Subject: Re: speher keyword of qhull Posted by Haje Korth on Fri, 10 Nov 2006 17:55:18 GMT View Forum Message <> Reply to Message

Andy,

yes I hope one of these days, ITTVIS provide a detailed tutorial on qhull/griddata, describing the right combination of keywords to get a particular job done. This should benefit anyone involved in Earth and/or space sciences, which is a pretty broad audience.

I got bit for the colinear-points problem with triangulate a few years ago because I wanted to interpolate data on a sphere which came on a regular grid. On regular grids the probability that three point lie along a great circle is pretty large, thus resulting in the colinear-point error message in triangulate.

Haje

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Andy Heaps wrote:
> Hello Sebinjapan,
          an interesting question for me as I was puzzling over the
> same point last week. I don't have any real answers but the following
 should maybe provide some illumination on the subject:
>
> I have a strange grid of points in longitude and latitude on a globe:
> LATS
              FLOAT
                        = Array[722, 511]
> LONGS
                FLOAT
                          = Array[722, 511]
> TEMPERATURE
                      FLOAT
                                = Array[722,511]
> The longitudes (LONGS) go from -179.997 to 179.999 and the latitudes
> (LATS) go from -77.0105 to 89.8854. TEMPERATURE is the ocean surface
> temperature on this grid.
>
> The location of the longitudes and latitudes are very irregular so
> triangulation data is needed to pass to the CONTOUR command. The
> TRIANGULATE procedure works and CONTOUR produces a pretty decent plot.
  There is a wrapping problem, however, at the dateline seen as a
> line from the north to south poles. Adding the /SPHERE to the
> TRANGULATE call produces:
> % TRIANGULATE: Points are co-linear, no solution.
>
> No hope here then so I then used QHULL on the suggestion of a colleague:
> If I use QHULL, longs, lats, tri, /DELAUNAY, SPHERE =1
> I get:
> % QHULL: Expression must be named variable in this context: <INT
> (
       1)>.
```

> Okay, let's used a named variable:

```
> QHULL, longs, lats, tri, SPHERE = s
> HELP, s, tri
> S
            DOUBLE = Array[3, 368943]
> TRI
                       = Array[3, 733642]
             LONG
>
> Using the triangulation data TRI with CONTOUR produces a perfect plot
 with no dateline missing data.
>
> So we're back to your original question - what is returned by
> SPHERE=s? THE IDL reference guide for version 6.0 QHULL says:
> DELAUNAY Performs a Delaunay triangulation and returns the vertex
> indicies of the resulting polyhedra; otherwise, the convex hull of the
> data are returned.
> SPHERE Computes the Delaunay triangulation of the points which lie on
> the surface of a sphere. The V0 argument contains the longitude, in
> degrees, and V1 contains the latitude, in degrees, of each point.
>
> It looks like the IDL documentation could be better just here. Does
> SPHERE=s imply a Delaunay triangulation and that s is the convex hull
> of the data? Printing off some values of s I get:
> PRINT, s(*, 0:3)
> PRINT, 'min, max of s are', MIN(s), MAX(s)
     0.066654513
                      0.21466261
                                   -0.97441118
>
     0.064778714
                      0.21523610
                                    -0.97441118
>
>
     0.062897982 0.21579320
                                   -0.97441118
     0.061012460
                      0.21633386
                                   -0.97441118
>
  min, max of s are -0.99999048
                                     0.99999800
>
>
>
  Is this the sort of thing you're trying to work out as well?
>
>
       Cheers
>
       Andy
>
>
>
>
>
    David Fanning wrote:
>> sebinjapan writes:
>>
>>> Does anyone knows was is returned in the sphere variable when using:
>>> ghull, v0, v1, tr. /delaunay, sphere = s
>>
>> As I read the documentation, it seems to me SPHERE is
>> an input variable, with a value of 0 or 1.:-)
>>
>> Cheers,
```

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