```
% ccfd.m  3-dec-07
% cross correlation in the frequency domain

im=imread('im.jpg');
tm=imread('tm.jpg');
% set the color map for monochrome
cm256
image(im);
axis equal

figure(2);
cm256
image(tm);
axis equal

% make double and zero mean
dim=double(im);
mn=mean(mean(dim));
dim=dim - mn;
dtm=double(tm);
mn=mean(mean(dtm));
dtm=dtm - mn;
% zero pad the template up to size of image
dtmf=zeros(256,256);
for i=1:32
  for j=1:32
    dtmf(i,j)=dtm(i,j);
    end
  end

% take 2D fourier transforms
DIM=fft2(dim);
DTMF=fft2(dtmf);
DTMFC=conj(DTMF);
% element-wise product
% not matrix product !!
PRD=DIM.*DTMFC;
% inverse 2D fft
cc=ifft2(PRD);
% let's look at the magnitude
dscc=abs(cc);
dsccT=dscc;
% flip for display as a graph
for i=1:256
  for j=1:256
    dsccT(i,j)=dscc(256-i+1,j);
    end
  end
figure(3);
mesh(dsccT);
v=axis;
v(1)=0;
v(2)=341;
v(3)=0;
v(4)=260;
axis(v);
```

```
% cm256.m
% monochrome 8-bit color map
cm=zeros(256,3);
for i=1:256
  cm(i,1)=i/256;
  cm(i,2)=i/256;
  cm(i,3)=i/256;
  end
colormap(cm);
```

```
% cm256.m
% monochrome 8-bit color map
cm=zeros(256,3);
```