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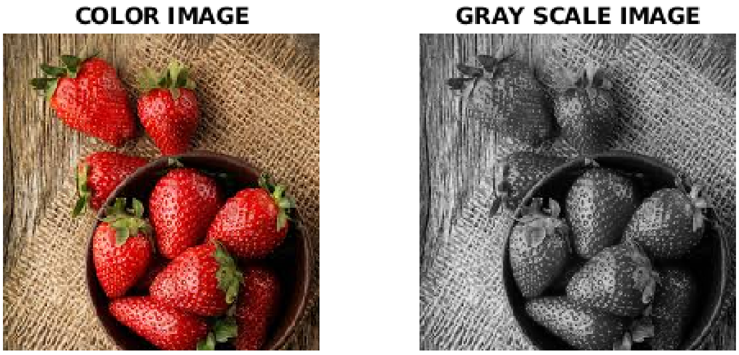
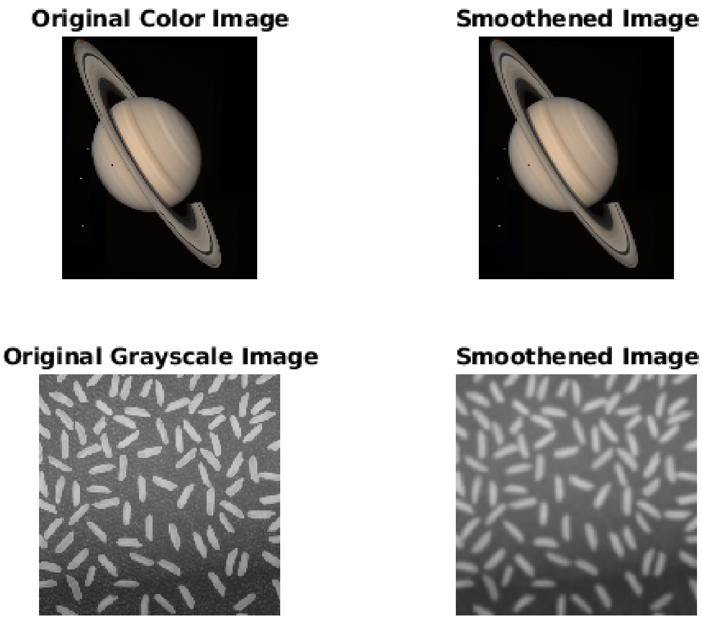
Demonstrate various image enhancement techniques using Built-in and user defined functions.

```
%Loading the Image
c_im=imread('strawberry.jpg');

%Image conversion
g_im=rgb2gray(c_im); %converting color to gray scale

%Displaying the images
clf;
subplot(1,2,1),imshow(c_im), title('COLOR IMAGE');
subplot(1,2,2),imshow(g_im), title('GRAY SCALE IMAGE');
```

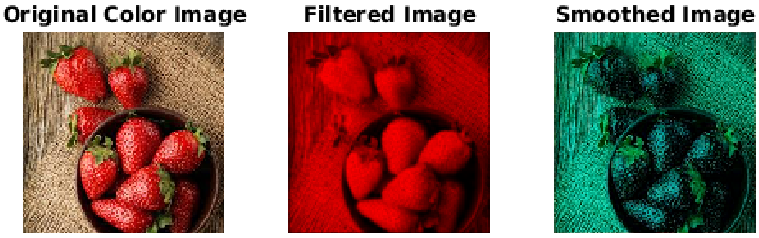


1.SMOOTHENING THE IMAGES (LPF)

```
% Built-In function : COLOR IMAGE

a = imread('saturn.png');
c = imread('rice.png');

e = imgaussfilt(a,2);
f = imgaussfilt(c,2);

subplot(2,2,1),imshow(a),title("Original Color Image");
subplot(2,2,2),imshow(e),title("Smoothened Image");
subplot(2,2,3),imshow(c),title("Original Grayscale Image");
subplot(2,2,4),imshow(f),title("Smoothened Image");
```

