

Clipping and offsetting algorithms

For optimizing geometry for cutting technologies there are a lot of important tools and algorithms out there to solve a lot of common problems. There are a lot of clipping algorithms out there. Most of them work kind a sweep line algorithm - that's a kind of scanning routine which mostly works by visiting elements and brute-forcing them with different methods.

[https://de.m.wikipedia.org/wiki/Sweep_\(Informatik\)](https://de.m.wikipedia.org/wiki/Sweep_(Informatik))

Greiner Hormann Clipping Algorithm

used for polygon clipping. It can process both self-intersecting and non-convex polygons) - also known as EvenOdd problem

- <https://github.com/karimbahgat/Clippy> (works for polygons, not for bezier paths)
- https://oreillymedia.github.io/Using_SVG/extras/ch06-fill-rule.html see "winding rule"

Bentley Ottmann Clipping Algorithm

a sweep line algorithm for listing all crossings in a set of line segments, i.e. it finds the intersection points (or, simply, intersections) of line segments (does not work for bezier paths)

- https://github.com/ideasman42/isect_segments-bentley_ottmann (python)
- https://github.com/lycantropos/bentley_ottmann (python)
- <https://github.com/anvaka/isect> (NodeJS)

Bush algorithm

<https://github.com/anvaka/isect>

Sutherland-Hodgman Algorithm

Vatti Clipping Algorithm

Allows clipping of any number of arbitrarily shaped subject polygons by any number of arbitrarily shaped clip polygons. Unlike the Sutherland-Hodgman and Weiler-Atherton polygon clipping algorithms, the Vatti algorithm does not restrict the types of polygons that can be used as subjects or clips. Even complex (self-intersecting) polygons, and polygons with holes can be processed. The algorithm is generally applicable only in 2D space.

Libraries:

- <https://github.com/karimbahgat/Clippy>
- <https://github.com/fonttools/pyclipper> (works for lines and polygons, not for bezier paths)
 - clipping and offsetting lines and polygons → performs line & polygon clipping - intersection, union, difference & exclusive-or, and line & polygon offsetting
 - <http://www.angusj.com/delphi/clipper/documentation/Docs/Overview/Body.htm>
 - <https://sourceforge.net/projects/polyclipping>

Weiler-Atherton Algorithm

Martinez-Rueda polygon clipping algorithm

Libraries:

- <https://github.com/w8r/martinez>
- <https://github.com/karimbahgat/Clippy>

Offsetting curves

A really good primer about Bezier curves can be found at
<https://pomax.github.io/bezierinfo/#offsetting>

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