

function hybrid();

خواندن دو تصویر هم اندازه و مرتب

```
I1=imread('/Users/user/Desktop/HW3/03_image1.jpg');
I2=imread('/Users/user/Desktop/HW3/04_image2.jpg');
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

گرفتن فوریه از هر سه کانال تصویر اول، شیفت دادن آن به مرکز تصویر و نمایش و ذخیره آن

```
J0=fft2(I1);
J1=fftshift(J0);
J2=abs(J1);
F1=log(J2);
subplot (1,3,1); imagesc(F1(:,:,1));subplot (1,3,2); imagesc(F1(:,:,2));subplot (1,3,3);
imagesc(F1(:,:,3));
saveas(gcf,'/Users/user/Desktop/HW3/05_dft1.jpg','jpg');
```

```
F1=J0;
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

گرفتن فوریه از هر سه کانال تصویر دوم، شیفت دادن آن به مرکز تصویر و نمایش و ذخیره آن

```
J0=fft2(I2);
J1=fftshift(J0);
J2=abs(J1);
F2=log(J2);
subplot (1,3,1); imagesc(F2(:,:,1));subplot (1,3,2); imagesc(F2(:,:,2));subplot (1,3,3);
imagesc(F2(:,:,3));
saveas(gcf,'/Users/user/Desktop/HW3/06_dft2.jpg','jpg');
```

```
F2=J0;
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

r=60 ساختن فیلتر گاوسی با

```
x=size(F1,2);
y=size(F1,1);
r=60;
```

```
X=[0:x-1];
Y=[0:y-1];
Gx=(exp(-((X-x/2).*(X-x/2))/(2*r*r)));
Gy=(exp(-((Y-y/2).*(Y-y/2))/(2*r*r)));
```

```

G=Gy'*Gx;
G1(:,1)=G;
G1(:,2)=G;
G1(:,3)=G;
subplot(1,1,1); imagesc(G);
saveas(gcf,'/Users/user/Desktop/HW3/07_highpass_r.jpg','jpg');
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

```

ساختن فیلتر گاوسی برعکس (یک منهای یک فیلتر گاوسی، به عنوان یک فیلتر بالا گذر) با سیگمای سعی و خطی شده ی  $s=50$

```

x=size(F2,2);
y=size(F2,1);
s=50;
X=[0:x-1];
Y=[0:y-1];
Gx=(exp(-(X-x/2).*(X-x/2)/(2*s*s)));
Gy=(exp(-(Y-y/2).*(Y-y/2)/(2*s*s)));
G=ones(y,x);
G=G-Gy'*Gx;
G2(:,1)=G;
G2(:,2)=G;
G2(:,3)=G;
subplot(1,1,1); imagesc(G);
saveas(gcf,'/Users/user/Desktop/HW3/08_lowpass_s.jpg','jpg');
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

```

اعمال دو کات روی فیلتر ها، که عدد 0.9 و 0.05 با سعی و خطا مناسب دیده شده است

```

cutr=0.9;
cuts=0.05;
G1(G1<cutr)=0;
G2(G2<cuts)=0;
subplot(1,1,1); imagesc(G1(:,1));
saveas(gcf,'/Users/user/Desktop/HW3/09_highpass_cutoff.r.jpg','jpg');
subplot(1,1,1); imagesc(G2(:,1));
saveas(gcf,'/Users/user/Desktop/HW3/10_lowpass_cutoff.s.jpg','jpg');
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

```

اعمال فیلتر ها روی فوریه عکس اول (ضرب کردن فیلتر ها در لگاریتم انجام نشده بلکه در خود فوریه انجام شده است)

```

J1=fftshift(F1);
FF1=J1.*G1;
J2=abs(FF1);
FF11=log(J2);

```

```

subplot (1,3,1); imagesc(FF11(:, :, 1)); subplot (1,3,2); imagesc(FF11(:, :, 2)); subplot (1,3,3);
imagesc(FF11(:, :, 3));
saveas(gcf, '/Users/user/Desktop/HW3/11_highpassed.jpg', 'jpg');

```

اعمال فیلتر ها روی فوریه عکس دوم (ضرب کردن فیلتر ها در لگاریتم انجام نشده بلکه در خود فوریه انجام شده است)

```

J1=fftshift(F2);
FF2=J1.*G2;
J2=abs(FF2);
FF22=log(J2);
subplot (1,3,1); imagesc(FF22(:, :, 1)); subplot (1,3,2); imagesc(FF22(:, :, 2)); subplot (1,3,3);
imagesc(FF22(:, :, 3));
saveas(gcf, '/Users/user/Desktop/HW3/12_lowpassed.jpg', 'jpg');

```

ترکیب دو فوریه ی فیلتر زده شده، با تناسب ۱

```

landa=1;
FF=ifftshift(FF1)+landa*ifftshift(FF2);
J1=fftshift(FF);
J2=abs(J1);
FF33=log(J2);
subplot (1,3,1); imagesc(FF33(:, :, 1)); subplot (1,3,2); imagesc(FF33(:, :, 2)); subplot (1,3,3);
imagesc(FF33(:, :, 3));
saveas(gcf, '/Users/user/Desktop/HW3/13_hybrid_frequency.jpg', 'jpg');

```

باز گرداندن فوریه تصویر ادغام شده به فضای تصویر و مپ کردن به 0 تا 255

```

Il=ifft2(FF);
m=max(max(max(Il)));
Il=uint8(255*(Il/m));
subplot (1,1,1); imshow(Il);
saveas(gcf, '/Users/user/Desktop/HW3/14_hybrid.jpg', 'jpg');
imshow(imresize(Il, 0.2));
saveas(gcf, '/Users/user/Desktop/HW3/15_hybrid_far.jpg', 'jpg');
%%%%%%%%%%%%%%
end

```