

Polygon Clipping Algorithm (Weiler Atherton)

Computer Graphics

Weiler & Atherton Polygon Clipping

2D

- This Algorithm is capable of clipping of a concave polygon.
- Polygon to be Clipped : Subject Polygon
- Clipping Window : Clip Polygon



***Clockwise
Processin
g***

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- For Clockwise Processing:
 - For an Outside-to-Inside pair of vertices follow the polygon boundary.
 - For an Inside-to-Outside pair of vertices, follow the window boundary.

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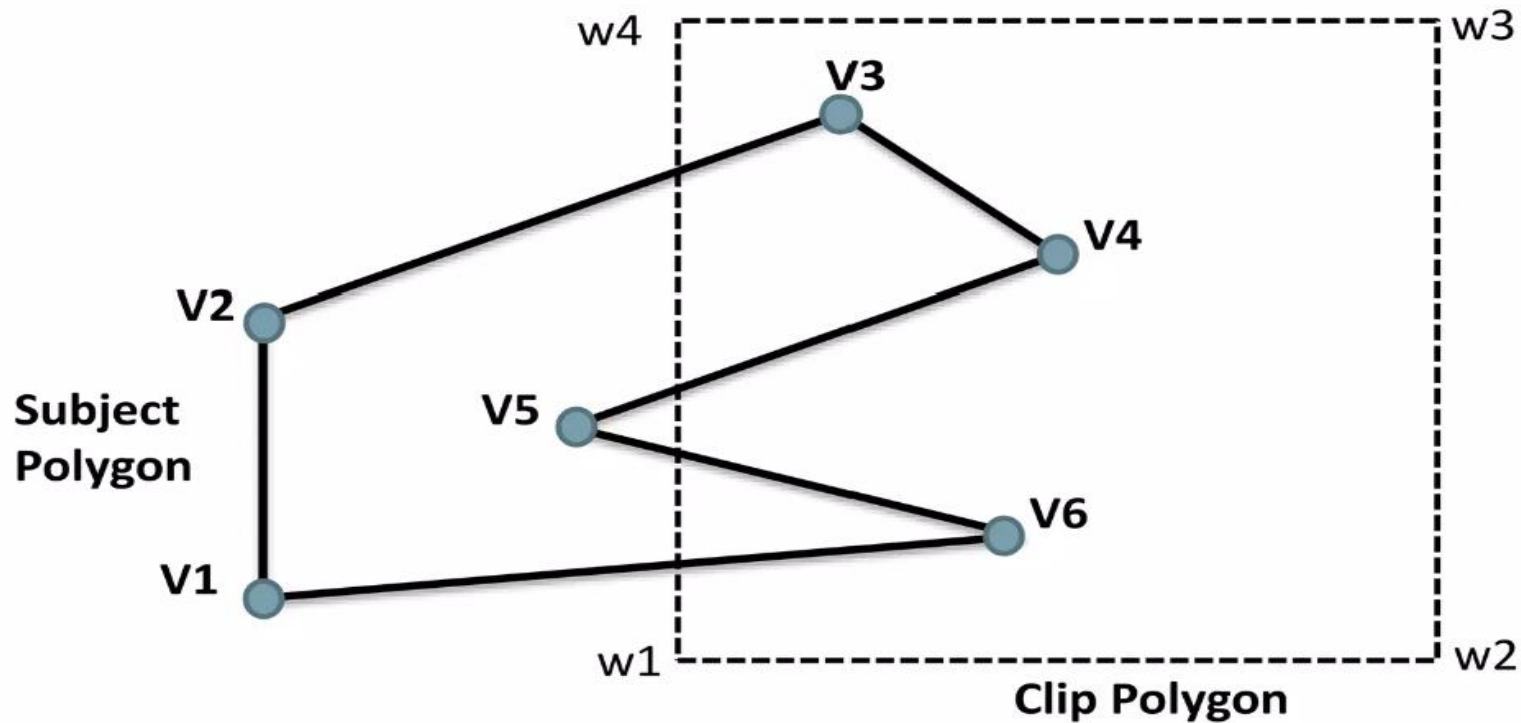
■ Algorithm:

- Assume the polygon listed in clockwise order.
- If the edge enter the clip polygon, record the intersection points and continue to trace the subject polygon.
- If the edge leaves the clip polygon, record the intersection point and make a right follow the clip polygon in same manner. i.e treat clip polygon as subject polygon.
- Continue until vertex reach visited vertex.

