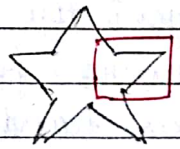
Lecture-23
MDU

classmate
Date 28/03/18
Page

Window to viewport coordination transformation

Clipping Operation
- Clipping algorithm: any procedure that identifies those portions of a picture that are either inside or outside of a specified region of space.
- Clip window: The region against which an object is to be clipped.



Applications
- Extracting part of scene for viewing
- Anti-aliasing line segments or objects

Clip window
- Polygon or curved boundary depending on the application

Viewport clipping
- To display those picture parts that are within the window area.

- Viewport clipping can reduce calculation by allowing concatenation of viewing and geometric transformation matrices.
- On raster systems, clipping algorithms are often combined with scan conversion.

Line clipping
- To find line pos" w.r.t a standard regular clipping region

Steps:
- Test the line whether it is completely inside the clipping win
- If not, test if it completely outside.
  Otherwise perform intersection calcu"s of line with
- one or more clipping boundaries.

Line clipping

- The parametric representation of clipping boundary is
  $x = x_1 + u(x_2 - x_1)$
  $y = y_1 + u(y_2 - y_1)$, $0 <= u <= 1$
- To determine values of parameter u for intersection with clipping boundary coordinates
- The line is outside when the value of u is beyond the range.
- Otherwise find intersections.
- ☆ Special handling for the lines parallel to window edges.
- Parametric test: good deal of computation, faster clipping.

Cohen-Sutherland line clipping

- Oldest
- Most-popular
- Speeds up the processing of line segments.
  - by performing initial tests
  - reduces the no. of intersections that must be calculated.
- Every line end-point in a picture is assigned a 4-digit binary code, called a region code, that identifies the location for point relative to the boundaries of the clipping rectangle.

1001	0001	0101
1000	0000	0100
1010	0010	0110

bit: 1 2 3 4
left right below above

Calculate differences b/w endpoint co-ordinates and clipping boundaries.

Use the resultant sign bit of each diff calculn to set the corresponding value in the region code.

Bit 1 is the sign bit of $x - xw_{min}$

" 2 " $xw_{max} - x$

" 3 " $y - yw_{min}$

" 4 " $yw_{max} - y$

Lecture-24 02/04/18

NSU