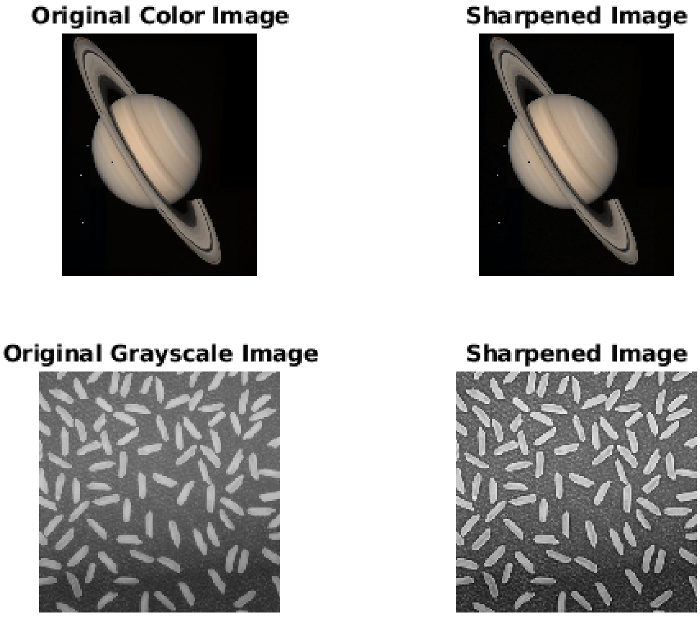


```
% User-defined function :COLOR IMAGE
A=c_im;

%Preallocate the matrices with zeros
I1=A;
I=zeros(size(A));
I2=zeros(size(A));


%Filter Masks
F1=ones(3,3)/9;
F2=ones(5,5)/25;

%Padarray with zeros
A=padarray(A,[1,1]);
A=double(A);
for i=1:size(A,1)-2
    for j=1:size(A,2)-2
        I(i,j)=sum(sum(F1.*A(i:i+2,j:j+2)));
    end
end

I=uint8(I);

%Smoothed Image
B=I1-I;

subplot(1,3,1),imshow(c_im),title("Original Color Image");
subplot(1,3,2),imshow(I),title("Filtered Image");
subplot(1,3,3),imshow(B),title("Smoothened Image");
```



2.SHARPENING THE IMAGES (HPF)

```
% Built-In function : COLOR IMAGE

a = imread('saturn.png');
c = imread('rice.png');
% imsharpen(A) sharpens the grayscale or truecolor (RGB) input image A by using the unsharp masking method.
b = imsharpen(a);
% imsharpen(A,Name,Value) uses name-value pairs to control aspects of the unsharp masking.
d = imsharpen(c,'Radius',2,'Amount',1);

subplot(2,2,1),imshow(a),title("Original Color Image");
subplot(2,2,2),imshow(b),title("Sharpened Image");


subplot(2,2,3),imshow(c),title("Original Grayscale Image");
subplot(2,2,4),imshow(d),title("Sharpened Image");
```



```
% User-defined function : COLOR IMAGE
A=c_im
```

```
%Preallocate the matrices with zeros
I1=A;
I=zeros(size(A));
I2=zeros(size(A));

%Filter Masks
F1=[0 1 0;1 -4 1; 0 1 0];
F2=[1 1 1;1 -8 1; 1 1 1];

%Padarray with zeros
A=padarray(A,[1,1]);
A=double(A);

%Implementation of the equation in Fig.D
for i=1:size(A,1)-2
    for j=1:size(A,2)-2

        I(i,j)=sum(sum(F1.*A(i:i+2,j:j+2)));

    end
end

I=uint8(I);

%Sharpenend Image
K=I1-I;

subplot(1,3,1),imshow(c_im),title("Original Color Image");
subplot(1,3,2),imshow(I),title("Filtered Image");
subplot(1,3,3),imshow(K),title("Sharpened Image");
```