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Example: Clip the Subject Polygon .

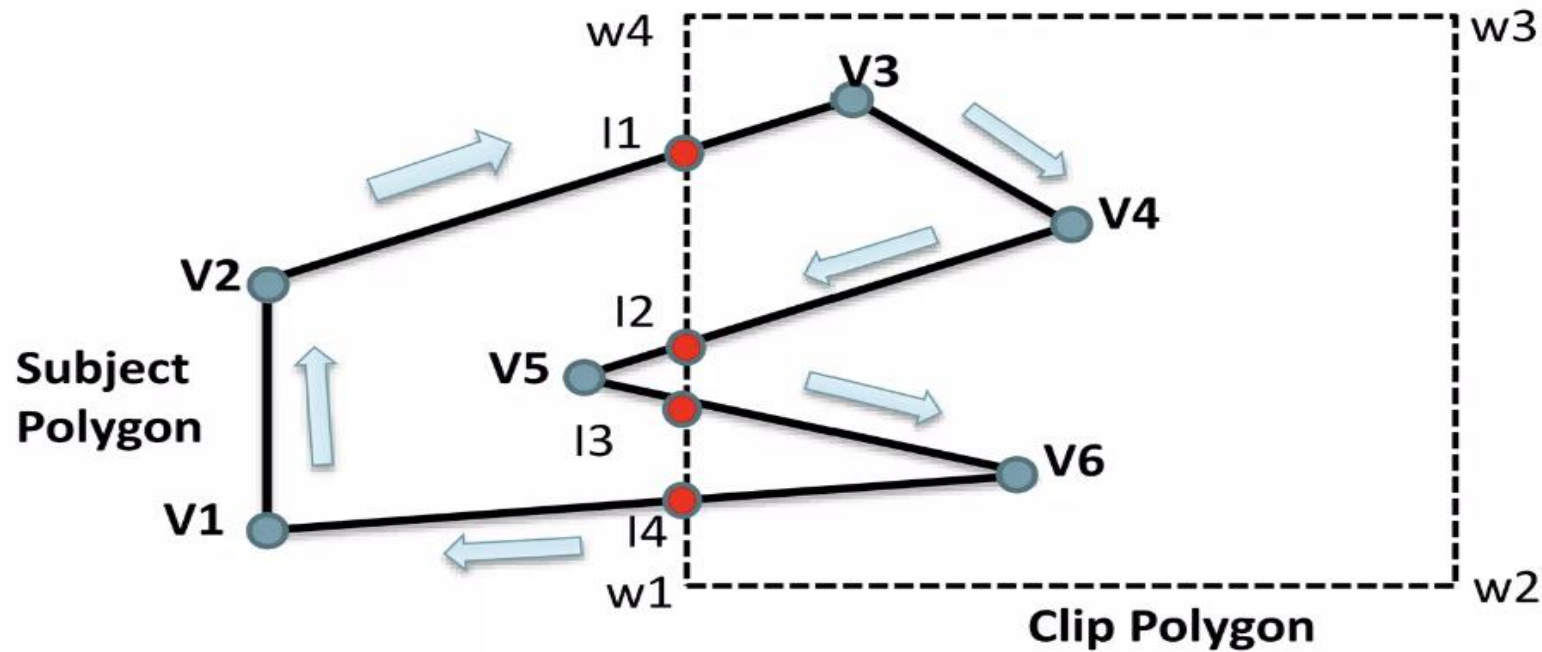


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Solution:

1. Clockwise notation in subject polygon.



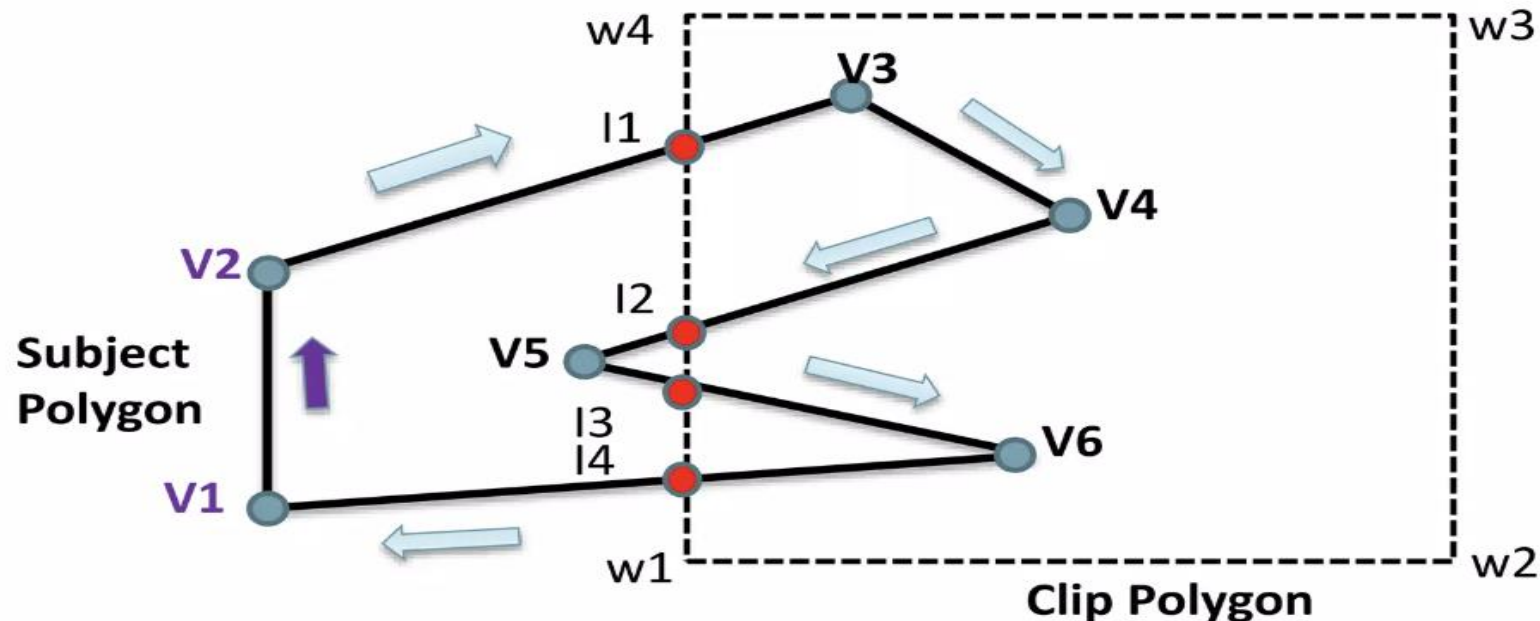
Here, Intersection points are $I1, I2, I3$ & $I4$

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Solution:

