24. VSD- BSP tree onwards

20 March 2024 07:17

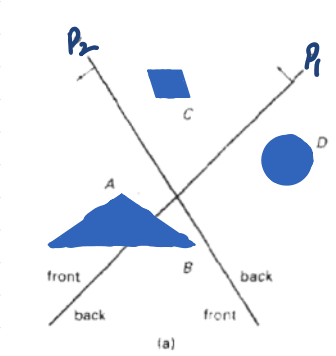
Source: Computer Graphics by Donald Hearn and M. Pauline Baker

① BSP Tree Method :-

(Binary Space Partitioning Tree)

Also painting the surfaces onto the screen from back to front.

Useful when the view reference point changes, but the objects in a scene are at fixed positions.



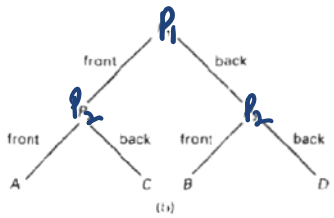


Figure 13-19
A region of space (a) is partitioned with two planes P_1 and P_2 to form the BSP tree representation in (b).

Once the tree is complete, the tree is processed from back to front, so that foreground objects are painted over the background.

② Ray-tracing Method :-

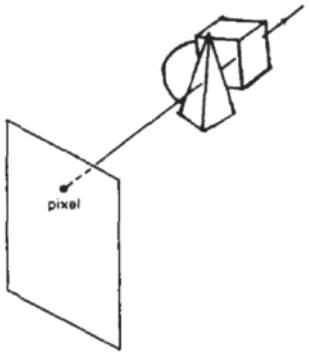


Figure 13-26
A ray along the line of sight from a pixel position through a scene.

Determing the intersection of the object using the line of sight.
Visible surface is the one whose intersection point is closest to the pixel
Ray Casting :- visibility-detection tool, based on geometric optics methods, which traces the paths of light rays.

③ Area sub-division method :-
image-space method but object-space operations can be used to accomplish depth ordering of surfaces.

Area-coherence by locating those view areas that represent part of a single surface.

Successively deviding the total viewing area into smaller and smaller rectangles until each small area is projection of a single visible surface or no surface at all.

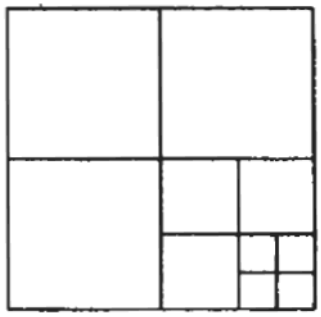
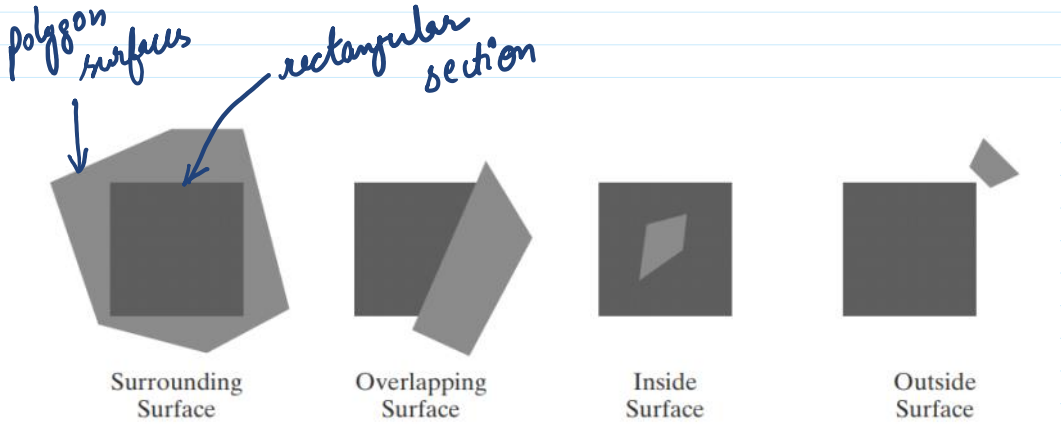


Figure 15-20
Dividing a square area into equal-sized quadrants at each step.



area completely enclosed

partly inside partly outside

completely inside

completely outside

No further subdivisions of a specified area are needed if

1. An area has no inside, overlapping, or surrounding surfaces.
2. An area has only one inside, overlapping or surrounding surface.
3. An area has one surrounding surface that obscures all other surfaces within the area boundaries.

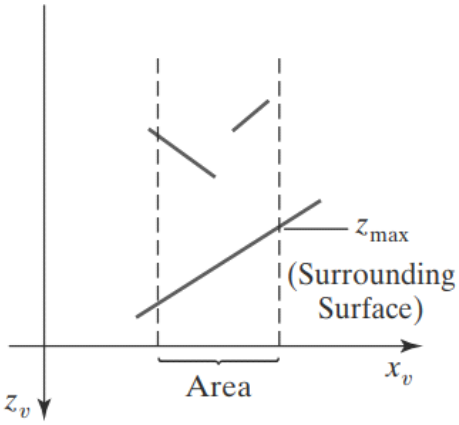


FIGURE 22
Within a specified area, a surrounding surface with a maximum depth of z_{max} obscures all surfaces that have a minimum depth beyond z_{max}.