```
%Chris Farquer
%EE-4663 Digital Image Processing
%Project II

T1=cputime; %code start time

%read in two dollars image
I1=imread('twodollars.bmp','bmp');
info=imfinfo('twodollars.bmp','bmp');

%%%%%%%%Change to Gray Scale%%%%%%%%%%
I1=rgb2gray(I_1);
[N,M]=size(I1);

[N,M]=size(I1);
%display two dollars image
h_fig=figure;
set(h_fig,'Tag','Fig1',...
    'Name','Project II Chris Farquer',...
    'MenuBar','none',...
    'Position',[10 425 488 305]);
h_s1=subplot(1,1,1);
image(I1);
colormap(gray(255));
axis('image')
axis on;
h_t1=title('Two Dollars Image');
set(h_t1,'FontName','Times','FontSize',12,'Color','k');
pause(1)

%read in target image
I2=imread('target1.bmp','bmp');
info=imfinfo('target1.bmp','bmp');

%%%%%%%%Change to Gray Scale%%%%%%%%%%%%%%%
I2=rgb2gray(I_2);

[N,M]=size(I2);
%display target image
h_fig=figure;
set(h_fig,'Tag','Fig1',...
    'Name','Project II Chris Farquer',...
    'MenuBar','none',...
    'Position',[600 425 488 305]);
h_s2=subplot(1,1,1);
image(I2);
colormap(gray(255));
axis('image')
axis on;
h_t1=title('Target Image');
set(h_t1,'FontName','Times','FontSize',12,'Color','k');
pause(2)

%display subplot target image
```

```
h_s3=subplot(2,2,1);
image(I2);
colormap(gray(255));
axis('image')
axis on;
h_t1=title('Target Image');
set(h_t1,'FontName','Times','FontSize',12,'Color','k');
%rotate target image
R=imrotate(I2,180);
h_s4=subplot(2,2,2);
image(R);
axis('image')
axis on;
h_t1=title('Rotated Target Image');
set(h_t1,'FontName','Times','FontSize',12,'Color','k');
pause(2)

%gradient
XR=double(R)+1; %change from size uint8 to size double
h1=(1/8*[-1 -1 -1;-1 8 -1;-1 -1 -1]);
X_gx=zeros(N,M);
Y_gy=zeros(N,M);
for m=2:N-1
    for n=2:M-1
        Xpart=XR(n-1:n+1,m-1:m+1);
        Ypart=Xpart.*h1;
        x1=sum(sum(Ypart));
        X_gx(n,m)=x1;
        Ypart=Xpart.*h1;
        x1=sum(sum(Ypart));
        Y_gy(n,m)=x1;
    end
end
h_s5=subplot(2,2,2);
image(2*abs(X_gx));
axis('image')
axis on
h_t1=title('Gradient of Rotated Target Image');
set(h_t1,'FontName','Times','FontSize',12,'Color','k');
pause(2)

%image padding and 2-D DFT of images
h_fig=figure;
set(h_fig,'Tag','Fig1',...
    'Name','Project II Chris Farquer',...
    'MenuBar','none',...
    'Position',[10 95 488 305]);
F1=fft2(I1,1024,1024);
N1=F1/1024;
h_s=subplot(2,2,1);
image(fftshift(abs(N1)));
colormap(gray(64))
axis([0 1024 0 1024])
axis on
```

```
h_t1=title('2-D DFT Two Dollars Image');
set(h_t1,'FontName','Times','FontSize',12,'Color','k');
pause(1)
F2=fft2(2*abs(X_gx));
N2=F2/1024;
h_s=subplot(2,2,2);
image(fftshift(abs(N1))*16);
colormap(gray(255))
axis([0 1024 0 1024])
axis on
h_t1=title('2-D DFT Gradient Target Image');
set(h_t1,'FontName','Times','FontSize',12,'Color','k');
pause(1)

%correlation
IM1=(fftshift(abs(N1)));
IM2=(fftshift(abs(N1))*16);
C=abs(normxcorr2(IM2,IM1));
h_s=subplot(2,2,3);
image(C*64);
colormap(gray(64))
axis('image')
axis on
h_t1=title('Correlation');
set(h_t1,'FontName','Times','FontSize',12,'Color','k');
pause(1)

%correlation histogram
H=hist_my(C,2,2,4,'b');
h_t1=title('Correlation Histogram');
set(h_t1,'FontName','Times','FontSize',12,'Color','k');
pause(2)

%mark maximums
h_fig=figure;
set(h_fig,'Tag','Fig1',...
    'Name','Project II Chris Farquer',...
    'MenuBar','none',...
