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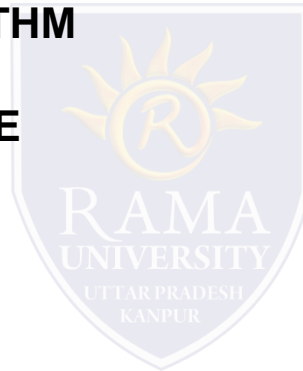
BCS -504 Computer Graphics & Multimedia

Lecture-21

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- **SCAN LINE ALGORITHM**

- **ALGORITHM**

- **AREA SUBDIVISION ALGORITHM**

- **CLASSIFICATION OF SCHEME**

It is an image space algorithm. It processes one line at a time rather than one pixel at a time. It uses the concept area of coherence. This algorithm records edge list, active edge list. So accurate bookkeeping is necessary. The edge list or edge table contains the coordinate of two endpoints. Active Edge List (AEL) contain edges a given scan line intersects during its sweep. The active edge list (AEL) should be sorted in increasing order of x. The AEL is dynamic, growing and shrinking. Following figures shown edges and active edge list. The active edge list for scan line AC_1 contain e_1, e_2, e_5, e_6 edges. The active edge list for scan line AC_2 contain e_5, e_6, e_1.
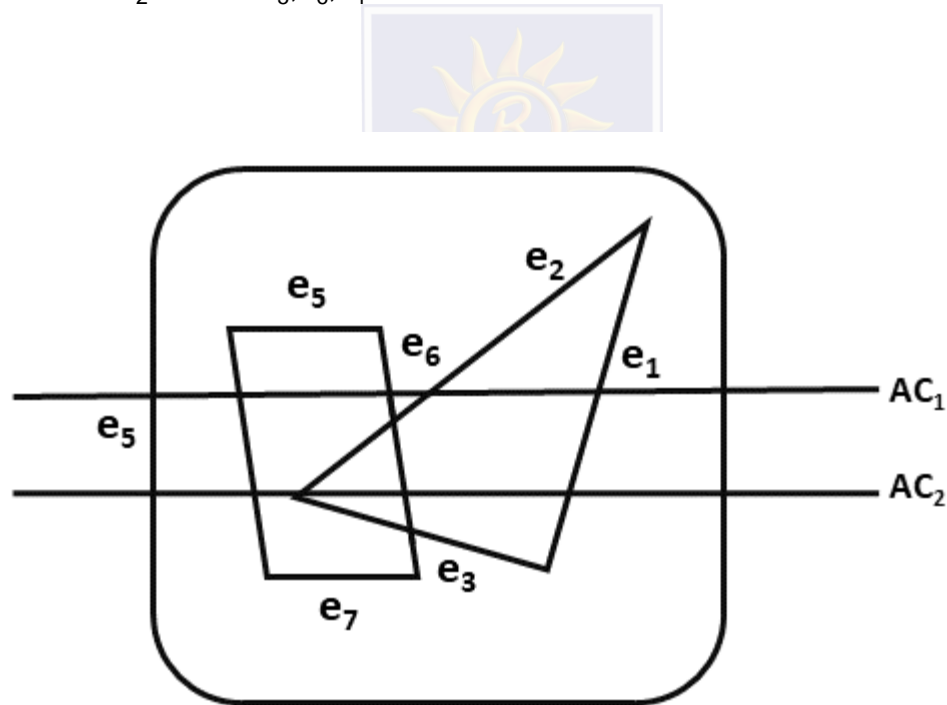
Scan Line Algorithm

Algorithm

Step1: Start algorithm

Step2: Initialize the desired data structure

1. Create a polygon table having color, edge pointers, coefficients

2. Establish edge table contains information regarding, the endpoint of edges, pointer to polygon, inverse slope.

3. Create Active edge list. This will be sorted in increasing order of x.

4. Create a flag F. It will have two values either on or off.

Step3: Perform the following steps for all scan lines

1. Enter values in Active edge list (AEL) in sorted order using y as value

2. Scan until the flag, i.e. F is on using a background color

3. When one polygon flag is on, and this is for surface S_1 enter color intensity as I_1 into refresh buffer

4. When two or image surface flag are on, sort the surfaces according to depth and use intensity value S_n for the nth surface. This surface will have least z depth value

5. Use the concept of coherence for remaining planes.

Step4: Stop Algorithm

Area Subdivision Algorithm

It was invented by John Warnock and also called a Warnock Algorithm. It is based on a divide & conquer method. It uses fundamental of area coherence. It is used to resolve the visibility of algorithms. It classifies polygons in two cases i.e. trivial and non-trivial.