2. Start from V1 vertex to V2 vertex in clockwise direction, both outside vertices then leave.

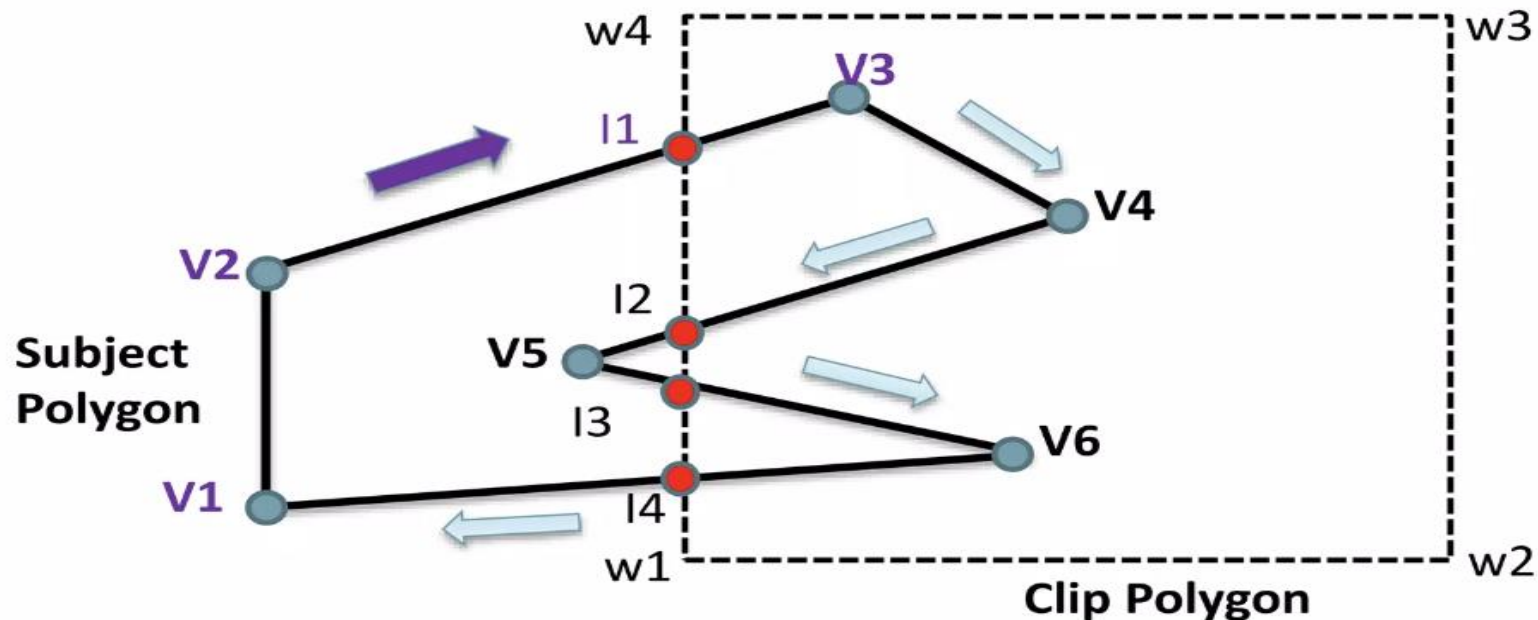


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Solution:

3. From V2 vertex to Vertex V3 in clockwise direction, Here V2 is outside and V3 is inside. so, record Intersection Point I1 and continue to subject polygon to V3 Vertex.