    'Position',[375 100 488 305]);
h_s1=subplot(1,1,1);
image(I1);
colormap(gray(255));
axis('image')
axis on;
h_t1=title('Maximums of Two Dollars Image');
set(h_t1,'FontName','Times','FontSize',12,'Color','k');
hold on;
plot(470, 190, 'X', 'MarkerSize', 5, 'LineWidth', 3);
hold on;
plot(453, 702,'X','MarkerSize',5,'LineWidth',3);
hold on;

T2=cputime; %code end time
dT=T2-T1 %time difference
```

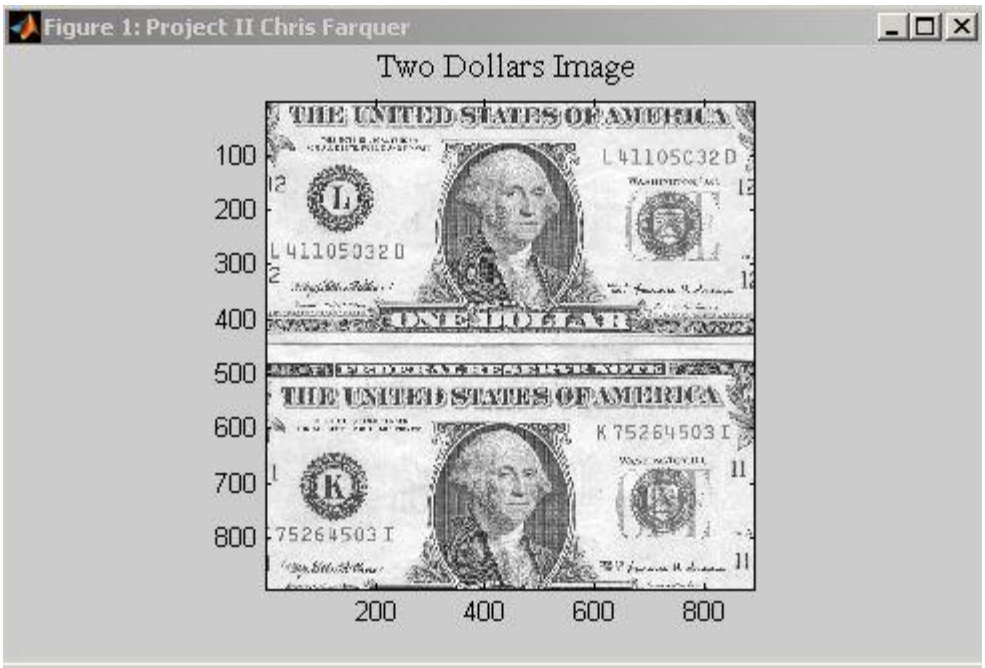
Figure 1: Project II Chris Farquer
Two Dollars Image
100
200
300
400
500
600
700
800
200
400
600
