Computer Graphics 15:
More Surface Detection Methods

Contents

Today we will continue to look at visible surface detection methods:

- Depth-sorting method
- Other methods

We will also compare the different techniques we have studied and suggest when different techniques should be employed

Depth-Sorting Method

A visible surface detection method that uses both image-space and object-space operations

Basically, the following two operations are performed

- Surfaces are sorted in order of decreasing depth
- Surfaces are scan-converted in order, starting with the surface of greatest depth

The depth-sorting method is often also known as the **painter's method**
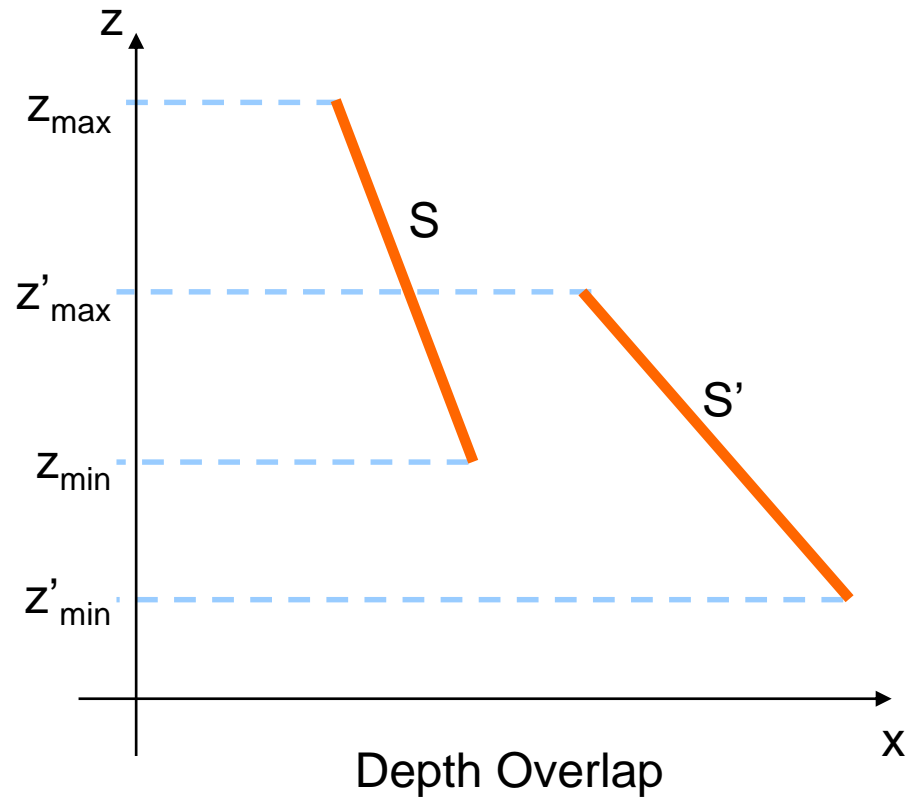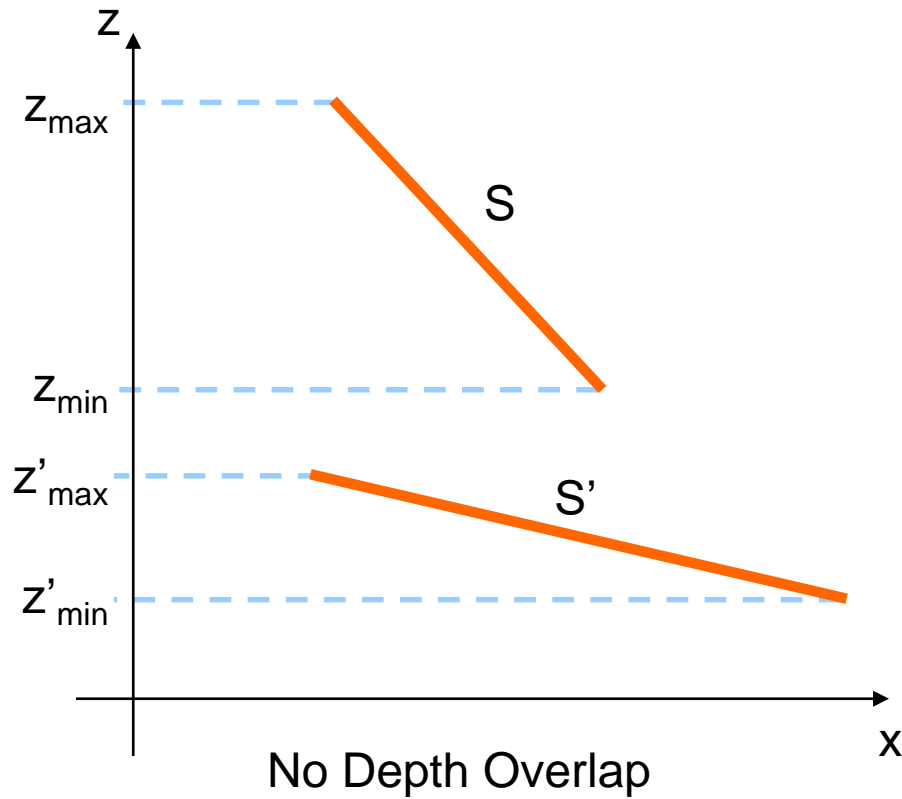
Depth-Sorting Method (cont…)

