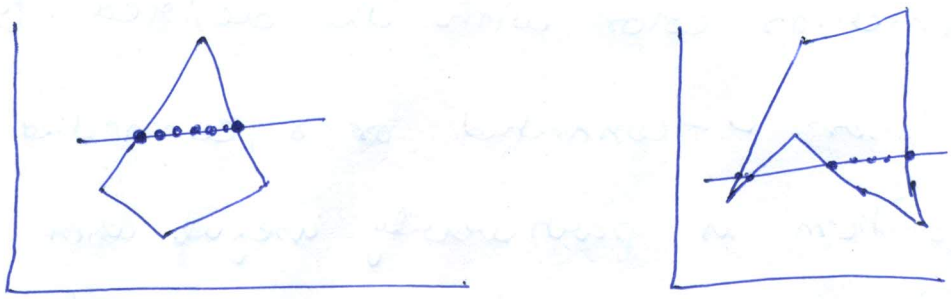
Filled Area Primitives → Area filling →

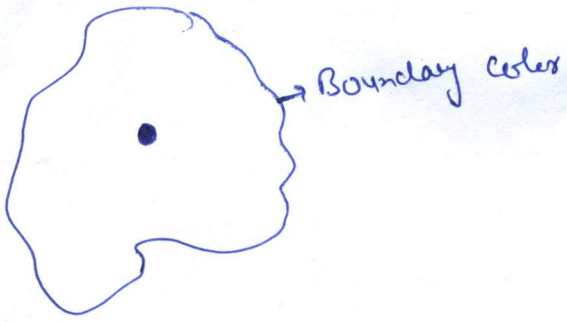
(1) To fill an area is to determine the overlap intervals for scan lines that cross the area. The scan line approach is used to fill polygons, circles, ellipses and other curves. for eg.

Scan line polygon fill algo →



(2) Another way is to start from a given interior position and paint outward from this point until we encounter the specified boundary condn. It is mostly used in interactive painting system.

Boundary-fill Algorithm →




4-connected


8-connected

A Boundary fill procedure accepts as I/P the coordinates of an interior point (x, y), a fill color and a boundary color. Starting from (x, y), the procedure tests neighboring positions to determine whether they are of boundary color. If not they are painted with fill color & their neighboors are tested. This procedure continues until all pixels up to the boundary color for the area have been tested.

Flood Fill Algorithm → ① If we want to fill in an area that is not defined within single color boundary. i.e Area bounded by several different color regions.

② we start from a specified interior ~~color~~ pt (x, y) reassign all pixel values that are currently set to a given interior color with the desired fill color.

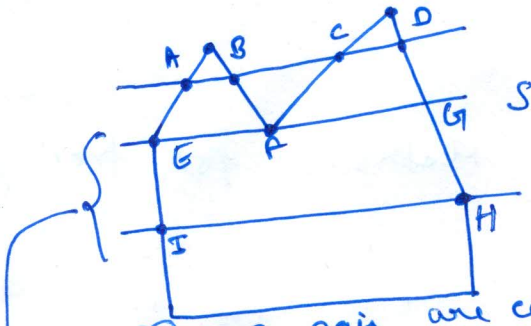
③ It also uses 4-connected or 8 connected approach.

④ This algorithm is particularly useful when the region to be filled has no uniformally coloured boundary

⑤ Now instead of checking the boundary colour, this algorithm checks to see if the pixel has region original or old colour.

Area fill Algorithm

- Scan line algorithm
  - → Polygon fill algorithm
- Seed fill algorithm
  - → Boundary fill algorithm
  - → flood fill algorithm



Scan line y (5 edges)

Scan line x (3 edges)

① AB pair are considered
CD pair " "

② Special case which requires special processing
EF & FG are two pairs

③ IH pair is considered because at vertex H both edges lies on opposite side

for eg ①  → two intersection point

②  → single intersection point

Boundary fill Algorithm →

① interior point is known as seed

It requires three inputs

(a) Coordinates (x,y) of a seed

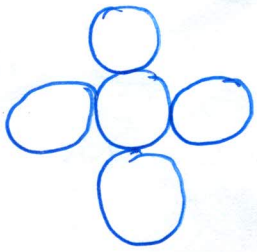
(b) fill colour

(c) Boundary colour

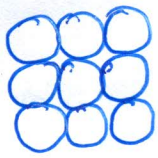
There are two different Methods for tracing neighbour pixels

(a) 4-connected

(b) 8-Connected



4-Connected



8-Connected

boundaryfill(x+1, y, fill color, boundary color)

(x+1, y)
(x-1, y)
(x, y+1)
(x, y-1)

Limitation → ① It may not fill the region correctly if some interior pixels are already displayed in the fill colour.

② It uses high no. of recursive calls. As a result it takes more time and more memory.

③ It only fills polygon with a unique boundary colour.

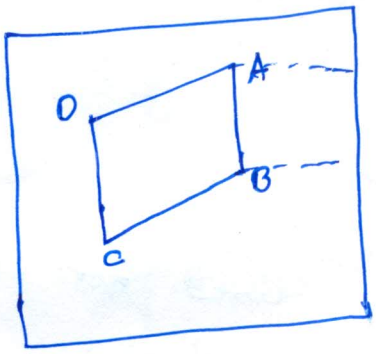
edge fill Algorithm →

① It uses the concept of scan line and fill colour in the polygon by selecting each edge of the polygon.

② It first find the intersection of polygon edge with each scan line and then complements all the pixels on right hand side from the intersection point to the extreme screen coordinates for each scan line.

③ This process is repeated for all polygon edges.
④ interior pixels within polygon are coloured once and exterior pixel are coloured twice.

forej →



① edge AB
② edge AD
③ edge DC
④ edge BC

Limitation → ① It is time consuming process and each time individual pixel is addressed many time

Flood Fill Algorithm –

① An Area is filled by replacing a specified interior colour or old colour instead of searching for a boundary colour.

② Instead of checking the boundary colour, this algo checks to see if the pixel has region original colour or old colour.

③ if a pixel has original or old colour, it fills that pixel with a new colour.

④ It is used to fill the area whose boundary may have more than one colour.

Limitation → It is not used for polygon in which edges intersect each other.

floodfill (x+1, y, fill-colour, old-colour)

fence fill algorithm →

① It was introduced to reduce the problem encountered in edge fill algorithm

② fence means border.