
Subject: Re: New tool: sort points by countries with a shapefile and IDL

Posted by [MarioIncandenza](#) on Thu, 17 Jun 2010 20:02:44 GMT

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Also, here are parallel routines that use the 1:10m datasets. Note that for the million-point case, this takes about 24 hours to process, but if you have a high-resolution application involving only a few countries, it could be reasonable.

```
function
  ingest_natureearth_admin0_10m_scaleranks_shapefile,shapefile_path
;#####
; Extract the country polygon dataset
;#####
;NAME: ingest_natureearth_admin0_10m_scaleranks_shapefile()
;NOTES: The Natural Earth project is a volunteer-driven, public-domain
;project to produce usable GIS layers for basic cultural and physical
;parameters. The data used by this routine is the ADMIN0 political
;map, in the 'scale rank' configuration where each polygon has clean
;topology (==no intersections), and so can be used as an ROI.
;To download the shapefile, and find more information, go to
; http://www.natureearthdata.com/
; http://www.natureearthdata.com/downloads/10m-cultural-vectors/10m-admin-0-details/
;PURPOSE: extract country 'scale rank' polygons
;OPTIONAL KEYWORD: SHAPEFILE_PATH = location of shapefile on disk.
;RETURN VALUE: Structure with attributes and polygon vertices
;USAGE:
  POLY_STRUCT=INGEST_NATUREEARTH_ADMIN0_10M_SCALERANKS_SHAPEFILE([SHAPEFILE_PATH])
country_shapes=create_struct(name='COUNTRY_POLY', $
    "objectid",0I, $
    "scalerank",0I, $
    "featureclass","", $
    "sov","", $
    "admin_0","", $
    "mapunit","", $
    "subunit","", $
    "Shape_Leng",0.0d, $
    "Shape_Area",0.0d, $
    "polyx",ptr_new(), $
    "polyy",ptr_new())
if n_elements(shapefile_path) eq 0 then $
country_shapefile='10m-admin-0-scale-ranks.shp' $
else country_shapefile=shapefile_path
if(file_test(country_shapefile,/read) eq 0) then
  message,string(country_shapefile,format=('"Can't read ",a'))
myshape=OBJ_NEW('IDLFFShape',country_shapefile)
if(size(myshape,/type) ne 11) then message,"Couldn't create
```

```

IDLffShape object!"
myshape->IDLffShape::GetProperty, N_ENTITIES=n_ent
myshape->IDLffShape::GetProperty, ATTRIBUTE_NAMES=attr_names ; not
strictly necessary, included for reference
nattr=n_elements(attr_names)
out=replicate(country_shapes,n_ent)
for i_ent = 0l,n_ent-1 do begin
;out=replicate(country_shapes,3)
;for i_ent = 0l,2 do begin
    attr=myshape->IDLffShape::GetAttributes(i_ent)
    for i_attr=0l,nattr-1 do out[i_ent].(i_attr) = attr.(i_attr)
    ent=myshape->IDLffShape::GetEntity(i_ent)
    if(ent.shape_type ne 5) then begin
        print,"non-polygon! Boom!"
        print,attr.attribute_3
        continue
    endif
    out[i_ent].polyx=ptr_new(reform((*ent.vertices)[0,*]))
    out[i_ent].polyy=ptr_new(reform((*ent.vertices)[1,*]))
    undefine,ent
endfor
obj_destroy,myshape
return,out
end

function
    sort_countries_10m,xdata,ydata,shapefile_path=shapefile_path
, country_list=country_list,poly_struct=poly_struct,target=target
compile_opt idl2
on_error,0
;#####
; Do some operations with the country polygon dataset
;#####
;NAME: sort_countries()
;PURPOSE: extract country 'scale rank' polygons and evaluate them
;against XY input.
; USAGES:
; 1) No XY DATA: returns structure giving information on geographic
; units: COUNTRY_LIST =
SORT_COUNTRIES([SHAPEFILE_PATH=SHAPEFILE_PATH])
; 2) XY DATA, no TARGET: Returns structure giving geographic fields
; for each XY point (SLOW and INTENSIVE)
; XY_GEO_STRUCT=SORT_COUNTRIES(XDATA,YDATA,
[SHAPEFILE_PATH=SHAPEFILE_PATH])
; 3) XYDATA + TARGET: finds polygons with TARGET[0] = TARGET[1],
; returns 0|1|2|3 = outside/inside/edge/vertex (see documentation
; for IDLanROI for details):
; InCountryB = SORT_COUNTRIES(XDATA,YDATA,TARGET=[FIELD,VALUE])