First, assume that we are viewing along the z direction

All surfaces in the scene are ordered according to the smallest z value on each surface

The surface S at the end of the list is then compared against all other surfaces to see if there are any depth overlaps

If no overlaps occur then the surface is scan converted as before and the process repeats with the next surface

Depth Overlapping

No Depth Overlap

Depth Overlap

Depth-Sorting Method (cont…)

When there is depth overlap, we make the following tests:

– The bounding rectangles for the two surfaces do no overlap

– Surface S is completely behind the overlapping surface relative to the viewing position

– The overlapping surface is completely in front of S realtive to the viewing position

– The boundary edge projections of the two surfaces onto the view plane do not overlap
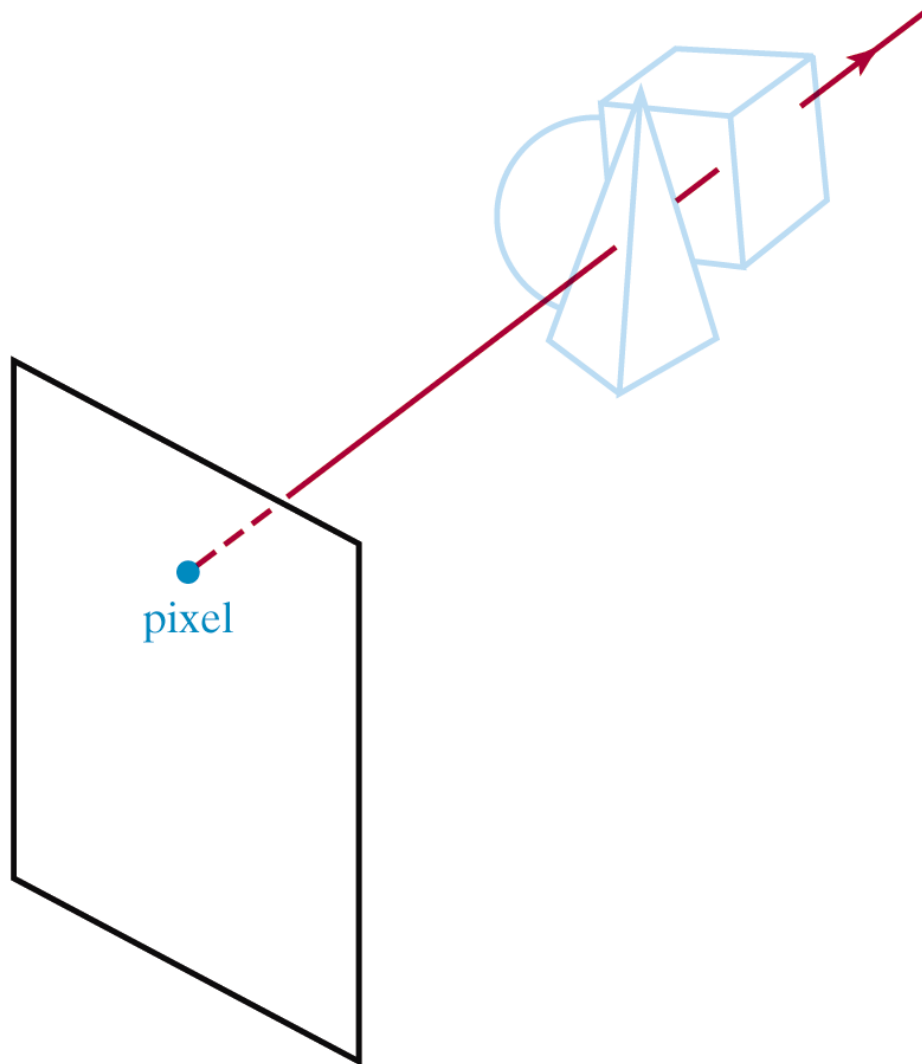
Depth-Sorting Method (cont...)

The tests are performed in the order listed and as soon as one is true we move on to the next surface

If all tests fail then we swap the orders of the surfaces

There are a number of other techniques all based around are division

– BSP-Tree Method

– Area-Subdivision Method

– Octree Methods

Raycastig can also be used

pixel

When few surfaces are present either the depth sorting algorithm or the BSP tree method tend to perform best

Scan-line also performs well in these situations – up to a several thousand polygon surfaces

The depth buffer method tends to scale linearly, so that for low numbers of polygons its performance is poor, but it is used for higher numbers of polygons.

We need to make sure that we only draw visible surfaces when rendering scenes