## Subject: Re: A distracting puzzle
Posted by Craig Markwardt on Mon, 17 Sep 2001 22:19:55 GMT
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JD Smith <jdsmith@astro.cornell.edu> writes:

>
> Given a polygon defined by the vertex coordinate vectors x & y, we've
> seen that we can compute the indices of pixels roughly within that
> polygon using polyfillv().  You can run the code attached to set-up a
> framework for visualizing this.  It shows a 10x10 pixel grid with an
> overlain polygon by default, with pixels returned from polyfillv()
> shaded.
>
> You'll notice that polyfillv() considers only integer pixels, basically
> truncating any fractional part of the input polygon vertices (you can
> see this by plotting fix([x,x[0]]), etc.).  For polygons on a fractional
> grid, this error can be significant.
>
> The problem posed consists of the following:
>
> Expand on the idea of the polyfillv algorithm to calculate and return
> those pixels for which *any* part of the pixel is contained within the
> polygon, along with the fraction so enclosed.
>
> For instance, the default polygon shown (invoked simply as
> "poly_bounds"),  would have a fraction about .5 for pixel 34, 1 for
> pixels 33 & 43, and other values on the interval [0,1] for the others.
> Return only those pixels with non-zero fractions, and retain polygon
> vertices in fractional pixels (i.e. don't truncate like polyfillv()
> does).

Question: instead of making it a 10x10 image, could you make it a
100x100 image, or even a 1000x1000 image?  Then you could resample
back down using rebin, after converting to float of course, and get a
reasonably accurate estimate of the area enclosed.

This is essentially performing an integral over a complex 2-d region.
Another possibility is to do it by Monte Carlo.  For example, cast a
bunch of random 2-numbers onto the plane, and only accept those within
the polygon (at least David has an IN_POLY routine, right?), and
finally compute the fraction of accepted pairs.

If you want it exactly, then it sounds like you will be performing
polygon intersections, which are non-trivial.

These ideas help?

Cheers,
Craig

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Astrophysics, IDL, Finance, Derivatives | Remove "net" for better response
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