TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING

PURWANCHAL CAMPUS

Dharan-8

A Lab Report On: To Draw Line Using DDA Algorithm

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TITLE: TO DRAW LINE USING DDA ALGORITHM

CONCEPT

We know that, any equation of straight line is given by,

$$y = mx + c \text{ ——————— } 1$$

where, x and y are coordinates of x-axis and y-axis respectively and c is constant. m gives the slope i.e. change in y w.r.t. x or we can write it as

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\Delta y}{\Delta x} \text{ ——————— } 2$$

Here y_2, y_1 and x_2, x_1 are the coordinates of two points which is required to draw a straight line by changing above equations. We can find out small interval step of change in x as **Δ**x and change in y as **Δ**y as follows,

$$\Delta x = \frac{\Delta y}{m}, \Delta y = m\Delta x$$

To draw the line, we take a point x_1 and y_1 as (x_1, y_1). We find out which interval is greater **Δ**x or **Δ**y. We take interval which is greater and increment that by 1 and we calculate other interval step by using formula above. We repeat the process until we reach end-point. The increment or decrement is done keeping in mind the direction where we are drawing the line.

ALGORITHM

1. Start
2. Take input (x_1, y_1) and (x_2, y_2)
3. $\Delta x = x_2 - x_1, \Delta y = y_2 - y_1$
4. If $|\Delta x| > |\Delta y|$,
   step = $|\Delta x|$
   else
   step = $|\Delta x|$
5. Let x = x_1 and y = y_1. Plot (x, y)
6. Starting at K=0; Repeat steps
   $x = x + x_{inc}$
   $x = y + y_{inc}$
   k=k+1
   plot(round(x), round(y))

EXAMPLE

Lets take example where (x_1, y_1) = (3,5) and (x_2, y_2) = (7,3)

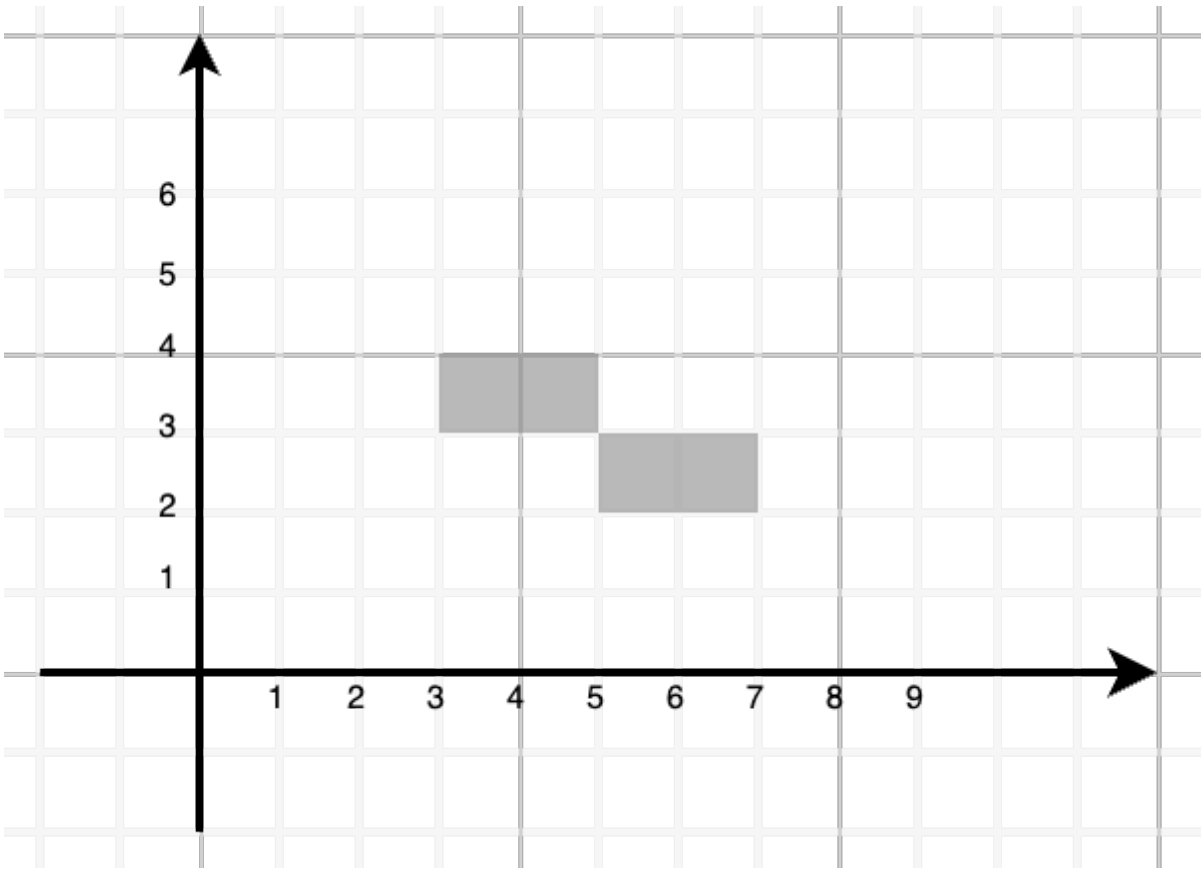
Δx = 4

Δy = -2

$$m = \frac{\Delta y}{\Delta x} = \frac{-2}{4} = \frac{-1}{2}$$

k	x	y	Plot(x, y)
0	4	4.5	(4, 4)
1	5	4	(5, 4)
2	6	3.5	(6, 3)
3	7	3	(7, 3)

GRAPH



DERIVATION

By doing above & concept we will get 8 conditions for values for different types of lines.

1. For a line L- R
    1. |m| < 1
        1. m is +ve
            x = x + 1
            y = y + m
        2. m is -ve
            x = x + 1
            y = y - m
    2. |m| >1|
        1. m is +ve
            x = x + 1/m
            y = y + 1
        2. m is -ve
            x = x + 1/m
            y = y - 1
2. For a line L- R
    1. |m| < 1
        1. m is +ve
            x = x - 1
            y = y - m
        2. m is -ve
            x = x - 1
            y = y + m
    2. |m| >1 as m is +ve
        1. m is +ve
            x = x - 1/m
            y = y - 1
        2. m is -ve
            x = x - 1/m
            y = y + 1

Hence we can get different valves of (x, y) for different types of lines.

CONCLUSION

Thus, we can conclude that we drew a line using DDA Algorithm using graphics.h library & putpixel function