Trivial cases are easily handled. Non trivial cases are divided into four equal subwindows. The windows are again further subdivided using recursion until all polygons classified trivial and non trivial.
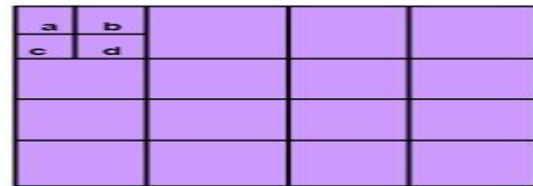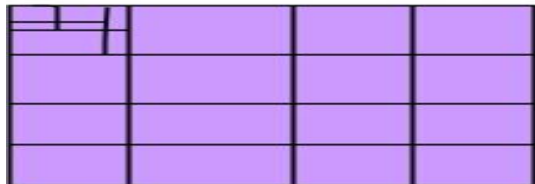
Original area
(a)
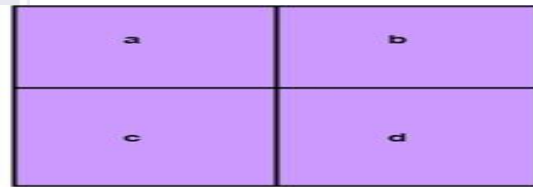
First division or subdivision of area
(b)

Second division
(c)

Third subdivision
(d)

Fourth subdivision
(e)

Classification of Scheme

1. It divides or classifies polygons in four categories:

2. Inside surface

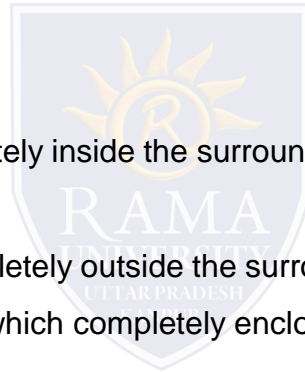3. Outside surface

4. Overlapping surface

5. Surrounding surface

6. **1. Inside surface:** It is surface which is completely inside the surrounding window or specified boundary as shown in fig (c)

7. **2. Outside surface:** The polygon surface completely outside the surrounding window as shown in fig (a)

8. **3. Overlapping surface:** It is polygon surface which completely encloses the surrounding window as shown in fig (b)

9. **4. Overlapping surface:** It is surface partially inside or partially outside the surface area as shown in fig (c)
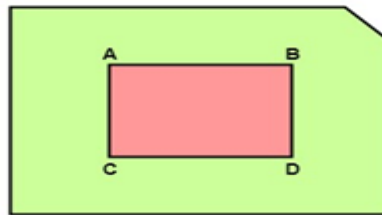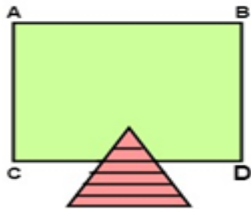
Classification of Scheme

ABCD is current window against which particular window is determined to be of either of four categories
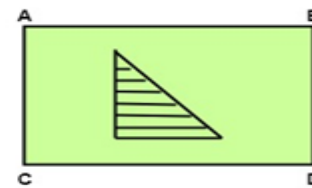
(a)

(b)

(c)

Surface of object intersecting desired window

Outside

(d)

Surface is outside specified window

(e)

Surface is inside specified window

MUTIPLE CHOICE QUESTIONS:

Sr no	Question	Option A	Option B	OptionC	OptionD
1	frame buffer can be anywhere in the system memory and video controller access this for …….the screen.	backward kinematics	movement	refresh	quit
2	video controller more processors are used as co-processors to ……….. in sophisticated raster system.	modify the system	accelerate the system	alter the system	All of these
3	Two registers are used to store the coordinates of the screen pixels which are …….	W and Y	X and W	X and Y	none of these
4	The value stored in frame buffer for this pixel is …... and used to set the intensity of the CRT beam.	retrieved	stored	fix	none of these
5	One way to designing raster system is having separate …………..	Destop processor	display coprocessor	image processor	none of these

REFERENCES

- http://www.engppt.com/search/label/Computer%20Graphics