
Subject: Re: point inside polygon
Posted by [davidf](#) on Mon, 06 Mar 2000 08:00:00 GMT
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Klaus Scipal (kscipal@ipf.tuwien.ac.at) writes:

> the algorithm works fine until the point is lying on the polygon. in such a
> case the algorithm returns sometimes in and sometimes out. what i am looking
> for is an algorithm which discerns if a point is lying on the polygon and
> give only one answer either in or out but not one time in and the next time
> out.

Humm. Well, here is another one by Julie Greenwood and used
with her permission. I haven't used this one myself, but it
might be worth a try. It uses a nice coding style, which
always suggests to me that it will probably work. :-)

Cheers,

David

```
function IsPointInPolygon, xPts, yPts, XTest, YTest
;+
; NAME:
; IsPointInPolygon
;
; PURPOSE:
; Determine whether point (XTest,YTest) is within the boundary of
; the polygon defined by vectors xPts & yPts.
; Function returns 1 if point is within polygon, else returns 0
; Use ArePointsInPolygon to test entire array at a time
;
; AUTHOR: Julie Greenwood (julieg@oceanweather.com)
;
; CATEGORY: Geometry
;
; CALLING SEQUENCE:
; bResult = IsPointInPolygon (xPts, yPts, XTest, YTest)
;
; INPUTS:
; xPts, yPts - vectors containing vertices of convex polygon in $
; counterclockwise order. See argument B to routine Triangulate.pro
; xTest, yTest - point to test for within-ness
;
; Optional Inputs: None
;
; OUTPUTS:
; Function returns -1 if point is within polygon, else returns 0
```

```

;
; OPTIONAL OUTPUTS: None
;
; KEYWORD Parameters: None
;
; COMMON BLOCKS: None
;
; SIDE EFFECTS: None
;
; RESTRICTIONS:
; Polygon must be closed (first point is same as last)
;
; PROCEDURE:
; See: http://www.swin.edu.au/astronomy/pbourke/geometry/insidepoly/
;
; Consider a polygon made up of N vertices (xi,yi) where I ranges from
; 0 to N-1. The last vertex (xN,yN) is assumed to be the same as the
; first vertex (x0,y0), that is, the polygon is closed. To determine
; the status of a point (xp,yp) consider a horizontal ray emanating
; from (xp,yp) and to the right. If the number of times this ray
; intersects the line segments making up the polygon is even then the
; point is outside the polygon. Whereas if the number of intersections
; is odd then the point (xp,yp) lies inside the polygon.
;
; MODIFICATION HISTORY:
; jgg - 2-Dec-1999 - Created
;-

```

```

npts = n_elements(xPts)
if (npts ne n_elements(yPts)) then begin
    print,' Error in IsPointInPolygon: vertex arrays must have same size.'
    return,PointIn
endif
if (npts lt 2) then begin
    print,' Error in IsPointInPolygon: polygon has less than 2 points.'
    return,PointIn
endif

PointIn = 0
for ia = 0,nPts-1 do begin
    ib = (ia+1) mod nPts

    sLine = xPts[ia] + $
            (yTest-yPts[ia]) * (xPts[ib]-xPts[ia]) / (yPts[ib]-yPts[ia])

    bInRange = $
            (( (yPts[ia] le yTest) and (yTest lt yPts[ib]) ) or $
            ( (yPts[ib] le yTest) and (yTest lt yPts[ia]) ))

```

```

if ( bInRange and (xTest lt sLine) ) then begin

    PointIsIn = not PointIsIn

endif
endfor

return, PointIsIn

end

function ArePointsInPolygon, xPts, yPts, XTest, YTest
;+
; NAME:
;   ArePointsInPolygon
;
; PURPOSE:
;   Determine whether points (XTest,YTest) are within the boundary of
;   the polygon defined by vectors xPts & yPts.
;   Function returns array of same size and shape as XTest, containing
;   1 if point is within polygon, else 0
;   Use IsPointInPolygon to test one point at a time
;
; AUTHOR: Julie Greenwood (julieg@oceanweather.com)
;
; CATEGORY: Geometry
;
; CALLING SEQUENCE:
;   bResult = ArePointsInPolygon (xPts, yPts, XTest, YTest)
;
; INPUTS:
;   xPts, yPts - vectors containing vertices of convex polygon in $
;   counterclockwise order. See argument B to routine Triangulate.pro
;   xTest, yTest - arrays of points to test for within-ness
;
; Optional Inputs: None
;
; OUTPUTS:
;   Function returns array of same size and shape as XTest, containing
;   -1 if point is within polygon, else 0
;
; OPTIONAL OUTPUTS: None
;
; KEYWORD Parameters: None
;
; COMMON BLOCKS: None
;

```

```

; SIDE EFFECTS:  None
;
; RESTRICTIONS:
; Polygon must be closed (first point is same as last)
;
; PROCEDURE:
; See: http://www.swin.edu.au/astronomy/pbourke/geometry/insidepoly/
;
; Consider a polygon made up of N vertices (xi,yi) where i ranges from
; 0 to N-1. The last vertex (xN,yN) is assumed to be the same as the
; first vertex (x0,y0), that is, the polygon is closed. To determine
; the status of a point (xp,yp) consider a horizontal ray emanating
; from (xp,yp) and to the right. If the number of times this ray
; intersects the line segments making up the polygon is even then the
; point is outside the polygon. Whereas if the number of intersections
; is odd then the point (xp,yp) lies inside the polygon.
;
; MODIFICATION HISTORY:
; jgg - 3-Dec-1999 - Created
;-

```

```

nsizeX = size(xTest)
nsizeY = size(yTest)
if (total(nsizeX ne nsizeY)) then begin
    help, xTest, yTest
    print, 'Error in ArePointsInPolygon: grid arrays must have same size.'
    return, PointsIn
endif
if (nsizeX[0] ne 2) then begin
    help, xTest, yTest
    print, 'Error in ArePointsInPolygon: grid arrays must have 2 dimensions'
    return, PointsIn
endif

```

```

npts = n_elements(xPts)
if (npts ne n_elements(yPts)) then begin
    help, xPts, yPts
    print, 'Error in ArePointsInPolygon: vertex arrays must have same size.'
    return, PointsIn
endif
if (npts lt 2) then begin
    help, xPts, yPts
    print, 'Error in ArePointsInPolygon: polygon has less than 2 points.'
    return, PointsIn
endif

```

```

PointsIn = LonArr(nsizeX[1],nsizeX[2])
for ia = 0,nPts-1 do begin

```

```

ib = (ia+1) mod nPts

sLine = xPts[ia] + $
        (yTest-yPts[ia]) * (xPts[ib]-xPts[ia]) / (yPts[ib]-yPts[ia])

blnRange = $
        (( (yPts[ia] le yTest) and (yTest lt yPts[ib]) ) or $
         ( (yPts[ib] le yTest) and (yTest lt yPts[ia]) ))

GotIt = where ( blnRange and (xTest lt sLine) , count)
if (count ne 0) then PointsIn[GotIt] = not PointsIn[GotIt]

endfor

return, PointsIn

end

```

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