Subject: A distracting puzzle
Posted by John-David T. Smith on Mon, 17 Sep 2001 20:58:37 GMT
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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).

JD

```
pro poly_bounds,x,y,N=n
  if n_elements(n) eq 0 then n=10
  if n_elements(x) eq 0 then begin
     x=[1.2,3,5.3,3.2] & y=[1.3,6.4,4.3,2.2]
  endif
  window,XSIZE=500,YSIZE=500
  ;; Set up the plot region, etc.
  plot,[0],[0],XRANGE=[0.,n],YRANGE=[0.,n], XMINOR=-1,YMINOR=-1, $
        XTICKS=n,YTICKS=n,POSITION=[.05,.05,.95,.95],TICKLEN=0,/NODA TA
  p=polyfillv(x,y,n,n)
  for i=0,n_elements(p)-1 do begin
     xp=p[i] mod n
     yp=p[i]/n
      polyfill,[xp,xp,xp+1,xp+1],[yp,yp+1,yp+1,yp],COLOR=!D.N_COLO RS/2
  endfor
  oplot,[x,x[0]],[y,y[0]]
  for i=0,n-1 do begin
     plots,i,!Y.CRANGE
```

```
    plots,!X.CRANGE,i
    for j=0,n-1 do begin
      plots,i+.5,j+.5,PSYM=3
      xyouts,i+.1,j+.1,strtrim(i+j*n,2)
    endfor
  endfor
end
```

File Attachments

1) poly_bounds.pro, downloaded 154 times