800

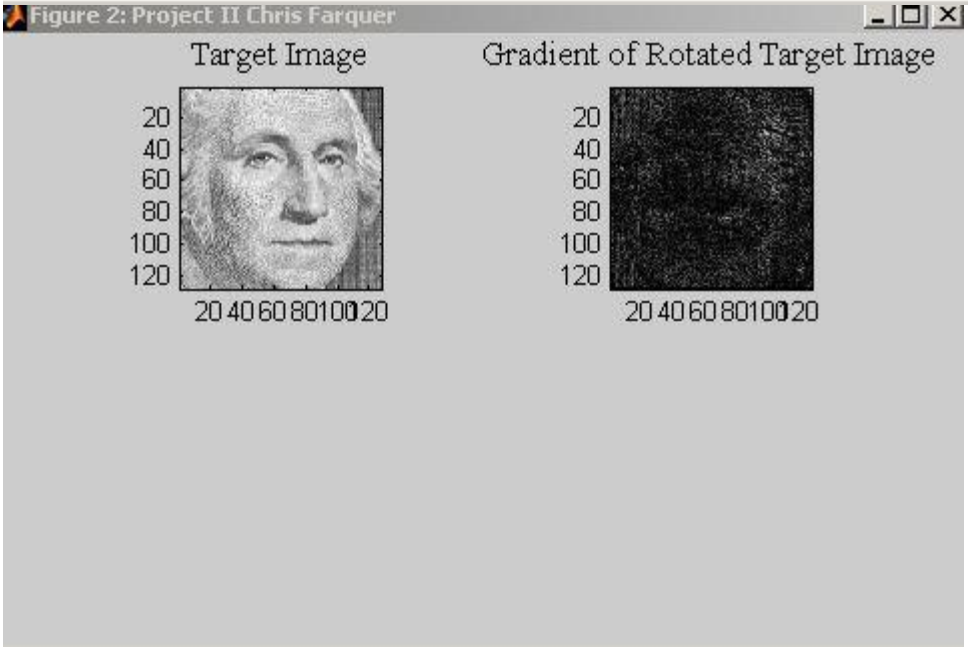
Figure 2: Project II Chris Farquer
Target Image
Gradient of Rotated Target Image
20
40
60
80
100
120
20 40 60 80 100 120

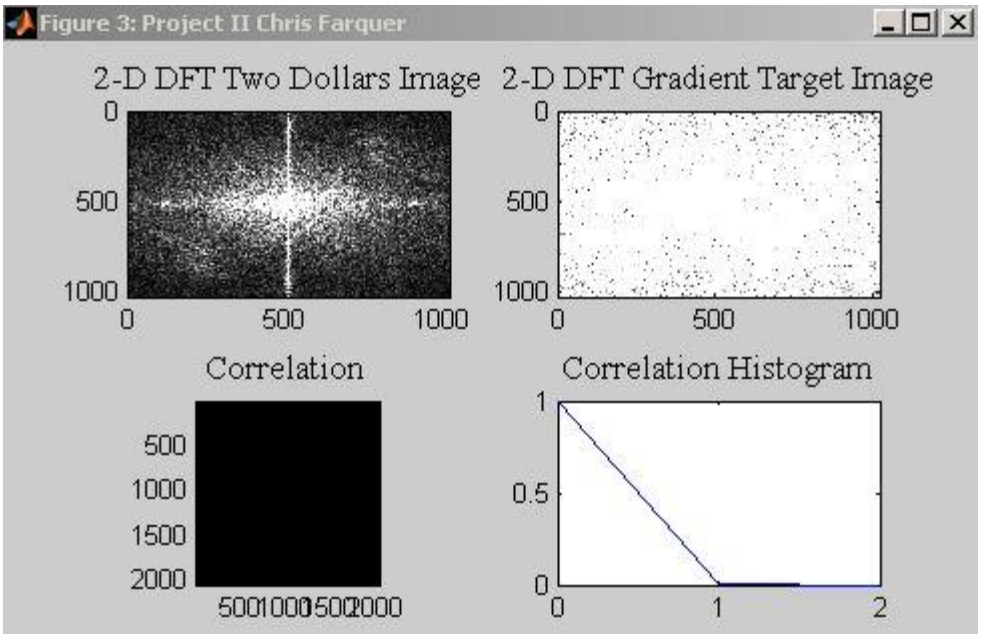
Figure 3: Project II Chris Farquer
2-D DFT Two Dollars Image
2-D DFT Gradient Target Image
Correlation
Correlation Histogram
0
500
1000
1500
2000
0
0.5
1
2

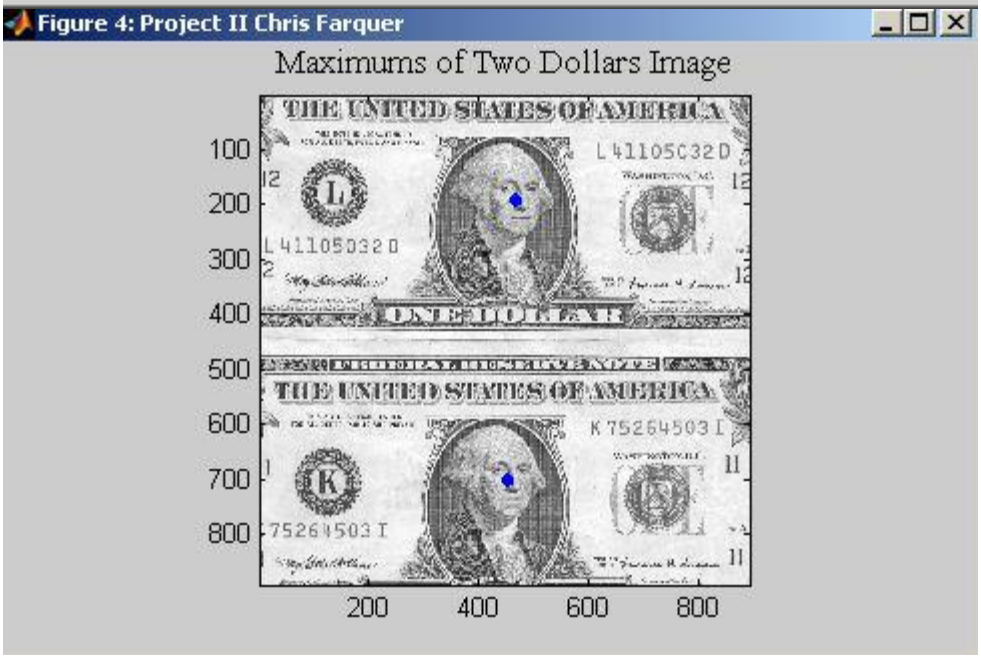
Figure 4: Project II Chris Farquer
Maximums of Two Dollars Image
THE UNITED STATES OF AMERICA
ONE DOLLAR
100
200
300
400
500
600
700
800