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DDA Line Drawing Algorithm

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Abstract: The vector generation algorithms generate the line by determine the pixel which should be turned on are sometimes called Digital Differential Analyzer (DDA).

Keywords: DDA, Pixel.

I. INTRODUCTION

In computer graphics, a line drawing algorithm is an algorithm for approximating a line segment on discrete graphical media, such as pixel-based displays and printers. On such media, line drawing requires an approximation (in nontrivial cases). Basic algorithms rasterize lines in one colour. DDA line drawing algorithm uses the common slop of a straight line to find the smallest change in the pixel coordinates along the line. These quantities are defined by **dx** and **dy** which are added to each known X and Y coordinates for determining the next pixel coordinates.

II. WORKING

To draw a straight line with the starting point as (x1,y1) and ending point as (x2,y2) using DDA line drawing algorithm we can consider m (slop of the line as) :

m=dy/dx where dx=x2-x1 and dy=y2-y1

For any given x interval dx along a line, we can compute the corresponding y interval dy from above equation as

dy= (y2-y1 / x2-x1) * dx

Similarly, we can obtain the x interval dx corresponding to specified dy as

dx= (x2-x1 / y2-y1) * dy

Once the intervals are known the value for next x and next y on the straight line can be obtained as follows

x(i+1) = xi+dx
y(i+1) = yi+dy

To generate a recursive relation for successive values of x and y along a required line either dx or dy, whichever is larger, is chosen as one raster unit

if dx > dy then dx=1 or dy=1

With this simplification,

if dx=1 then y(i+1) = yi+ (y2-y1/x2-x1) and x(i+1) = xi+1

And if dy=1 then x(i+1) = xi+ (x2-x1/y2-y1) and y(i+1) = yi+1

Based on this working we can generate the DDA line algorithm.

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III. ALGORITHM

Step 1: Read the line and points (x1,y1) and (x2,y2) such that they are not equal(if equal then plot that point and exit)

Step 2: dx=x2-x1 and dy=y2-y1

Step 3: If(dx>dy) then
length=dx
else
length=dy

Step 4: dx=dx/length
dy=dy/length

Step 5: x=x1+ 0.5* Sign(dx)
y=y1+ 0.5* Sign(dy)
plot(x,y)

Step 6: i=1
while(i<=length)
{
x=x+dx
y=y+dy
plot(x,y)
i=i+1
}

Step 7: stop

IV. PROBLEM

Consider the line from (1,0) to (6,9). Use the simple DDA algorithm to rasterize this line.

Solution-

Step 1-5 from DDA algorithm:

We have x1=1, y1=0, x2=6, y2=9

dx=x2-x1 =6-1=5
dy=y2-y1 =9-0=9

As dy>dx ; length=dy=9

Recalculating the intervals
dx = dx/length =5/9=0.56
dy = dy/length =9/9=1

Initial value for
x = x1 + 0.5 * sign(dx) = 1+0.5*1=1+0.5= 1.5
y = y1 + 0.5 * sign(dy) = 0+0.5*1=0+0.5=0.5

Means the line is in first quadrant and it is a steep slop line. (when dx>dy line has gentle slop and if dy>dx line has steep slop)

Step 6 from DDA algorithm: dx=1/ dy=0.5:

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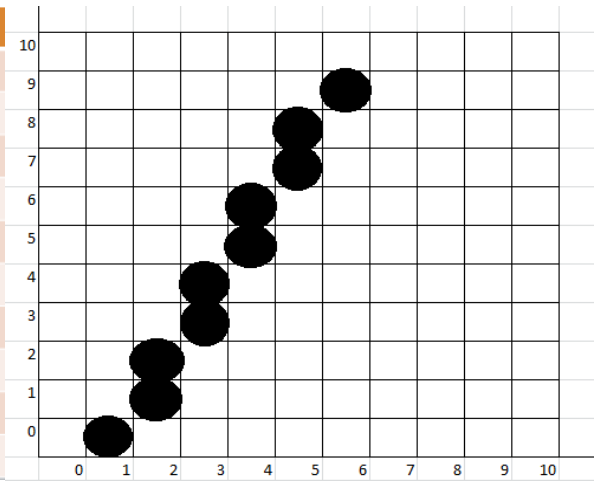
i	x	y	plot
0	1.5	0.5	(1,0)
1	2.06	1.5	(2,1)
2	2.62	2.5	(2,2)
3	3.18	3.5	(3,3)
4	3.74	4.5	(3,4)
5	4.3	5.5	(4,5)
6	4.86	6.5	(4,6)
7	5.42	7.5	(5,7)
8	5.98	8.5	(5,8)
9	6.54	9.5	(6,9)



REFERENCES

[1]. Donald Hearn, Baker M. Pauline, “Computer Graphics”, Pearson Education, New Delhi, June 2012, ISBN: 817758765X.
[2]. Maurya Rajesh K., “Compute Graphics”, Wiley-India 2011, Delhi ISBN: 978-81-265-3100-4.
[3]. Dr. Chopra Rajiv, “Computer Graphics”, S. Chand 2016, New Delhi, ISBN: 978-93-856-7633-8.
[4]. Foley James, “Computer Graphics principles and practices”, Pearson Education, New Delhi 2014, ISBN: 978-0-321-39952-6.