Expt No. A2

Assignment No. 2

Title :- DDA & Bresenham's circle drawing algorithm

Problem statement :- Write a c++ program to draw inscribed and circumscribed circle in triangle as shown in an example for outer circle use Bresenham's algorithm & DDA algorithm for inner circle & any algorithm for an triangle.

Outcome :-

- Ability to understand different circle drawing algorithm.
- Able to understand different equation of line & circle.

Objective :-

To draw the above figure using DDA circle & Bresenham's circle drawing algorithm.

Software & hlw :- Fedora OS
QT creator.

Theory :

- Bresenham's Circle drawing algorithm :
  i) It is the circle drawing algorithm that selects by nearest pixel position to complete the circle.
  ii) The distance between the actual line & nearest grid location is called error & it is denoted by G.

Algorithm :

1. Read centee (x_c, y_c) & radius r
2. $x_1 = 0$, $y_1 = r$, $p = 3 - 2r$
3. while $(x_1 \leq y_1)$

```
{
Draw ();
if (p<0)
{
p = p + 4x + 6
}
else
{
p = p + 4 (x1 - y1) + 10
y1 = y1 - 1
}
x1 = x1 + 1
}
```

```
Draw()
 {
Setpixel (xc+x, yc+y, color);
Setpixel (xc+x, yc-y, color);
Setpixel (xc-x, yc-y, color);
Setpixel (xc-x, yc-y, color);
setpixel (xc+y, yc+x, color);
Setpixel (xc-y, yc+x, color);
setpixel (xc+y, yc-x, color);
setpixel (xc-y, yc-x, color);
}
```

Advantage :-

i) entire algorithm is based on equation of circle

$$x^2+y^2=r^2$$

... easy to implement

Disadvantage :-

i) Accuracy of the generating is issue.

ii) It suffers when used to generate complex & high graphical images.

- DDA circle drawing algorithm :

i) The program calculates each successive pixels that lies on the circle using DDA algorithm.
ii) Drawing circle DDA algorithm is quite easy.

algorithm :

1. Read centre (x_c, y_c) & radius
2. $Sx = x$, $Sy = y$
3. $x_1 = r$, $y_1 = 0$
4. $e = 1.0/r$
5. do
   {
   $x_2 = x_1 + e * y_1$
   $y_2 = y_1 - e * x_2$
   Setpixel $(x_c + x_2, y_c - y_2$, color)
   $x_1 = x_2$
   $y_1 = y_2$
   } while $((y_1 - Sy) < e \;||\; (Sx - x_1) > e)$

advantage :

i) It is simplest
ii) It does not requir special skill for implemantation.

Conclusion :-

We have learn & implement the DDA circle drawing & Bresenham's circle drawing algorithm & also see its advantage & disadvantage.