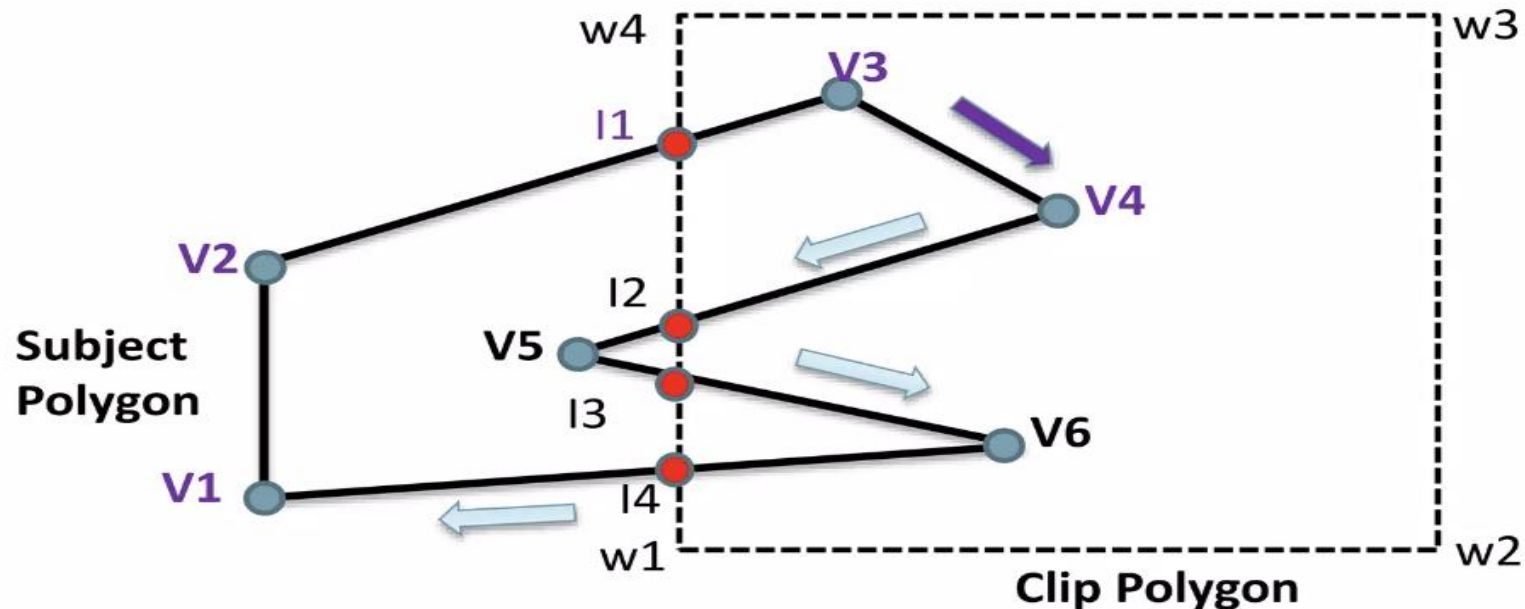


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Solution:

4. From V3 vertex to Vertex V4 in clockwise direction. Here both V2 and V3 is inside. so, continue to subject polygon to V4 Vertex.

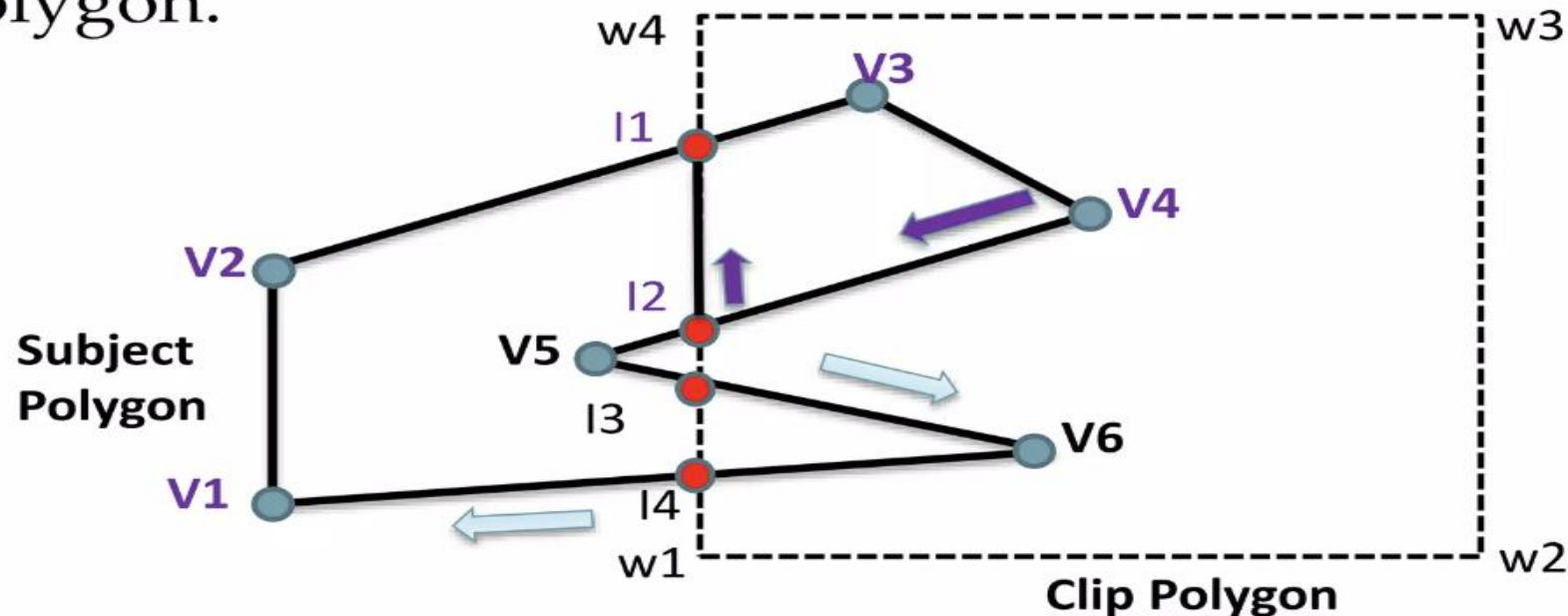


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Solution:

5. From V4 vertex to Vertex V5 in clockwise direction. Here both V4 is inside point and V5 is outside. so, continue to **Clip Polygon** clockwise to intersection point from I2 to I1. Also clip the polygon.

