

3 Polygon clipping

Line clipping is acceptable when the output can be a set of disconnected lines segments. There are, however, situation in which a polygon clipped against a window should result in one or more polygons.

For example a region that is to be shaded must have a closed boundary.

The Sutherland-Hodgman polygon clipping algorithm clips a polygon against each edge of the window, one at a time. Specifically for each window edge it inputs a list of vertices and outputs a new list of vertices which is submitted to the algorithm for clipping against the next window edge.

The first window edge has as input the original set of vertices.

After clipping against the last edge, the output list consists of the vertices describing the clipped polygon.

In the algorithm, for each window edge, we tack the input list of vertices for that edge, tests a pair of consecutive vertices against a window edge to produce the output list of vertices. There are four possible cases of testing as illustrated in figure - 3 - Where testing is performed against the left edge

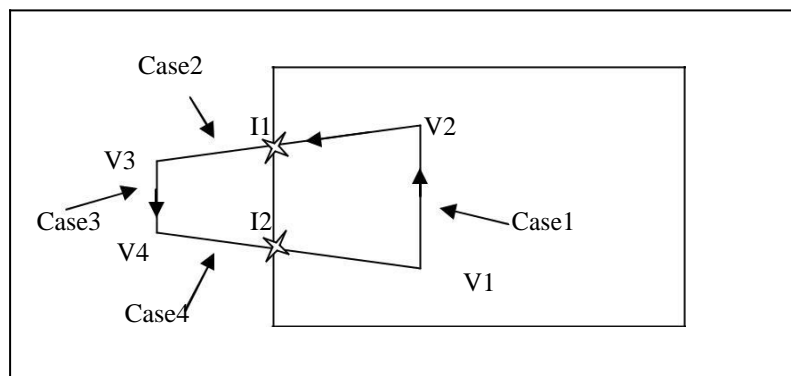


Figure - 3 -

The sample polygon has vertices { V1 , V2 , V3 , V4 } .

Case 1 has the first and second vertices V1 and V2 inside the window, so the second vertex V2 is send to the output list.

Case2 has the first vertex V2 inside and the second vertex V3 outside the window. The point of intersection, I1 , of the side of the polygon joining the vertices and the edge is added to the output list.

Case3 has both vertices, V3 and V4 outside the window and no point is output.

Case4 has the first vertex V4 outside and the second vertex V1 inside the window, the point of intersection I2 and the second vertex V1 are added to the output list.

The result of this left clipping is the transformation of the input list { V1 , V2 , V3 , V4 } to the output list { V2 , I1 , I2 , V1 }.