

DPBS(PG) College, Anoopshahr
BCA IV Semester
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Sutherland - Hodgman Polygon Clipping

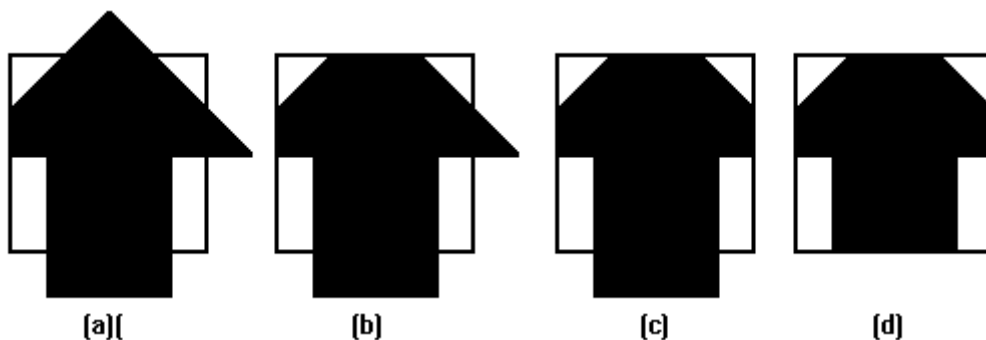
The Sutherland - Hodgman algorithm performs a clipping of a polygon against each window edge in turn. It accepts an ordered sequence of vertices $v_1, v_2, v_3, \dots, v_n$ and puts out a set of vertices defining the clipped polygon.



Before clipping

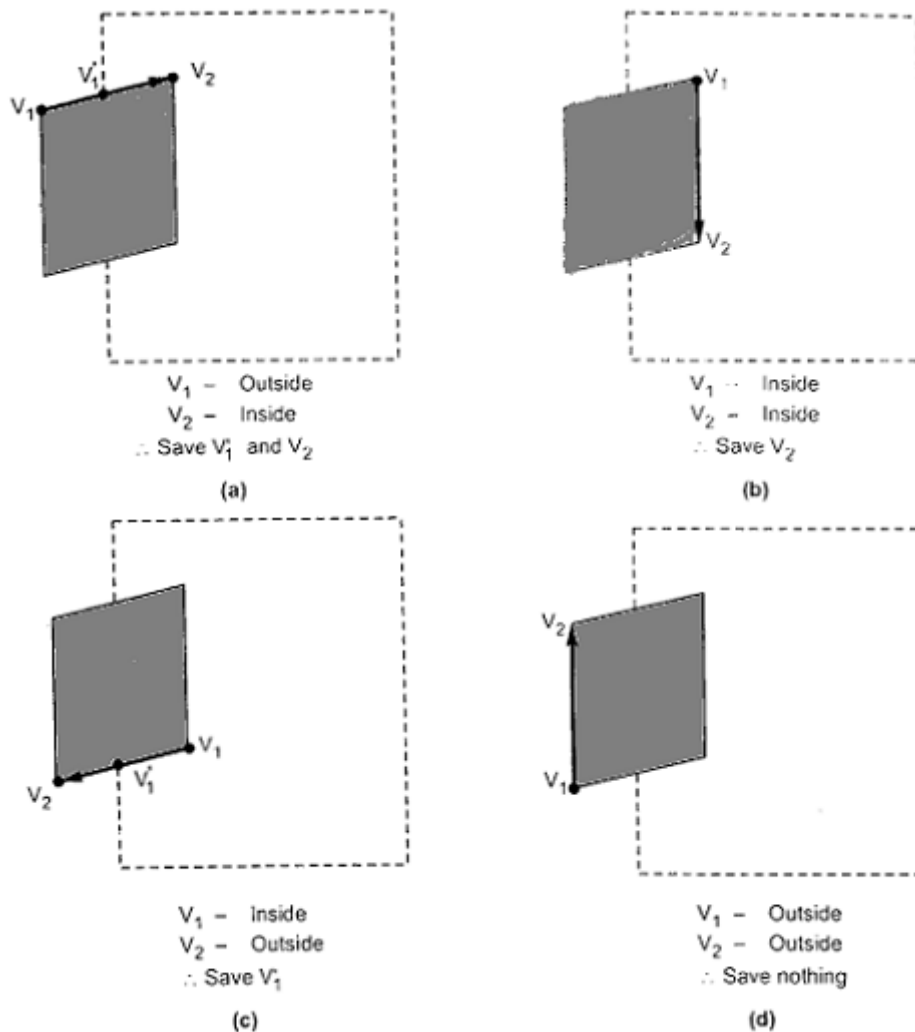
This figure represents a polygon (the large, solid, upward pointing arrow) before clipping has occurred.

The following figures show how this algorithm works at each edge, clipping the polygon.



- a. Clipping against the left side of the clip window.
- b. Clipping against the top side of the clip window.
- c. Clipping against the right side of the clip window.
- d. Clipping against the bottom side of the clip window.

The output of the algorithm is a list of polygon vertices all of which are on the visible side of a clipping plane. Such each edge of the polygon is individually compared with the clipping plane. This is achieved by processing two vertices of each edge of the polygon around the clipping boundary or plane. This results in four possible relationships between the edge and the clipping boundary or Plane.



1. If the first vertex of the edge is outside the window boundary and the second vertex of the edge is inside then the intersection point of the polygon edge with the window boundary and the second vertex are added to the output vertex list.
2. If both vertices of the edge are inside the window boundary, only the second vertex is added to the output vertex list.

3. If the first vertex of the edge is inside the window boundary and the second vertex of the edge is outside, only the edge intersection with the window boundary is added to the output vertex list.
4. If both vertices of the edge are outside the window boundary, nothing is added to the output list.

Once all vertices are processed for one clip window boundary, the output list of vertices is clipped against the next window boundary. Going through above four cases we can find right output.

References:

<https://www.cs.helsinki.fi/group/goa/viewing/leikkaus/intro2.html>

<https://www.ques10.com/p/11168/explain-sutherland-hodgeman-algorithm-for-polygo-1/>