

## **IMP ThreeDPCA6**

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### **Introduction**

ThreeDPCA6 is a tool for carrying out Principal Component Analysis of three dimensional geometric morphometric data. If you are not familiar with the IMP software series, please download the CoordGen and PCAGen programs for 2D data and become familiar with those prior to attempting to work with 3D data. You will also need a copy of Simple3D to convert input files from the TPS data type into the IMP x1y1z1x2y2...CS file format.

This is very much a Beta version of this program, I have not published using it to date. Please contact me if you are using it.

ThreeDPCA was built using most of PCAGEN6, so the interface is basically the same as the 2D program.

The program loads the data, computes a GLS Procrustes reference form, then calculates Partial Warp scores and then carries out a PCA on the Partial Warp scores. The PC scores may then be plotted and the deformation (relative to the reference) implied by each PC axes may be displayed.

### **Instructions for Use**

1.) Load a data file in x1y1z1 format-three example files are included

combosq->the twenty shapes used in the example files squares10.txt and  
trapz10.txt used with simple3d.  
marm3d2a.txt-> Don's four marmots  
junkmarm-> 20 noisy variations on Don's first marmot.

Note that the program simple3D can convert from TPS format into the x1y1z1...CS format.

2.) Next load a wire list-you really need this-use  
sqwire- for combosq.txt, the squares or  
skullwires-for any of Don's marmot files

See the manual for simple3D on how to construct wire frames.

3.) Now load a group list if you have one

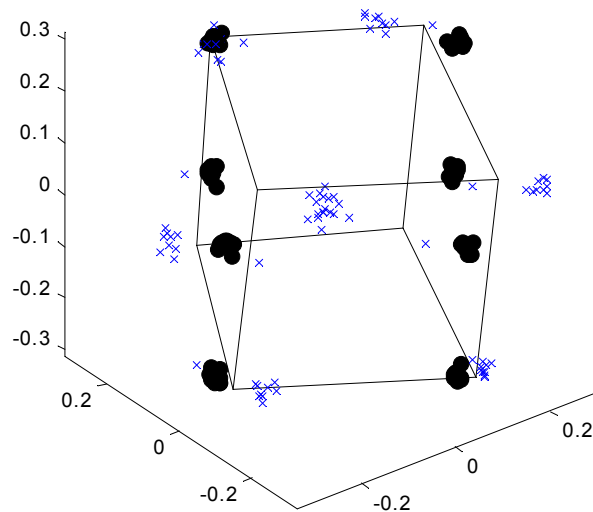
lamelist.txt-> is a group list for combosq.

There is currently no group list for the marmots.

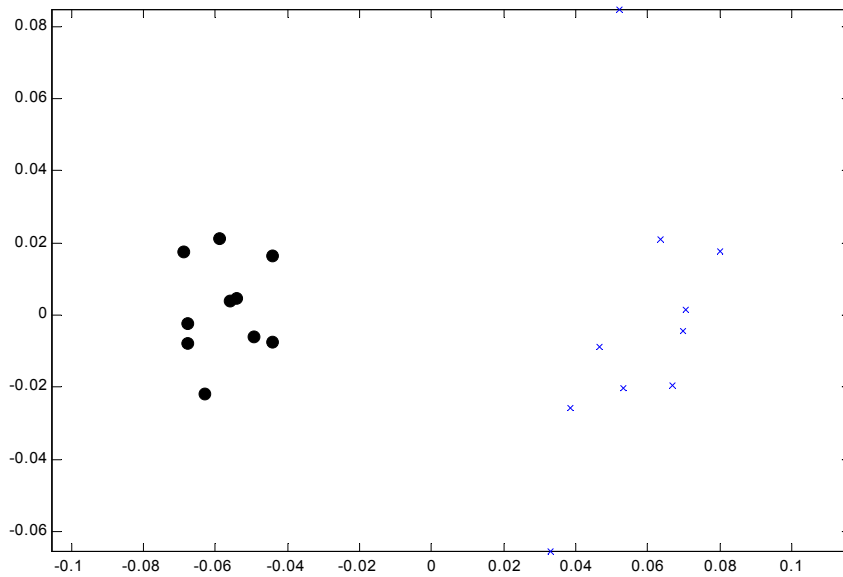
If you don't have a group list chose No Group List.

See the PCA Gen manual on how to create group lists.

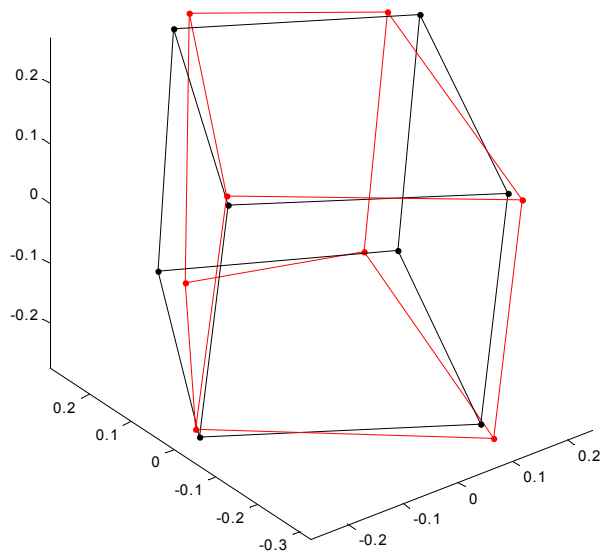
After you enter these three options, the program will open a 3D figure window and plot your data, showing a wire diagram of the mean form.



The distribution of points in the file combosq.txt. The trapezoids (group 2) are blue.



The PCA scores on axis 1 (horizontal) and axis 2 (vertical) for the squares (black) and trapezoids(blue).



The shape change implied by the first PC axes (shown in red) relative to the reference form (black) as one moves in along the positive PC 1 axes (this motion makes the shape more trapezoidal).

## **Miscellaneous Notes**

Note that the program needs to work with the reference form in PCA alignment to calculate the uniform component scores, so the orientation will be odd. You can use the option on the 3D axis controls to label the landmarks on the 3D diagram which will make life a bit easier. We will have to deal more later with axis rotation control. Uggh.

The PCA Axis plot works just like PCAGen6, it is in 2D on the main control window.

You can view any principle component axis or the deformation implied by markers placed on the PCA axis graph.

I will write up a more detailed manual later, but I am knackered now, so give it a try and see if you can get it to work. Try punching different buttons and see what happens. One thing, though, closing the 3D window manually before exiting the main window (the one with buttons on it) will produce an odd crash, so use the clear 3D window button rather than closing the window.

The mathematics is all there, all the work needed is on displays and program control. If you need it, let's talk

-Dave