ICT 4203

Computer Graphics and Animation

Lecture 07

Region Filling

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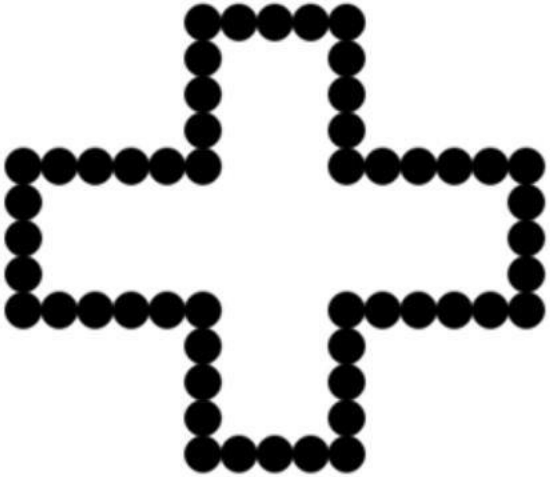
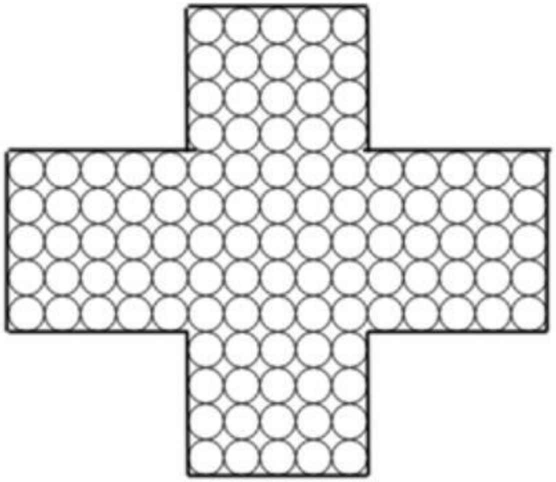
Region Filling

- Region filling is the process of filling image or region.
- Filling can be of boundary or interior region as shown in the following figure.
- **Boundary Fill** algorithms are used to fill the boundary and **flood-fill algorithms** are used to fill the interior.



Boundary Filled Region



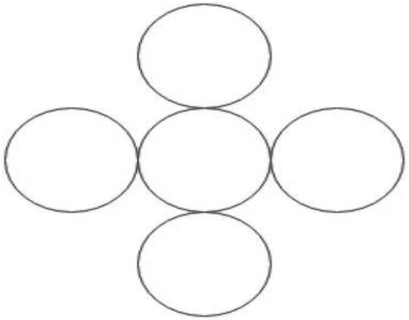
Interior or Flood Filled Region

Boundary-Fill Algorithm

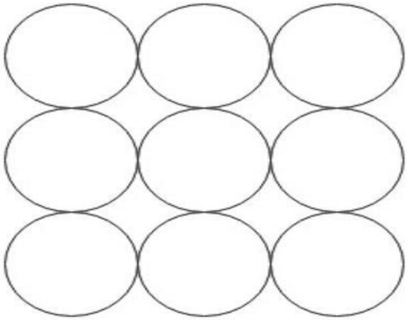
- This algorithm uses the recursive method.
- First of all, a starting pixel called as the seed is considered.
- The algorithm checks boundary pixel or adjacent pixels are colored or not.
- If the adjacent pixel is already filled or colored then leave it, otherwise fill it.
- The filling is done using four connected or eight connected approaches.
- Four connected approaches is more suitable than the eight connected approaches.

Continue...

- **Four connected approaches:** In this approach, left, right, above, below pixels are tested.
- **Eight connected approaches:** In this approach, left, right, above, below and four diagonals are selected.
- Boundary can be checked by seeing pixels from left and right first. Then pixels are checked by seeing pixels from top to bottom. The algorithm takes time and memory because some recursive calls are needed.



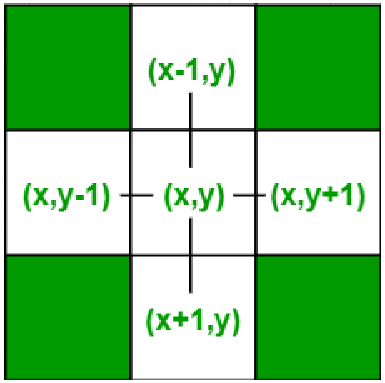
Four Connected



Eight Connected

Algorithm:

```
void boundaryFill4(int x, int y, int fill_color,int boundary_color)
{
        if(getpixel(x, y) != boundary_color && getpixel(x, y) != fill_color)
        {
                putpixel(x, y, fill_color);
                boundaryFill4(x + 1, y, fill_color, boundary_color);
                boundaryFill4(x, y + 1, fill_color, boundary_color);
                boundaryFill4(x - 1, y, fill_color, boundary_color);
                boundaryFill4(x, y - 1, fill_color, boundary_color);
        }
}
```



Flood-Fill Algorithm

- In this method, a point or seed which is inside region is selected. This point is called a seed point.
- Then four connected approaches or eight connected approaches are used to fill with specified color.
- The flood fill algorithm has many characters similar to boundary fill. But this method is more suitable for filling multiple colors boundary.
- When boundary is of many colors and interior is to be filled with one color we use this algorithm.
- In flood-fill algorithm, we start from a specified interior point (x, y) and reassign all pixel values are currently set to a given interior color with the desired color.
- Using either a 4-connected or 8-connected approaches, we then step through pixel positions until all interior points have been repainted.

Algorithm

```
Function FloodFill (x, y, fill_ color, old_color) If
(getpixel (x, y)=old_color)
{
    setpixel (x, y, fill_color);
    FloodFill (x+1, y, fill_color, old_color);
    FloodFill (x-1, y, fill_color, old_color);
    FloodFill (x, y+1, fill_color, old_color);
    FloodFill (x, y-1, fill_color, old_color);
    }
}
```

Thank You!