Subject: Re: Recursive Function Program in IDL
Posted by b_gom on Wed, 14 Dec 2005 19:43:35 GMT
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David Fanning wrote:
> Does anyone have a handy recursive function that does something neat?
> Someone is asking, and I don't have time to work on this.

Here is a recursive algorithm for simplifying polyline vertices. See
'poly_simplify.pro' in the IDL user contributed library.
http://www.rsinc.com/codebank/search.asp?FID=307

Brad

```
;************************************
pro simplifyDP,tol,vertices,j,k,mk
; This is the Douglas-Peucker recursive simplification routine
; It just marks vertices that are part of the simplified polyline
; for approximating the polyline subchain vertices[j] to vertices[k].
; Input: tol = approximation tolerance
; vertices[] = polyline array of vertex points
; j,k = indices for the subchain vertices[j] to vertices[k]
; Output: mk[] = array of markers matching vertex array vertices[]

 if (k le j+1) then return ; there is nothing to simplify

 ; check for adequate approximation by segment S from vertices[j] to
vertices[k]
 maxi = j ; index of vertex farthest from S
 maxd2 = 0. ; distance squared of farthest vertex
 S = [[vertices[*,j]], [vertices[*,k]]]  ; segment from vertices[j] to
vertices[k]
 u = S[*,1]-S[*,0] ; segment direction vector
 cu = ps_dot(u,u); segment length squared

 ;test each vertex vertices[i] for max distance from S
 ;compute using the Feb 2001 Algorithm's dist_Point_to_Segment()
 ;Note: this works in any dimension (2D, 3D, ...)

 ;Pb = base of perpendicular from vertices[i] to S
 ;dv2 = distance vertices[i] to S squared

 for i=j+1,k-1 do begin
  ;compute distance squared
  w = vertices[*,i] - S[*,0]
  cw = ps_dot(w,u)
  if cw le 0 then begin
   dv2 = ps_d2(vertices[*,i], S[*,0]);
```

```
   endif else begin
   if cu le cw then begin
    dv2 = ps_d2(vertices[*,i], S[*,1])
    endif else begin
    b = cw / cu;
    Pb = S[*,0] + b * u;
    dv2 = ps_d2(vertices[*,i], Pb);
    endelse
   endelse
  ;test with current max distance squared
  if dv2 le maxd2 then continue
  ;vertices[i] is a new max vertex
  maxi = i
  maxd2 = dv2
  endfor

 if (maxd2 gt tol^2) then begin ;// error is worse than the tolerance
;  split the polyline at the farthest vertex from S
  mk[maxi] = 1 ; mark vertices[maxi] for the simplified polyline
;  recursively simplify the two subpolylines at vertices[*,maxi]
  simplifyDP, tol, vertices, j, maxi, mk ; // polyline vertices[j] to
vertices[maxi]
  simplifyDP, tol, vertices, maxi, k, mk ; // polyline vertices[maxi]
to vertices[k]
  endif
;  else the approximation is OK, so ignore intermediate vertices
 return
end
```