

Assignment 2

ICS 186A

What to do?

A. The idea is to build a graphical model, given data in some specified format.

The data structure should be an abstraction for representing 3D models of objects, and should contain the following information:

1. Model Information:
 - Number of vertices and number of faces.
2. Vertex Information:
 - Coordinates
 - Number of Faces incident on the vertex
 - Array of Indices of the incident faces *in order*
 - Normal of the vertex (normalized)
3. Face Information:
 - List of vertex indices *in order*
 - Normal of the face (normalized)

Note : some of the above information is given to you. Rest has to be computed by you.

B. Report if the given model is

1. a manifold with boundaries,
2. a manifold without boundaries OR
3. not a manifold

C. Find the Euler characteristic and the genus of the model if it is a manifold.

D. (Extra points) Report if the model is orientable or not.

What is given?

1. Code to read “.PLY” files is given to you. You MAY use this code. Some parts of the code that you have to write, are indicated with the comment line “// Your code here”
 - a. facelist.h – the header containing the structure definition
 - b. model.c – implementation file where code is to be added
 - c. Makefile and Makedepend
 - d. mk/ - subfolder containing supplemental code for the makefile depending on the platform. Right now hard-coded to work on SunOS
2. voila – Compare your output with this sample binary.
prompt% ./voila box.ply
3. *.ply – sample files to test your code with.

Where?

Copy the above files from /home/graphics/teaching/ics186a/gopi-W03/assignment2.

What is the expected output?

Call your binary(executable) model. I should be able to execute

```
prompt% model datafile.ply
```

to display the model given in *datafile.ply*. Further, it should print all the relevant information like the Euler characteristics, genus, and the classification of the model (manifold, etc.).

Hints/suggestions...

1. Use the given code to figure out what the format of the file could be.
2. A triangular face could be represented by 3 indices into the vertex list. Does the order matter?
3. The normal at a vertex could be derived from normals of all the faces that are incident on it.
4. After normalize(3D vector (a,b,c)) : $(a^2) + (b^2) + (c^2) = 1$
5. REMEMBER: the format of the “.ply” files will be fixed. You cannot change it to suit your program.

Remember

- Provide a README – even if you don’t change the makefile.
- If you wish to resubmit, DO NOT mail kartic or gopi the tar. Send kartic@ics a mail saying you wish to resubmit, and Kartic will clean it up so that you can turn it in again.
- A, B and C count towards your score. Solving D will earn you bonus points.