

Experiment – 1

Aim: To learn Digital Differential Analyser (DDA) Line Drawing Algorithm

Theory

- DDA is an incremental scan conversion method to determine points on screen to draw a line where the Start and End coordinates of the Line segment are provided.
- DDA calculates the length of the line segment with respect to the difference between either X coordinates or Y coordinates, whichever is greater.
- In DDA, we either step across X-Direction and solve for Y (In case of gentle slope lines) or we step Y-Direction and solve for X (incase of sharp slope lines) with the help of increment in either X and/or Y directions.
- As the increments are calculated with respect to X or Y direction ,so one of the increment will be either (1,0/-1) and the other increment may be in float.
- Floating point arithmetic in DDA algorithm is time-consuming which results in poor end point accuracy.
- It is the simplest algorithm and does not require special skills for implementation.

Procedure

ALGORITHM :

1. Start.
2. Accept End points of the line which are (x1, y1) and (x2, y2).
3. Calculate the Length of the Line segment:

```
if ( abs(x2-x1) >= abs(y2-y1) )  
    then  
        length = abs(x2-x1).  
else
```

```
length = abs (y2-y1).
```

4. Calculate the increment in X and Y directions respectively as:

```
xincr = (x2-x1) / length.  
yincr = (y2-y1) / length.
```

5. Initialize:

```
x=x1+0.5.  
y=y1+0.5.  
i=1.
```

6. while (i <= length)

```
{  
  
    plot (integer(x), integer(y))  
  
    x = x + xincr.  
    y = y + yincr.  
    i  = i + 1.  
}
```

7. Stop.

Stimulation:

Draw a line from (1,1) to (3,10) using DDA Line Drawing Algorithm

Q1 Q2 Q3 Q4 Q5

Check Co-ordinates Clear Canvas

0,0	1,0	2,0	3,0	4,0	5,0	6,0	7,0	8,0	9,0	10,0	11,0	12,0	13,0	14,0	15,0
0,1	1,1	2,1	3,1	4,1	5,1	6,1	7,1	8,1	9,1	10,1	11,1	12,1	13,1	14,1	15,1
0,2	1,2	2,2	3,2	4,2	5,2	6,2	7,2	8,2	9,2	10,2	11,2	12,2	13,2	14,2	15,2
0,3	1,3	2,3	3,3	4,3	5,3	6,3	7,3	8,3	9,3	10,3	11,3	12,3	13,3	14,3	15,3
0,4	1,4	2,4	3,4	4,4	5,4	6,4	7,4	8,4	9,4	10,4	11,4	12,4	13,4	14,4	15,4
0,5	1,5	2,5	3,5	4,5	5,5	6,5	7,5	8,5	9,5	10,5	11,5	12,5	13,5	14,5	15,5
0,6	1,6	2,6	3,6	4,6	5,6	6,6	7,6	8,6	9,6	10,6	11,6	12,6	13,6	14,6	15,6
0,7	1,7	2,7	3,7	4,7	5,7	6,7	7,7	8,7	9,7	10,7	11,7	12,7	13,7	14,7	15,7
0,8	1,8	2,8	3,8	4,8	5,8	6,8	7,8	8,8	9,8	10,8	11,8	12,8	13,8	14,8	15,8
0,9	1,9	2,9	3,9	4,9	5,9	6,9	7,9	8,9	9,9	10,9	11,9	12,9	13,9	14,9	15,9
0,10	1,10	2,10	3,10	4,10	5,10	6,10	7,10	8,10	9,10	10,10	11,10	12,10	13,10	14,10	15,10
0,11	1,11	2,11	3,11	4,11	5,11	6,11	7,11	8,11	9,11	10,11	11,11	12,11	13,11	14,11	15,11

CORRECT COORDINATES			
X:	1	Y:	1
X:	2	Y:	2
X:	2	Y:	3
X:	2	Y:	4
X:	2	Y:	5
X:	3	Y:	6
X:	3	Y:	7
X:	3	Y:	8
X:	3	Y:	9
X:	3	Y:	10

Green - Correctly Plotted Co-ordinates
Red - Wrong Co-ordinates plotted
Black - Co-ordinates which are correct but not plotted

Conclusion: Hence, we learnt that how to draw DDA line drawing algorithm.