

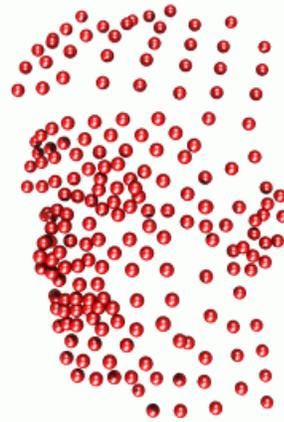
GUI. The graphical user interface to enter the pair of data has been improved a bit over the weekend, so that it can store and retrieve datas from a file. Furthermore, the points are displayed.

Needs still much improvement. The program was written in plain C directly with the Xwindows libraries. It would be more efficient to program this with a modern library like GTK or Qt.

Below you see attempts to scan the faces of Greg and Ruth. From Oscar Zariski, we have many pictures but did not manage yet to convert them into a 3D picture.



2D-3D. The transformation which produces from the pair of points the 3D points seems to be ok. However, it also needs more precision. In order to improve this, we have to measure the distance from the camera to the object precisely and also know the angles exactly. We did not measure that when we took the pictures of Greg and Ruth.



TRIANGULARISATION. This is a weak point. The Delaunay triangularisation which Mathematica uses is quite sensitive: if wrong points are paired, the surface becomes a mess. We have seen that when we did the first experiment during class.

A possible solution is to give already the correspondence between the points while pairing the data. We put a mesh over the first picture and try to find the deformed mesh on the second picture.

PREPARING THE PICTURE. Use your favorite conversion program to get two pictures file1.ppm file2.ppm. You can cat the files together to one picture with pnmcat:

```
pnmcat -leftright file1.ppm file2.ppm > image.ppm
```

THE PROGRAM 3dscan.c runs in X which is standard under Unix flavors like Linux or Solaris. Compile it with the Gnu compiler gcc as follows:

```
gcc -O -o 3dscan -L/usr/X11R6/lib 3dscan.c -lX11
```

Run the program 3dscan with the command

```
3dscan image.ppm image.dat
```

where image.dat are already stored datapoints. Initially, start with an empty data file. (You get one with "touch image.dat").

THE PROGRAM 3dstereo.m is a Mathematica procedure which produces from the 2D datapairs new 3D data.

THE PROGRAM blob.m is a Mathematica procedure which produces from the 3D data points a povray include file surface.inc.

THE PROGRAM triangularisation.m is a Mathematica procedure which produces from the 3D data a set of triangles in a form, Povray can read.

The program surface.pov is a Povray program which uses a file surface.inc produced above.

CONCLUSION. A lot of work is needed to make 3D scanning possible with a digital camera and software alone.

The challenge remains to produce an accurate 3D scan of a human face using a digital camera alone, possibly with more pictures. Any ideas? The programs will be available at <http://www.math.harvard.edu/knill/math21a2001>.