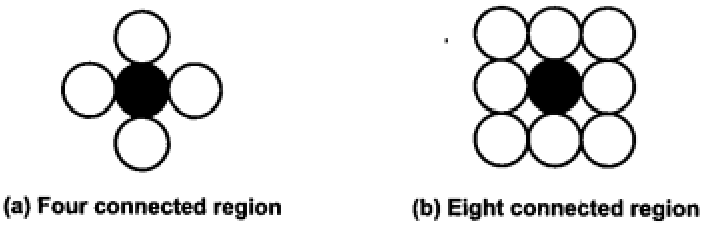
Experiment No. 5
Topic: To implement Area Filling Algorithm
Name: Vinith Shetty
Roll Number: 55
Date of Performance:
Date of Submission:

Experiment No. 5

Aim: To implement Area Filling Algorithm: Boundary Fill, Flood Fill.

Objective:
Polygon is an ordered list of vertices as shown in the following figure. For filling polygons with particular colors, we need to determine the pixels falling on the border of the polygon and those which fall inside the polygon. Objective is to demonstrate the procedure for filling polygons using different techniques.

Theory:
1) Boundary Fill algorithm –
Start at a point inside a region and paint the interior outward toward the boundary. If the boundary is specified in a single color, the fill algorithm processed outward pixel by pixel until the boundary color is encountered. A boundary-fill procedure accepts as input the coordinate of the interior point (x, y), a fill color, and a boundary color.



Procedure:
```
boundary_fill (x, y, f_color, b_color)
{
if (getpixel (x, y) != b_colour && getpixel (x, y) != f_colour)
        {
```

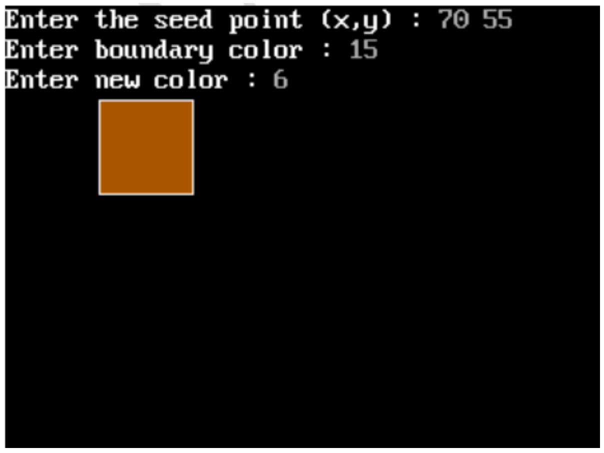
```
        putpixel (x, y, f_colour)
        boundary_fill (x + 1, y, f_colour, b_colour);
        boundary_fill (x, y + 1, f_colour, b_colour);
        boundary_fill (x - 1, y, f_colour, b_colour);
        boundary_fill (x, y - 1, f_colour, b_colour);
        }
}
```

Program:

```
#include<stdio.h>

#include<conio.h>

#include<graphics.h>

#include<doc.h>

 void boundary_fill(int x, int y, int fcolor, int
bcolor)

{

 if ((getpixel(x, y) != bcolor) && (getpixel(x, y) !=
fcolor))

 {

delay(10);

putpixel(x, y, fcolor);

boundary_fill(x + 1, y, fcolor, bcolor);
boundary_fill(x , y+1, fcolor, bcolor);
boundary_fill(x+1, y + 1, fcolor, bcolor);
boundary_fill(x-1, y - 1, fcolor, bcolor);
boundary_fill(x-1, y, fcolor, bcolor);
boundary_fill(x , y-1, fcolor, bcolor);
boundary_fill(x-1, y + 1, fcolor, bcolor);
boundary_fill(x+1, y - 1, fcolor, bcolor);

}

}

void main()

{
```

```
int x, y, fcolor, bcolor;

int gd=DETECT,gm;

initgraph(&gd, &gm, "C:\\TurboC3\\BGI");
printf("Enter the seed point (x,y) : ");
scanf("%d%d", &x, &y);

printf("Enter boundary color : "); scanf("%d",
&bcolor); printf("Enter new color : ");

scanf("%d", &fcolor); rectangle(50,50,100,100);
boundary_fill(x,y,fcolor,bcolor); getch();

}
```

Output:



