Subject: Re: 3d polygon mesh for 3 indpendent variables, x,y,z Posted by Dick Jackson on Mon, 23 Mar 2015 20:04:25 GMT

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On Thursday, 19 March 2015 03:23:54 UTC-7, guni wrote:

- > Hi,
- > I am a new in IDL. And I need some help.
- > I have 3 independent variables. I plotted 3d polygon in MATLAB using 'convhull' and then 'trimesh' precedures. But I have to do in IDL. I already plotted a 3d scatter plot using 'plot3d' and then I go for 'qhull' for the delaunay triangulation. However, I am not able to plot the (bound) polygon mesh in my 3d plot. Or, is this triangulation not the way I should look for?
- > If anyone can help how to plot such a 3d-polygon, that will be a nice pleasure.

Hi Guni,

This sounded familiar to me, and I see I wrote something like this a few years ago, before Function Graphics (search the archive for QHullTetra).

I'm not certain exactly what you are looking for as a final result. Here is how you can add the convex hull and the Delaunay triangulation (actually "tetrahedralization" in 3-D), which is a little trickier:

## PRO QHullTetra2

```
;3 indpendent variables
nPts = 10
x=randomu(seed,nPts)
y=randomu(seed,nPts)
z=randomu(seed,nPts)
xyz = [Transpose(x), Transpose(y), Transpose(z)]
;3d scatter plot
pch = PLOT3D(x, y, z, 'o', /SYM_FILLED, AXIS_STYLE=2, /PERSPECTIVE, $
       Aspect_Ratio=1, Aspect_Z=1, WINDOW_TITLE='Convex Hull')
: Convex Hull:
ahull,x,v,z,triVerts
convexHull = Polygon(x, y, z, /Data, $
 Connectivity=[Replicate(3, [1, N_Elements(triVerts)/3]), triVerts], $
 Target=pch, Transparency=80)
;3d scatter plot
pdt = PLOT3D(x, y, z, 'o', /SYM_FILLED, AXIS_STYLE=2, /PERSPECTIVE, $
 Aspect_Ratio=1, Aspect_Z=1, WINDOW_TITLE='Delaunay Tetrahedralization')
; Delaunay tetrahedralization:
ghull,xyz,tetraVerts,/delaunay
nTetra = N Elements(tetraVerts)/4
```

```
; Make four triangles from each tetrahedron tetraConn = tetraVerts[[0, 1, 2, 0, 2, 3, 0, 3, 1, 1, 3, 2], *] tetraConn = [Replicate(3, [1, nTetra*4]), Reform(tetraConn, [3, nTetra*4])] delaunayTri = Polygon(x, y, z, /Data, $ Fill_Background=0, Linestyle=0, $ Connectivity=tetraConn, Target=pdt)
```

## **END**

The Voronoi diagram is much trickier (see QHULL docs for VVERTICES in particular), and I don't have a final answer for that. You would start with this call to get all the data: qhull,x,y,z,triangle,/delaunay,VDIAGRAM=vdiagram,\$
VVERTICES=vvertices,connectivity=connectivity

Then much work remains!

Hope this is helpful.