f_{\min}$ from f to yield a function whose minimum value is 0:

$g_1 = f - f_{\min}$

Next divide g_1 by its maximum value to yield a function in the range $[0,1]$ and multiply the result by $L-1$ to yield a function with values in the range $[0, L-1]$

$g = (L-1/\max(g1))*g1$

Keep in mind that $f_{\min}$ is a scalar and f is an image.

Explain why the discrete histogram equalization technique does not in general yield a flat histogram

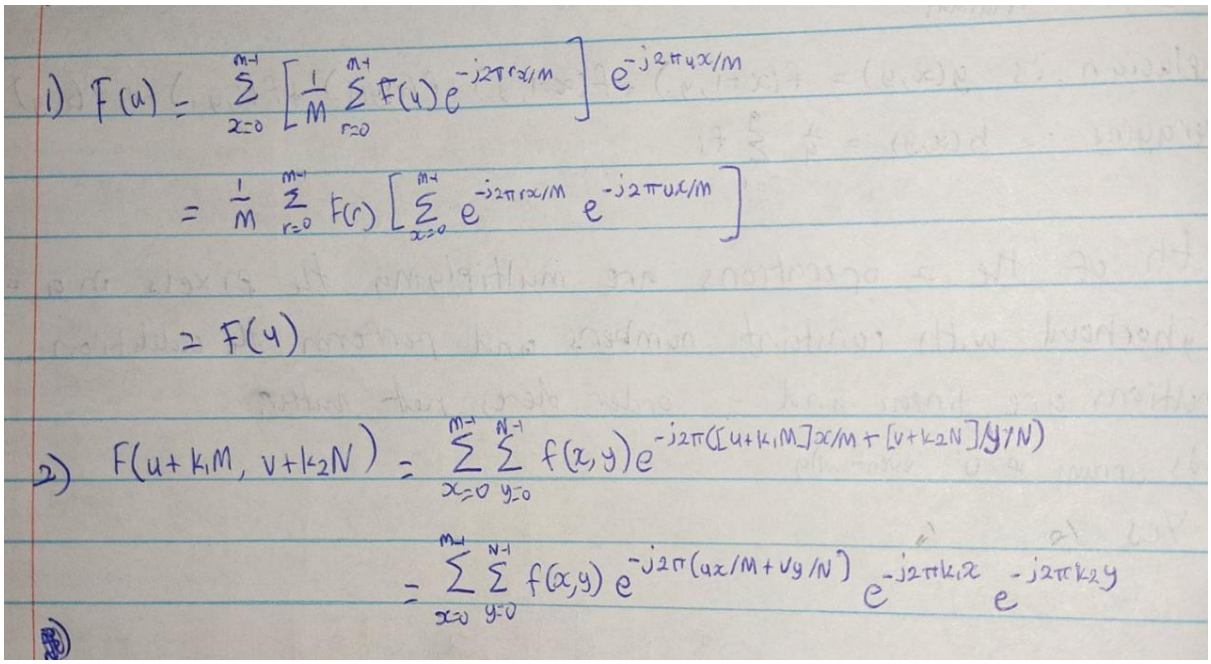
There is no pdf in discrete form so by summation of discrete probability you just spread it through whole range of gray level

Tut3

The Laplacian with a −8 in the center yields sharper results than the one with a −4 in the center. (i) Explain the reason why. (ii) Would using a larger “Laplacian-like” kernel, of size, for example, 5×5 with a −24 in the center, yield an even sharper results? Explain.

The Laplacianmask with a −4 in the center performs an operation proportional to differentiation in the horizontal and vertical directions. and mask with a −8 in the center and 1s in the horizontal, vertical, and diagonal directions will detect the same intensity changes as the mask with the −4 in the center but, in addition, it will also be able to detect changes along the diagonals, thus generally producing sharper-looking results.

Tut 4



We discussed the need for image padding when filtering in the frequency domain. We showed that images could be padded by appending zeros to the ends of rows and columns in the image. Do you think it would make a difference if we centered the image and surrounded it by a border of zeros instead, but without changing the total number of zeros used? Explain

The reason for padding is to establish a "buffer" between the periods that are implicit in the DFT. Either form of padding accomplishes the separation between images as desired