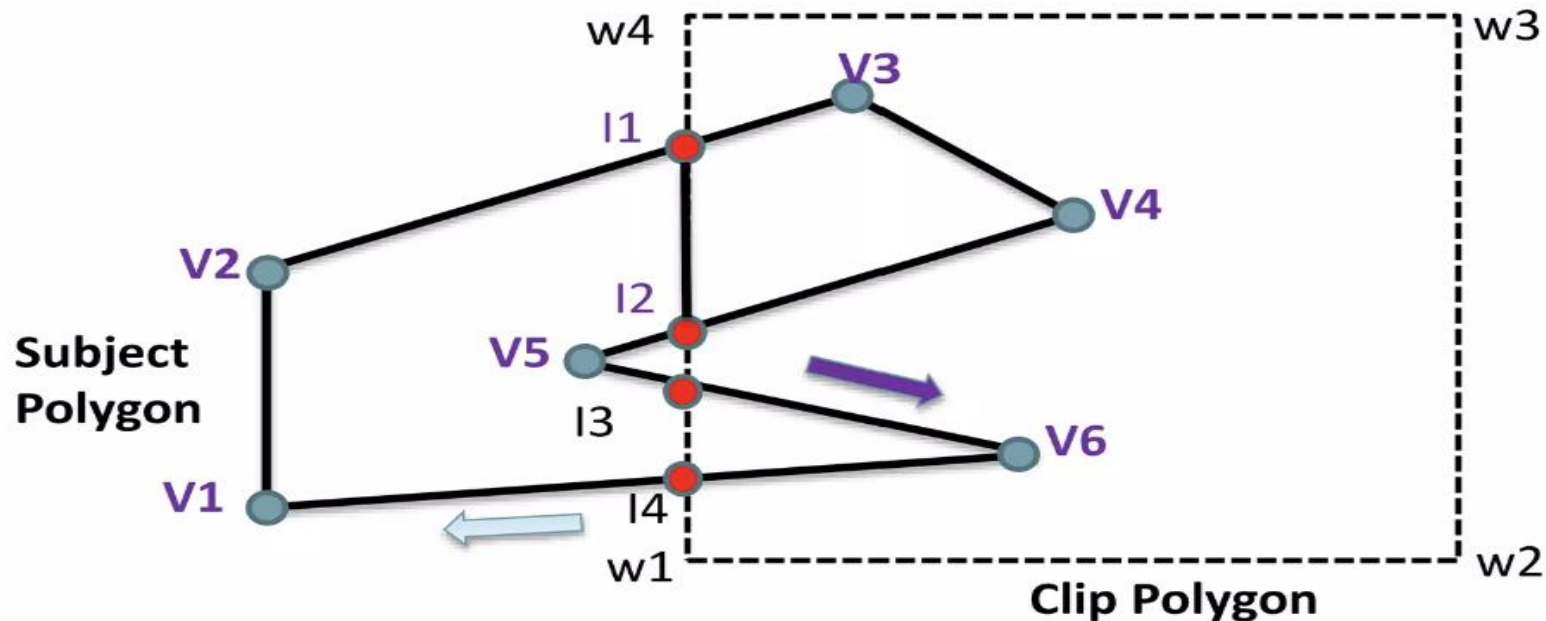


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Solution:

6. From V5 vertex to Vertex V6 in clockwise direction. Here both V5 is outside and V6 is inside. so, continue to subject polygon to V6 Vertex.

