

CG-Assignment

Generalized Bresenham's Line drawing Algorithm

Program:

Drawing lines with Generalized Bresenham's line drawing algorithm

Generalized Bresenham's line drawing algorithm

Aim: Implement generalized Bresenham's line drawing algorithm

Algorithm:

- take input for x_1, y_1, x_2, y_2
① $x = x_1, dx = x_2 - x_1$
 $y = y_1, dy = y_2 - y_1$
 $s1 = \text{sign}(dx)$
 $s2 = \text{sign}(dy)$
- ~~sign~~ $\Rightarrow \text{sign}(val) : \begin{cases} val > 0 & \text{return } 1 \\ val = 0 & \text{return } 0 \\ val < 0 & \text{return } -1 \end{cases}$
- ~~decision param.~~ $e = 2dy - dx$
if $dy > dx$
exchange values of dy & dx
 $exchange = 1$ // ~~exchange~~ is true
- loop till $i \neq 1$ and $i < dx$,
if ($e < 0$) & $e \neq -1$
if ($exchange \neq 1$)
putpixel($x, y + s2$)
else
putpixel($x + s1, y$)
 $e += 2dy$
} else {
putpixel($x + s1, y + s1$)
 $e += (2dy - 2dx)$
}
} // loop ends

Hariday Keswani,
Roll no. 2003088,
Hskeswani, C-21

Code:

```
#include<stdio.h>
#include<conio.h>
#include<graphics.h>
#include<math.h>

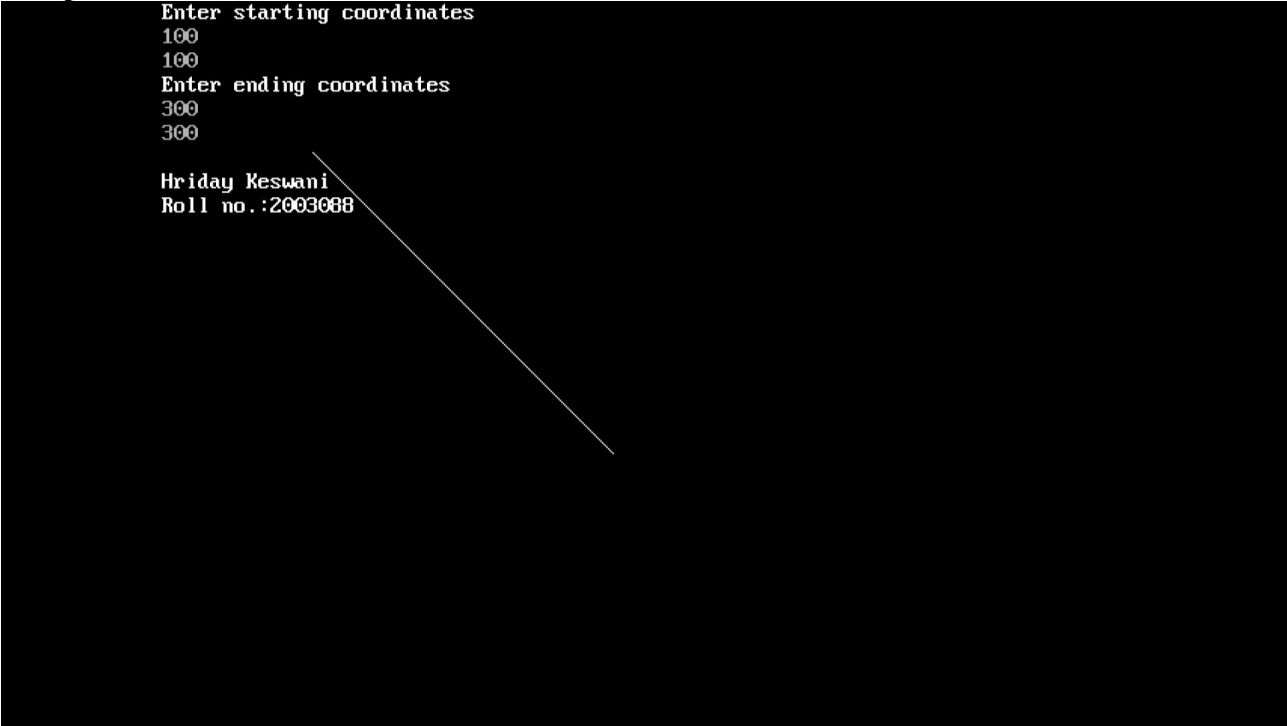
int sign(int a){
    if(a<0)
        return -1;
    else if(a>0)
        return 1;
    else
        return 0;
}

void bresenham(int x1, int y1, int x2, int y2){
    int x = x1, y = y1, dx, dy, e, swap = 0, i, s1, s2, temp;
    putpixel(x1, y1, WHITE);
    dx = abs(x2 - x1);
    dy = abs(y2 - y1);
    s1=sign(dx);
    s2=sign(dy);
    e=2*dy-dx;
    if(dy > dx){
        temp = dy;
        dy = dx;
        dx = temp;
        swap = 1;
    }
    for(i = 1;i < dx;i++){
        if(e<0){
            if(swap)
                putpixel(x, y = y + s2, WHITE);
            else
                putpixel(x = x + s1, y, WHITE);
            e = e + 2*dy;
        }else{
            putpixel(x = x + s1, y = y + s2, WHITE);
            e = e + 2*dy - 2*dx;
        }
    }
}

void main(){
    int x1, y1, x2, y2;
    int gd = DETECT, gm;
    clrscr();
    initgraph(&gd, &gm,"c://TURBOC3//BGI");
    printf("Enter starting coordinates\n");
    scanf("%d %d",&x1,&y1);
```

```
printf("Enter ending coordinates\n");
scanf("%d %d",&x2, &y2);
bresenham(x1,y1,x2,y2);
printf("\nHriday Keswani\nRoll no.:2003088\n");
getch();
closegraph();
}
```

Output:



The screenshot shows the output of a C++ program. It starts with the prompt "Enter starting coordinates", followed by the input "100" on two separate lines. Then it prompts "Enter ending coordinates", followed by the input "300" on two separate lines. Below this, the program prints "Hriday Keswani" and "Roll no.:2003088". Finally, a white line is plotted on a black background, starting from the coordinates (100, 100) and ending at (300, 300).

```
Enter starting coordinates
100
100
Enter ending coordinates
300
300

Hriday Keswani
Roll no.:2003088
```