

Q9)

I implemented local equalisation by padding the images with a certain number of 0s on all sides, and then using for loops to equalise individual pixels using the area around them. I used the `histeq()` function to implement global histogram equalisation.

code-

```
im1=imread('LC2.jpg');
%im1=imread('LC1.png');
%imshow(im1);

n=71

im2 = padarray(im1,[(n-1)/2 (n-1)/2],0,'both');
im3= im1;

for r = 1:size(im3, 1) % for number of rows of the image
    for c = 1:size(im3, 2)
        z=zeros(1,256);
        suma=0;
        for j = -(n-1)/2:(n-1)/2
            for i= -(n-1)/2:(n-1)/2
                z(im2(r+j+(n-1)/2,c+i+(n-1)/2)+1)= z(im2(r+j+(n-1)/2,c+i+(n-1)/2)+1) + 1;
            end
        end

        for k= 1:(im2(r+(n-1)/2,c+(n-1)/2)+1)
            suma= suma+ z(k);
        end

        im3(r,c)= round((suma/(n*n))*255);
        % increment counter loop
    end
end

imshow(im3);
J = histeq(im1);
%imshow(J)
```

For the image `lc1`, images were as follows, in the order `lc1`, `lc1` with global equalisation, `lc1` with `n=7`, `31`, `51`, and `71`





For the image lc2, images were as follows, in the order lc2, lc2 with global equalisation, lc2 with $n=7, 31, 51$, and 71





Observations-

As we see, for each of the above images,

- For each of the above images, we see that global equalisation gives a much more realistic contrast effect to the images, as even objects placed far apart retain their relative colour schemes.
- For local equalisation, we see that for $n=7$, we get a very inaccurate image, almost as if only the edges got registered. As n increases, our image keeps getting more and more realistic, and closer to how the global equalisation looked like.
- In global equalisation, at different places in the image, we see different intensity levels over large areas. In local equalisation, we see that almost every area in the image has about the same intensity levels for different pixels (not exactly same, but fairly similar).
- Local equalisation gives way better contrast in areas which are very close in intensity in the original image. Global equalisation preserves that similarity in intensity to a large extent whereas

local equalisation makes the intensities of even those points look fairly different. For example, on the left side of lc1, near the roof of the house, where everything looks black in global equalisation whereas local equalisation gives great contrast around that area.

-In lc2, the ground, near the roots of the trees looks fairly similar and light when we apply global histogram equalisation whereas on local histogram equalisation, we see great detail and contrast on those same areas on the ground and near the roots of the trees.

-hence local equalisation gives better results in the areas where the intensity levels are quite close for neighbouring points in the original image.