Homework 3

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function image\_out = homomorphic\_filter(image\_in, high, low, c, d0)

I = double(image\_in);

[M, N] = size(I);

a = M / 2;

b = N / 2;

log\_img = log1p(I);

log\_fft = fftshift(fft2(log\_img));

D = zeros(M, N);

H = zeros(M, N);

for i = 1:M

for j = 1:N

D(i, j) = sqrt((i - a)^2 + (j - b)^2);

H(i, j) = (high - low) \* (1 - exp(-c \* (D(i, j)^2 / d0^2))) + low;

end

end

H = ifftshift(H);

filtered\_fft = H .\* log\_fft;

log\_ifft = ifft2(filtered\_fft);

image\_out = real(expm1(log\_ifft));

end

image\_in = imread('data/image1.png');

if isempty(image\_in)

disp('Image not found');

else

% 转为灰度图，如果需要

if size(image\_in, 3) == 3

image\_in = rgb2gray(image\_in);

end

% 应用同态滤波

image\_out = homomorphic\_filter(image\_in, 2.0, 0, 1.0, max(size(image\_in)));

% 显示结果

figure;

subplot(1, 2, 1);

imshow(image\_in);

title('Original');

subplot(1, 2, 2);

imshow(image\_out, []);

title('After');

end



image\_path = 'data/image2.png';

img = imread(image\_path);

if isempty(img)

disp('Image not found!');

else

if size(img, 3) == 3

img = rgb2gray(img);

end

global\_hist\_eq = histeq(img);

% CLAHE

clahe\_eq = adapthisteq(img, 'ClipLimit', 0.02, 'NumTiles', [8 8]);

figure;

subplot(1, 3, 1);

imshow(img);

title('Original Image');

subplot(1, 3, 2);

imshow(global\_hist\_eq);

title('Global Histogram Equalization');

subplot(1, 3, 3);

imshow(clahe\_eq);

title('CLAHE');

end



original = imread("cameraman.tif");

figure;

distorted = imread("C:\Users\DELL\Desktop\inclass\DIPlab\_source\1.jpg");

subplot(121);imshow(original,[]),title('Original');

subplot(122);imshow(distorted,[]),title('distorted');

[movingPoints,fixedPoints] = cpselect(distorted,original,"Wait",true);

tform = fitgeotform2d(movingPoints,fixedPoints,'polynomial',3);

Roriginal = imref2d(size(original));

recovered = imwarp(distorted,tform,OutputView=Roriginal);

figure;

montage({original,recovered})



img = imread('redeye.jpg');

% rgb to hsi model, implementation in rgb2hsi

hsi\_img = rgb2hsi(img);

% get hue and saturation of img.

hue\_channel = hsi\_img(:,:,1);

saturation\_channel = hsi\_img(:,:,2);

% marking red eye region

red\_eye\_mask = (hue\_channel > 0.9) & (hue\_channel < 1.0)...

& (saturation\_channel > 0.4);

% turn 0 for red eye region

saturation\_channel(red\_eye\_mask) = 0;

hsi\_img(:,:,2) = saturation\_channel;

% from hsi return to rgb

output\_img = hsi2rgb(hsi\_img);

figure;

subplot(1,2,1); imshow(img); title('original');

subplot(1,2,2); imshow(output\_img); title('alleviating red eye effect');

