DIP LAB ASSIGMENT 8

K PRANAV KUMAR

21BEC1507

Use “starry night” as input image- download from google. Do colour image smoothing using mean filter, visualise it. Measure the quality of the output using PSNR and SSIM (one line command in matlab). Also, do color sharpening using Laplacian filtering. Evaluate your output using visualisation, PSNR, SSIM. Finally apply sharpening on smoothed image, evaluate and do vice verse too.

CODE:

```
% Read the color image (Starry Night)

img = imread("C:\Users\apoor\Downloads\Starry night.jpg");

% Display the original image

figure, imshow(img), title('Original Image');

%% 1. Color Image Smoothing using Mean Filter

mean_filter = fspecial('average', [5 5]);

smoothed_img = imfilter(img, mean_filter);

% Display the smoothed image

figure, imshow(smoothed_img), title('Smoothed Image (Mean Filter)');

% Evaluate using PSNR and SSIM

psnr_smoothed = psnr(smoothed_img, img);

ssim_smoothed = ssim(smoothed_img, img);

fprintf('Smoothing -> PSNR: %.4f, SSIM: %.4f\n', psnr_smoothed, ssim_smoothed);

%% 2. Color Image Sharpening using Laplacian Filter

laplacian_filter = fspecial('laplacian', 0.2);

sharpened_img = imfilter(img, laplacian_filter);

sharpened_img = img - sharpened_img; % Subtracting the laplacian image to sharpen
```

```
% Display the sharpened image

figure, imshow(sharpened_img), title('Sharpened Image (Laplacian Filter)');

% Evaluate using PSNR and SSIM

psnr_sharpened = psnr(sharpened_img, img);

ssim_sharpened = ssim(sharpened_img, img);

fprintf('Sharpening -> PSNR: %.4f, SSIM: %.4f\n', psnr_sharpened, ssim_sharpened);

%% 3. Apply Sharpening on Smoothed Image

sharpened_smoothed_img = imfilter(smoothed_img, laplacian_filter);

sharpened_smoothed_img = smoothed_img - sharpened_smoothed_img;

% Display the sharpened smoothed image

figure, imshow(sharpened_smoothed_img), title('Sharpened after Smoothing');

% Evaluate using PSNR and SSIM

psnr_sharpened_smoothed = psnr(sharpened_smoothed_img, img);

ssim_sharpened_smoothed = ssim(sharpened_smoothed_img, img);

fprintf('Sharpening after Smoothing -> PSNR: %.4f, SSIM: %.4f\n', psnr_sharpened_smoothed,
ssim_sharpened_smoothed);

%% 4. Apply Smoothing on Sharpened Image

smoothed_sharpened_img = imfilter(sharpened_img, mean_filter);

% Display the smoothed sharpened image

figure, imshow(smoothed_sharpened_img), title('Smoothed after Sharpening');

% Evaluate using PSNR and SSIM

psnr_smoothed_sharpened = psnr(smoothed_sharpened_img, img);

ssim_smoothed_sharpened = ssim(smoothed_sharpened_img, img);

fprintf('Smoothing after Sharpening -> PSNR: %.4f, SSIM: %.4f\n', psnr_smoothed_sharpened,
ssim_smoothed_sharpened);
```

OUTPUTS:

Original Image

Sharpened Image (Laplacian Filter)

Sharpened after Smoothing

Smoothed after Sharpening

Smoothed Image (Mean Filter)