Image-processing homework-one report

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Subject requirements:

Use matlab to write a function to generate a color image, display the sine wave in the range of 0 to 2*PI in red, the cosine wave in the range of 0 to 2*PI in green, and the square of x image in the range of 0 to 2*PI in blue.

My MATLAB code and the explanation:

```
% a function to generate a color image
% show images
function [img]=generateFigure(imgW,imgH)
    %the parameters imgW, imgH represent the width and the
        height of the image
    %generate a white image
    A=255*ones(imgH,imgW,3);
    A=uint8(A);
    %draw X and Y axes
    A(:,1,:)=0;
    a=round(imgH/2);
    A(a,:,:)=0;
    %select the x which are from 0 to 2*pi and take a
        value every 2*pi/imgW
    x=0:2*pi/imgW:2*pi;

    %the formula of the three functions is as follows
    y1=sin(x);
    y2=cos(x);
    y3=x.^2;

    %The function that produces the arrow is as follows
    y4=(-0.5)*x+pi;
    y5=0.5*x-pi;
    y6=(-2)*x+2;

    %map the values of X and y to the specified width and
        height
    x=int32(x*imgW/(2*pi));
```

```
27      y1=int32(imgH/2-y1*imgH/4);
28      y2=int32(imgH/2-y2*imgH/4);
29      y3=int32(imgH/2-y3*imgH/4);
30      y4=int32(imgH/2-y4*imgH/4);
31      y5=int32(imgH/2-y5*imgH/4);
32      y6=int32(imgH/2-y6*imgH/4);
33
34      %for loop rendering pictures
35      for i=1:imgW
36          %if x(i) is zero, entering the next loop
37          if x(i)==0
38              continue;
39          end;
40          %color three function image
41          if  y1(i)<=imgH
42              A(y1(i),x(i),2)=0;
43              A(y1(i),x(i),3)=0;
44          end;
45          if y2(i)<=imgH
46              A(y2(i),x(i),1)=0;
47              A(y2(i),x(i),3)=0;
48          end;
49          if y3(i)>0 && y3(i)<=imgH
50              A(y3(i),x(i),1)=0;
51              A(y3(i),x(i),2)=0;
52          end;
53
54          %draw two dotted lines representing the highest
                and the lowest number in sin and cos
55          sb=fix(i/5);
56          if rem(sb,2)==0
57              A(round(imgH*3/4),x(i),:)=0;
58              A(round(imgH*1/4),x(i),:)=0;
59          end;
60
61          %draw arrows for two axes
62          if i>=round(0.96*imgW)
63              A(y4(i),x(i),:)=0;
64              A(y5(i),x(i),:)=0;
65          end;
66          if i<=round(0.02*imgW)
67              A(y6(i),x(i),:)=0;
68          end;
69
70          %draw lines meaning pi/4 and 3*pi/4
71          if i==round(imgW/4) | i==round(imgW*3/4)
```

```
72                 for  t=1:10
73                       A(imgH/2-t,x(i),:)=0;
74                  end
75              end;
76      end;
77      %show the image
78      imshow(A);
79  end
```

Result: