

Re: Point Inside Polygon – Ray Method

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In article <4447F62D.A6CF7A29@xxxxxxxx>, James Waldby <j-waldby@xxxxxxxx> wrote:

Larry Hammick wrote:

Keith A. Lewis wrote:

There is an alternative method called "winding". It counts the number of times the polygon goes around the point.

...

If the final winding count is 0, the point is outside. If it's 1, the polygon went counterclockwise around the point.

Note, winding numbers may exceed 1 if the polygon isn't simple.

Three rays are enough; any three distinct ones will do. Related, but fancier, is this suped-up version of Sperner's lemma: <http://planetmath.org/encyclopedia/SpernersLemma.html>

Perhaps strict convexity would be a sufficient condition for three rays to be enough; it seems to me it ought to be, but the link below says point inclusion can be tested in $O(\log n)$ time for convex polygons.

http://softsurfer.com/Archive/algorithm_0103/algorithm_0103.htm compares crossing-number and winding-number point-is-in-polygon algorithms, and says that at the moment winding number calculations can be done slightly faster (although of same asymptotic efficiency).

-jiw

Re: Point Inside Polygon – Ray Method

If the boundary of a plane region is a simple closed curve, then one ray from any point not on the boundary is enough to determine whether that point is inside or outside the region. The point is inside or outside according to whether the parity of the number of intersections of the ray with the boundary is odd or even (with points of multiple contact of the ray with the boundary counted with their multiplicities, though a slight displacement of the ray will usually eliminate all such multiple points).

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