LAB 1

OBJECTIVE: To implement and understand the DDA (Digital Differential Analyzer) line drawing algorithm using C++ and the graphics library in Turbo C++.

THEORY:

The DDA Line Drawing Algorithm is an incremental scan conversion method used in computer graphics to draw lines between two points. It calculates intermediate positions by incrementing one coordinate and computing the other using the line equation.

The formula used is:

- dx = x2 - x1
- dy = y2 - y1
- step = max(|dx|, |dy|)
- x increment = dx / step
- y increment = dy / step

It is simple, fast, and works well for drawing straight lines.

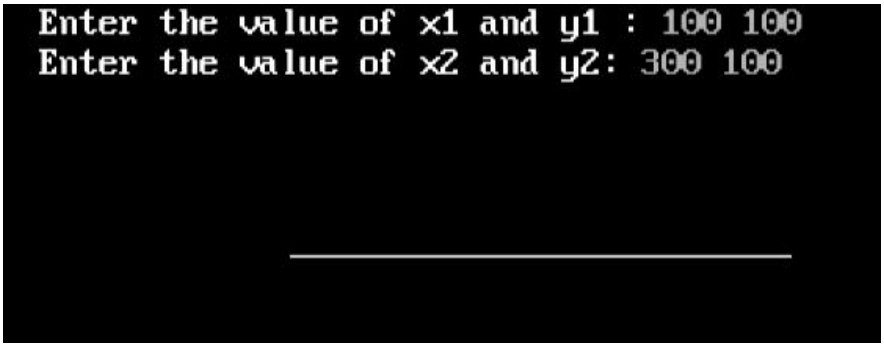
ALGORITHM:

1. Input the coordinates (x1, y1) and (x2, y2)
2. Calculate dx = x2 - x1 and dy = y2 - y1
3. Determine steps = max(|dx|, |dy|)
4. Calculate x increment = dx / steps
5. Calculate y increment = dy / steps
6. Set starting point (x, y) = (x1, y1)
7. Repeat steps to plot pixels until the end point is reached

PROGRAMS

```
#include <graphics.h>
#include <iostream.h>
#include <conio.h>
#include <math.h>
#include <dos.h>

void main(){
        float x,y,x1,y1,x2,y2,dx,dy,step;
        int i,gd=DETECT,gm;

        initgraph(&gd,&gm,"c:\\turboc3\\bgi");

        cout<<"Enter the value of x1 and y1 : ";
        cin>>x1>>y1;
        cout<<"Enter the value of x2 and y2: ";
        cin>>x2>>y2;

        dx=abs(x2-x1); dy=abs(y2-y1);
        if(dx>=dy) step=dx;
        else step=dy;

        dx=dx/step;
        dy=dy/step;

        x=x1; y=y1;

        i=1;
        while(i<=step){
                putpixel(x,y,10);
                x=x+dx;
                y=y+dy;
                i=i+1;
                delay(10);
        }
        getch();
        closegraph();
}
```

Output:



RESULTS:

The DDA line drawing algorithm was successfully implemented and executed. The program accurately draws a line between the given points using pixel plotting.

CONCLUSION:

The DDA algorithm is a straightforward and efficient method for line drawing in computer graphics. It uses floating-point operations to increment coordinates and is ideal for lines with arbitrary slopes.