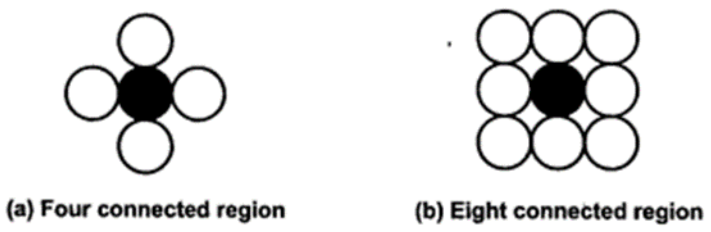
```
Enter the seed point (x,y) : 70 55
Enter boundary color : 15
Enter new color : 6
```

2) Flood Fill algorithm –

Sometimes we want to fill an area that is not defined within a single color boundary. We paint such areas by replacing a specified interior color instead of searching for a boundary color value. This approach is called a flood-fill algorithm.

1. We start from a specified interior pixel (x, y) and reassign all pixel values that are currently set to a given interior color with the desired fill color.
2. If the area has more than one interior color, we can first reassign pixel values so that all interior pixels have the same color.

3. Using either 4-connected or 8-connected approach, we then step through pixel positions until all interior pixels have been repainted.



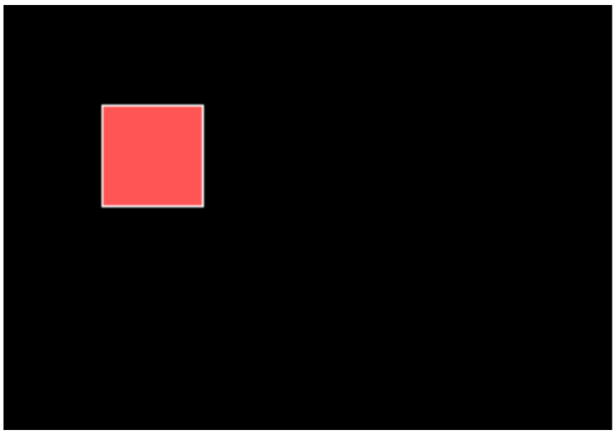
Procedure -

```
flood_fill (x, y, old_color, new_color)
{
if (getpixel (x, y) = old_colour)
        {
        putpixel (x, y, new_colour);
        flood_fill (x + 1, y, old_colour, new_colour);
        flood_fill (x - 1, y, old_colour, new_colour);
        flood_fill (x, y + 1, old_colour, new_colour);
        flood_fill (x, y - 1, old_colour, new_colour);
        flood_fill (x + 1, y + 1, old_colour, new_colour);
        flood_fill (x - 1, y - 1, old_colour, new_colour);
        flood_fill (x + 1, y - 1, old_colour, new_colour);
        flood_fill (x - 1, y + 1, old_colour, new_colour);
        }
}
```

Program:

```
#include<stdio.h>

#include<graphics.h>
#include<dos.h>

void flood(int,int,int,int);
int main()

{

int gd,gm=DETECT;
//detectgraph(&gd,&gm)
; initgraph(&gd,&gm," ");
rectangle(50,50,100,100)
; flood(55,55,12,0);
closegraph(); return 0;
} void flood(int x,int y, int fill_col, int old_col)

{

if(getpixel(x,y)==old_col)

{ delay(10); putpixel(x,y,fill_col);
flood(x+1,y,fill_col,old_col); flood(x-
1,y,fill_col,old_col);
flood(x,y+1,fill_col,old_col);
flood(x,y-1,fill_col,old_col); flood(x
+ 1, y + 1, fill_col, old_col); flood(x -
1, y - 1, fill_col, old_col); flood(x + 1,
y - 1, fill_col, old_col); flood(x - 1, y
+ 1, fill_col, old_col);

}

}
```

Output:



Conclusion: Comment on

1. Importance of Flood fill
2. Limitation of methods
3. Usefulness of method

Importance of Flood fill: The importance of flood fill lies in its versatility and efficiency in handling various image-based tasks and graphical operations. It provides a method for efficiently filling enclosed regions, making it a valuable tool in numerous fields, from computer graphics and image processing to user interface design and game development.

Limitation of methods: In Area Filling Method to mitigate these limitations, improvements and adaptations have been made in the algorithms, and new techniques have been developed to address specific challenges, such as handling complex shapes, non-enclosed areas, and performance optimizations in graphics software and systems.

Usefulness of method: The usefulness of Area Filling methods lies in their versatility and efficiency in handling area filling tasks. They provide fundamental tools in various domains, from graphic design and image processing to user interaction in software applications, making them an integral part of computer graphics and digital imaging techniques.