```

```
;ARGUMENTS:
; XDATA,YDATA: Longitude/Latitude points for comparison against
; shapefile
;OPTIONAL KEYWORDS:
; SHAPEFILE_PATH: Location of the country polygon shapefile on disk.
; COUNTRY_LIST: structure of geographic fields (see Usage 1)
; POLY_STRUCT: complete structure of shapefile data.
; TARGET = ['Field','Value']. $FIELD is the attribute in the
; shapefile that will be queried for $VALUE.
; E.g. TARGET=['SOV','Vietnam']
;RETURN VALUE:
; Variable. See USAGES.
;FILESYSTEM INPUT: Reads shapefile from $SHAPEFILE_PATH or default
;FILESYSTEM OUTPUT: NONE
```

```
;1) read in shapefile data
poly_struct=ingest_natureearth_admin0_10m_scaleranks_shapefile(shapefile_path)
;2) create COUNTRY_LIST structure
i_uniq=uniq(poly_struct.subunit,sort(poly_struct.subunit))
nuniq=n_elements(i_uniq)
country_list1=create_struct(name='COUNTRY_LIST', $
    "objectid",0l,$
    "scalerank",0l,$
    "featureclass","", $
    "sov","", $
    "admin_0","", $
    "mapunit","", $
    "subunit","")
country_list=replicate(country_list1,nuniq)
for i_poly=0l,nuniq-1 do for i_attr=0,6 do country_list[i_poly].
(i_attr)=poly_struct[i_uniq[i_poly]].(i_attr) ; paste attributes
if n_elements(xdata) eq 0 then begin
    if(~arg_present(poly_struct)) then undefine,poly_struct
    if(arg_present(poly_struct)) then print,"giving back POLY_STRUCT"
    return,country_list
endif
if(n_elements(xdata) ne n_elements(ydata)) then message,"XDATA and
YDATA don't match!"
;3) Check for TARGET
if n_elements(target) ne 0 then begin
    if n_elements(target) ne 2 then message,"Usage: TARGET =
[FIELD,VALUE]"
    target_tag=target[0] & target_name=target[1]
    all_tags=tag_names(poly_struct)
    f_target_tag = where(strmatch(all_tags,target_tag,/
fold_case),nf_target_tag)
    if(nf_target_tag eq 0) then
message,string(target_tag,all_tags,format='("No ",a," in ",150(a))')
```

```

    if(nf_target_tag gt 1) then message,"WTF multiple tag matches!"
; OK, we have TARGET_TAG, now check for TARGET_NAME
    f_target = where(strmatch(poly_struct.(f_target_tag),target_name,/
fold_case),nf_target)
    if(nf_target eq 0) then
message,string(target_name,target_tag,format='("No ",a," in ",a)')
; OK, we have F_TARGET. Now query the polygons
    intarget=xdata * 0b
    for i_poly=0l,nf_target-1 do begin

roi=obj_new('IDLAnROI',*(poly_struct[f_target[i_poly]].polyx ),*(poly_struct[f_target[i_poly]].polyy))
    result=roi->IDLAnROI::ContainsPoints(xdata,ydata)
    obj_destroy,roi
    intarget = intarget > result ; take highest value
    endfor
    if(~arg_present(poly_struct)) then undefine,poly_struct
    return,intarget
endif

```

;4) No TARGET specified. Do the complete scan. This can be VERY time-consuming.

```

npoly=n_elements(poly_struct)
ndata=n_elements(xdata)
country_match1=create_struct(name='COUNTRY_MATCH', $
    "objectid",0l, $
    "scalerank",0l, $
    "featureclass","", $
    "sov","", $
    "admin_0","", $
    "mapunit","", $
    "subunit","", $
    "n_poly",0l) ; extra tag for multiple

```

matches

;NOTE: the fields will be the LAST MATCH. The N_POLY field is
;diagnostic of multiple matches.

```
country_match_all=replicate(country_match1,ndata) ; BIG
```

```
for i_poly=0l,npoly-1 do begin
```

```
;Method1: IDLAnROI (loop)
```

```
    print,poly_struct[i_poly].subunit ; testing
```

```

roi=obj_new('IDLAnROI',*(poly_struct[i_poly].polyx),*(poly_struct[i_poly].polyy))
result=roi->IDLAnROI::ContainsPoints(xdata,ydata)

```

```
obj_destroy,roi
```

```
country_match_all.n_poly = country_match_all.n_poly + (result eq
```

```
1)
```

```

    f_inside=where(result eq 1,nf_inside) ; INSIDE only: no edge/
vertex pts.

```

```
    if(nf_inside gt 0) then $
```

```
    for i_attr=0,6 do country_match_all[f_inside].  
(i_attr)=poly_struct[i_poly].(i_attr) ; paste attributes  
endfor  
if(~arg_present(poly_struct)) then undefine,poly_struct  
return,country_match_all  
end
```
