RIGA TECHNICAL UNIVERSITY

FACULTY OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

Fundamentals of Computer Graphics and Image Processing

Practical Work #2

The second practical work - Ellipse line algorithm

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1. **Task of Work**

Contains the task of work

2. **Programming Code**

Contains the programming code of the program

3. **Screen Shots**

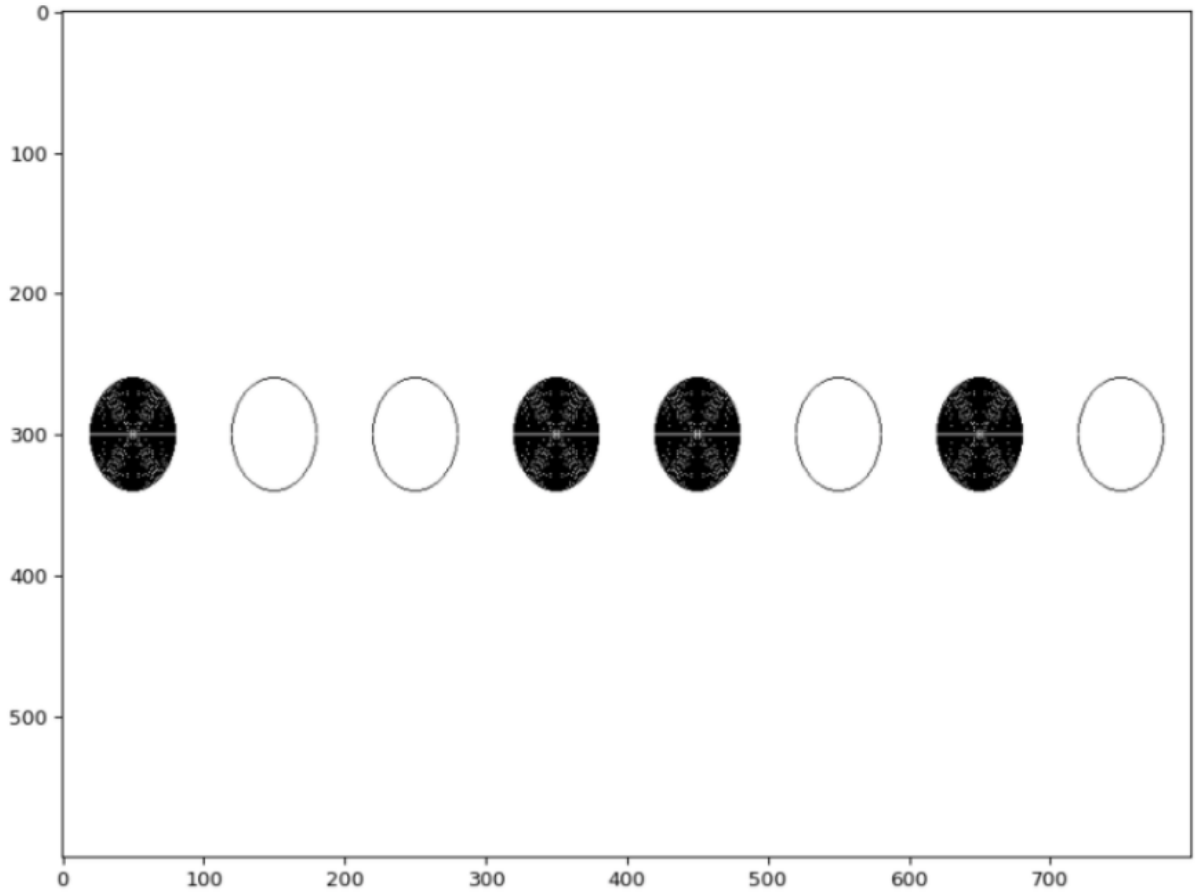
Contains screen shots that prove the correct work of the program

Task of Work

Once you have completed the Ellipse line midpoint algorithm, and you can draw a complete ellipse, you will need to draw a binary representation of the last 3 digits of your student id using Ellipses.

The "1" should be represented by a filled ellipse, and "0" by an empty ellipse.

For example: if your student id is (200RDB154) then you need to draw 154 which in binary is 1001 1010. And the final result should look like an image bellow.



Programming Code

```
import numpy as np
import matplotlib.pyplot as plt
from matplotlib.patches import Ellipse
import math

img = np.ones((250,900,3))
def Fill(x,y):#before I tried use Filling until boundary but it is so heavy
    if((x>0 and x<890) and (y>0 and y<249) and img[x,y,0] != 0.0):
        img[x,y] = 0;
        Fill(x,y+1);
        Fill(x,y-1);
        Fill(x+1,y);
        Fill(x-1,y);
    else:
        print(x,y);

def DrawEllipse(xc, yc, rx, ry):
    xk = 0;
    yk = ry;
    pk = ry*ry-rx*rx*ry + (1/4)*rx*rx;

    while(ry*ry*xk < rx*rx*yk):
        xk+=1;
        if(pk>0):
            yk-=1;
            pk=pk+2*ry**2*xk-2*rx**2*yk+ry**2;
        else:
            pk=pk+2*ry**2*xk+ry**2;

        img[(xc+xk), (yc+yk)] = 0;
        img[(xc+xk), (yc-yk)] = 0;
        img[(xc-xk), (yc+yk)] = 0;
        img[(xc-xk), (yc-yk)] = 0;

    pk = ry*ry*(xk+(1/2))*(xk+(1/2))+rx*rx*(yk-1)*(yk-1)-ry*ry*rx*rx;

    while(yk>0):
        yk-=1;
        if(pk<0):
            xk+=1;
            #pk=pk-2*ry*ry*yk+2*ry*ry*yk+rx*rx;
            pk=pk-2*rx*rx*yk+rx*rx+2*ry*ry*xk;
        else:
            #pk=pk-2*rx*rx*yk+rx*rx;
            pk=pk-2*rx*rx*yk+rx*rx;
        img[(xc+xk), (yc+yk)] = 0;
        img[(xc+xk), (yc-yk)] = 0;
        img[(xc-xk), (yc+yk)] = 0;
        img[(xc-xk), (yc-yk)] = 0;
    return;
#0110 0100
ID = "01100100"; #//Enter You id here or whatever you want with byte
posy = 100;
posx = 50;
```

```
num = 0;

for i in ID:
   DrawEllipse(posy,posx, 49, 36);
   if(i=='1'):
      xx = 49;
      while(xx>=0):
         DrawEllipse(posy,posx, xx, 36);
         xx-=1;
   posx+=80;

plt.figure(figsize = (10,8), dpi=100,facecolor = 'w', edgecolor='k');
plt.imshow(img);
plt.show();
```

```
#0110 0100
ID = "01100100"; #//Enter You id here or what ever you want with byte
posy = 100;
posx = 50;
num = 0;

for i in ID:
    DrawEllipse(posy,posx, 49, 36);
    if(i=='1'):
        xx = 49;
        while(xx>=0):
            DrawEllipse(posy,posx, xx, 36);
            xx-=1;
    posx+=80;

plt.figure(figsize = (10,8), dpi=100,facecolor = 'w', edgecolor='k');
plt.imshow(img);
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