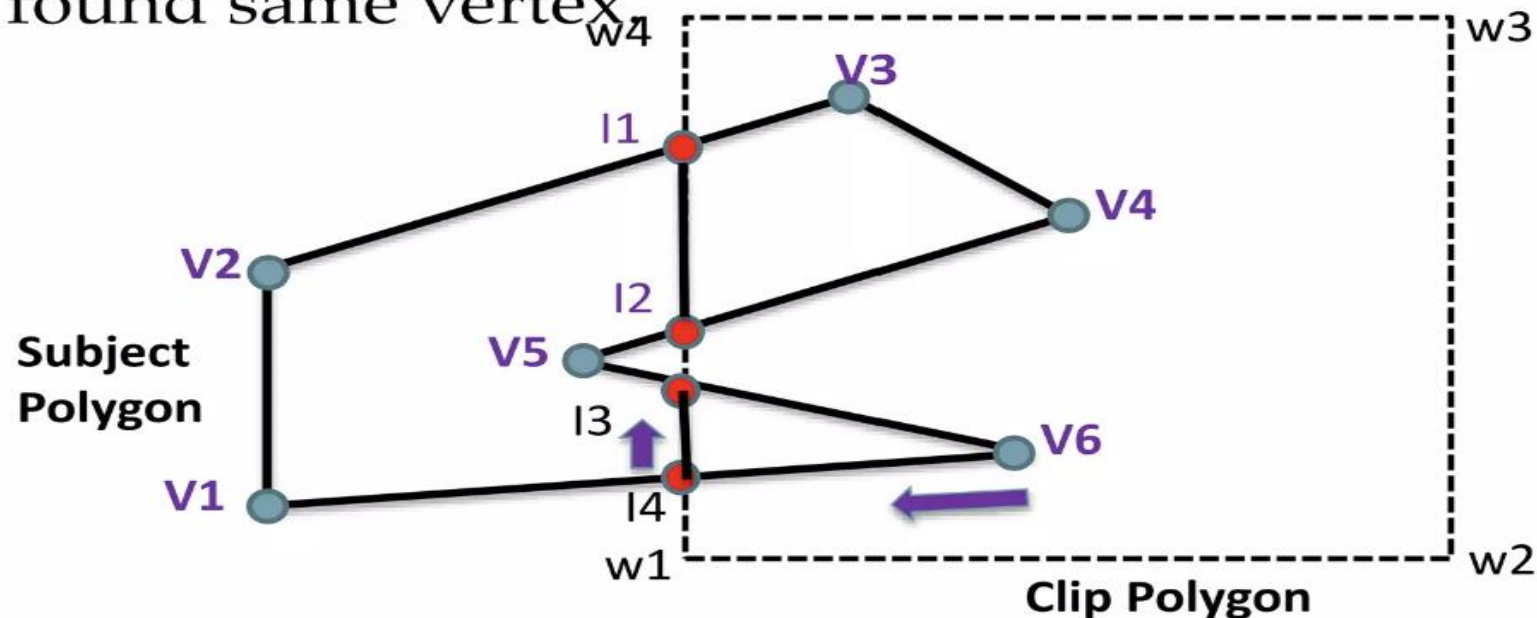


Weiler & Atherton Polygon Clipping

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Solution:

7. From V6 vertex to Vertex V1 in clockwise direction. Here both V6 is inside vertex and V1 is outside. so, continue to clip polygon from Intersection point I4 to I3 intersection point. Also clip if found same vertex



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Solution:

Subject List	Clipped List
V1	W1
V2	
I1	I4
V3	I3
V4	I2
I2	I1
V5	W4
I3	W3
V6	W2
I4	W1
V1	

The diagram illustrates the Weiler and Atherton polygon clipping algorithm. It shows two polygons: a subject polygon (V1-V6) and a clipper polygon (W1-W4). The subject polygon is a vertical line segment from V1 to V2, a horizontal segment from V2 to V3, a vertical segment from V3 to V4, a horizontal segment from V4 to V5, a vertical segment from V5 to V6, and a horizontal segment from V6 to V1. The clipper polygon is a vertical line segment from W1 to W2, a horizontal segment from W2 to W3, a vertical segment from W3 to W4, and a horizontal segment from W4 to W1. The intersection points are labeled I1, I2, I3, and I4. The diagram shows the subject polygon being clipped by the clipper polygon, resulting in a single continuous path that follows the subject polygon's boundary, entering and exiting the clipper polygon's boundary at the intersection points.

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Solution:

8. Final Clipped part of subject polygon is

