Digital Image Processing

Experiment -8

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Aim:- TO PERFORM IMAGE SMOOTHENINH USING MEAN FILTER, VISUALIZE IT. MEASURE THE QUALITY OF THE OUTPUT USING (PSNR AND SSIM) ONE LINE COMAND IN MATLAB, ALSO DO COLOR SHARPENING USING LAPLACIAN FILTER.

Code:-

```
image ="C:\Users\dsplab\Pictures\Van_Gogh_-_Starry_Night_-_Google_Art_Project.jpg";
img = imread(image);
% Display original image
figure(1);
imshow(img);
title('Original Image');
% Color image smoothing using mean filter
kernel_size = 5;
smoothed_img = imfilter(img, ones(kernel_size) / kernel_size^2, 'replicate');
% Display smoothed image
figure(2);
imshow(smoothed_img);
title('Smoothed Image');
% Measure PSNR and SSIM for smoothed image
psnr_smoothed = psnr(smoothed_img, img);
ssim_smoothed = ssim(smoothed_img, img);
% Display PSNR and SSIM values
fprintf('PSNR of smoothed image: %.2f dB\n', psnr_smoothed);
```

```matlab
fprintf('SSIM of smoothed image: %.2f\n', ssim_smoothed);
% Color sharpening using Laplacian filtering
laplacian_kernel = [-1 -1 -1; -1 8 -1; -1 -1 -1];
sharpened_img = img - imfilter(img, laplacian_kernel, 'replicate');
% Display sharpened image
figure(3);
imshow(sharpened_img);
title('Sharpened Image');
% Measure PSNR and SSIM for sharpened image
psnr_sharpened = psnr(sharpened_img, img);
ssim_sharpened = ssim(sharpened_img, img);
% Display PSNR and SSIM values
fprintf('PSNR of sharpened image: %.2f dB\n', psnr_sharpened);
fprintf('SSIM of sharpened image: %.2f\n', ssim_sharpened);
% Sharpening on smoothed image
sharpened_smoothed = smoothed_img - imfilter(smoothed_img, laplacian_kernel, 'replicate');
% Display sharpened smoothed image
figure(4);
imshow(sharpened_smoothed);
title('Sharpened Smoothed Image');
% Measure PSNR and SSIM for sharpened smoothed image
psnr_sharpened_smoothed = psnr(sharpened_smoothed, img);
ssim_sharpened_smoothed = ssim(sharpened_smoothed, img);
% Display PSNR and SSIM values
fprintf('PSNR of sharpened smoothed image: %.2f dB\n', psnr_sharpened_smoothed);
fprintf('SSIM of sharpened smoothed image: %.2f\n', ssim_sharpened_smoothed);
% Smoothing on sharpened image
smoothed_sharpened = imfilter(sharpened_img, ones(kernel_size) / kernel_size^2, 'replicate');
% Display smoothed sharpened image
figure(5);
imshow(smoothed_sharpened);
title('Smoothed Sharpened Image');
% Measure PSNR and SSIM for smoothed sharpened image
psnr_smoothed_sharpened = psnr(smoothed_sharpened, img);
```

```matlab
ssim_smoothed_sharpened = ssim(smoothed_sharpened,
img);
% Display PSNR and SSIM values
fprintf('PSNR of smoothed sharpened image: %.2f dB\n',
psnr_smoothed_sharpened);
fprintf('SSIM of smoothed sharpened image: %.2f\n',
ssim_smoothed_sharpened);
```

Output:-

Original Image

Smoothed Image

Sharpened Image

Sharpened Smoothed Image

Smoothed Sharpened Image