

Assignment 6

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Performance Date:
Submission Date:

Problem Statement:

Write C++ program to draw a given pattern. Use DDA line and Bresenham circle drawing algorithm.

Theory:

Line is a basic element in graphics to draw a line you need 2 end points b/w which you can draw a line. Digital differential Analyser (DDA) line drawing algorithm is the simplest line drawing algorithm.

Bresenham's circle drawing algorithm is used to determine the next pixel of screen to be illuminated while drawing a circle by determining the closest nearby pixel.

Algorithm:

- I DDA Line Algorithm:
 1. Read start & end points (x_1, y_1) & (x_2, y_2) .
 2. Calculate $(dx = x_2 - x_1, dy = y_2 - y_1)$.
 3. If $\text{abs}(dx) \geq \text{abs}(dy)$
then step = $\text{abs}(dx)$
else: step = $\text{abs}(dy)$.
 4. $x_{inc} = \frac{dx}{step}$, $y_{inc} = \frac{dy}{step}$.
 5. $x = x_1$, $y = y_1$
 $\text{setpixel}(x, y)$
 6. $i = 0$
while ($i < \text{step}$)
{
 $x = x_1 + x_{inc}$; $y = y_1 + y_{inc}$
 $\text{setpixel}(x, y)$;
 $i++$ }

A triangle

Stop

Normal form : $y = mx + c$

Bresenham's Circle Drawing algorithm:

1. Read (x, y) as center of circle.
2. Read radius of circle (r) .
3. Initialize $x=0, y=r$.
4. Initialize decision parameter : $p=3-2r$.
5. do {

 setpixel (centx+x, centy+y, colourname)
 if ($p < 0$),

$$P = P + 4x + 6$$

 else

$$P = P + 4(x-y) + 10$$

$y--$

$x++$

} while ($x < y$)

 setpixel (centx+x, centy-y, colourname)

 setpixel (centx+y, centy-x, colourname)

 setpixel (centx+y, centy+x, colourname)

 setpixel (centx+x, centy+y, colourname)

 setpixel (centx-y, centy+y, colourname)

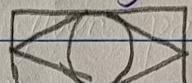
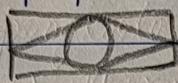
 setpixel (centx-y, centy+x, colourname)

 setpixel (centx-y, centy-x, colourname)

 setpixel (centx-x, centy-y, colourname)

Test Cases:

Input	Exp O/P	Actual O/P	Result
$x_1 = 100, y_1 = 200$	Line is drawn properly	line is drawn properly	Pass
$x_2 = 300, 400$			
$r = 50$			



Conclusion:

We successfully implemented Bresenham's line drawing algorithm, circle drawing algorithm & DDA line algorithm.

Implementation Code:

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Bresenham Line algorithm
    Read x1, y1 and x2, y2 (column name)
    Read color (color name)
    Initialize (x, y) = (x1, y1), colorname
    If pixel(x, y) is black then
        Set pixel(x, y) to colorname
    End if
    If pixel(x, y) is not black then
        Set pixel(x, y) to colorname
    End if
    Repeat the above steps until y >= y2
    End loop
    End program

```

while (y < y2)

If x < x2 then
 If y < y2 then
 Set pixel(x, y) to colorname
 End if
 End if