

LAB 1 : Digital Differential Analyzer (DDA)

OBJECTIVE :

- > To understand about DDA line algorithm
- > To generate line in console using DDA.

Theory :

Digital differential amplifier (DDA) algorithm is a scan conversion line algorithm based on calculating either Δx or Δy using the relation,

$$\Delta y = m \Delta x$$

[DDA Algorithm]

Step 1: Start

Step 2: Declare x_1, y_1, x_2, y_2, dx , step as integer variable and x, y, x_{inc}, y_{inc} as floating point.

Step 3: Enter variable values of x_1, y_1, x_2, y_2

Step 4: Calculate $dx = x_2 - x_1$

Step 5: Calculate $dy = y_2 - y_1$

Step 6: Calculate $steps = \max(\text{abs}(dx), \text{abs}(dy))$

Step 7: Calculate $x_{increment} = dx / steps$

Step 8: Calculate $y_{increment} = dy / steps$

Step 9: Set $(x, y) = (x_1, y_1)$

Step 10: Initialize empty lists: $xes = []$, $yes = []$

Step 11: For each step from 0 to steps-1:

a. Round x to the nearest integer and append it to xes .

b. Round y to the nearest integer and append it to yes .

c. Update $x = x + x_{\text{increment}}$

d. Update $y = y + y_{\text{increment}}$

Step 12: Plot the points (xes, yes) using `plt.plot()`.

Step 13: Show the plot using `plt.show()`.

Code :

```
#dda algorithm implementation
```

```
import matplotlib.pyplot as plt
```

```
def dda_algorithm (x1,y1,x2,y2):
```

```
    dx = x2 - x1
```

```
    dy = y2 - y1
```

```
    steps = max(abs(dx),abs(dy))
```

```
    xes = [ ]
```

```
    yes = [ ]
```

```
    xincrement = dx/steps
```

```
    yincrement = dy/steps
```

```
    x,y = x1,y1
```

```
    for i in range (steps):
```

```
        xes.append(x)
```

```
        yes.append(y)
```

```
        x = x + xincrement
```

```
        y = y + yincrement
```

```
    plt.plot (xes,yes,marker='*')
```

```
    plt.show()
```

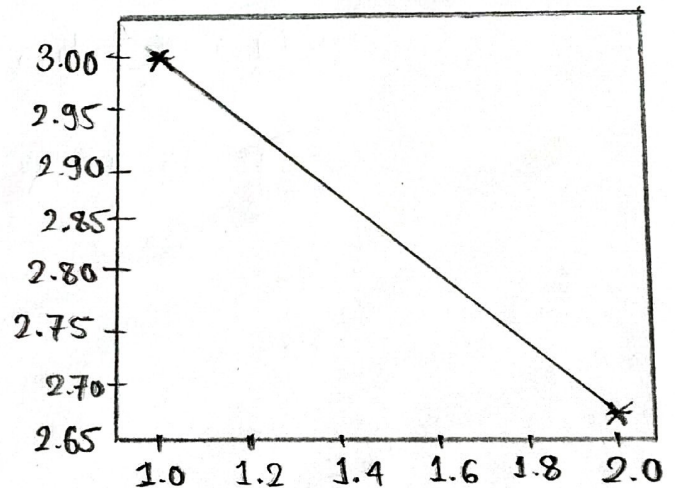
OUTPUT

Enter x1-coordinate: 1

Enter y1-coordinate: 3

Enter x2-coordinate: 4

Enter y2-coordinate: 2



```
x1 = int (input('Enter number x1-coordinate: '))
```

```
y1 = int (input('Enter y1-coordinate: '))
```

```
x2 = int (input('Enter x2-coordinate: '))
```

```
y2 = int (input('Enter y2-coordinate: '))
```

```
dda_algorithm (x1,y1,x2,y2)
```

Discussion and Conclusion :

In this lab, we learned about DDA line algorithm. The DDA algorithm is a technique used to draw lines on discrete coordinate system such as computer screens.

In this lab, we imported a python library called matplotlib. For this we used command 'pip install matplotlib'. The code didn't executed until and unless library was imported correctly.

From this lab, we got clear concept about DDA line algorithm which will be very helpful in future projects and understandings.