“Sviluppo di Modelli Computazionali 3D”

(3D Models Generation)

Laboratory 01 – 05/03/2019

Warm-up:

1. Download the source code for this laboratory session at:
   http://www.banterle.com/francesco/courses/2019/be_3drec/lab/lab1.zip
2. Extract the zip file in the folder MATLAB in Documents;
3. Add folders and sub-folders in the MATLAB path;
4. Read the **gargoyle.ply**, **iso.stl**,and **triangle.stl** 3D mesh in the folder **data** (code_lab_1) using functions **ReadSTL** and **ReadPLY** (code_lab_1) in the folder **io**. Check these functions help:
   1. help ReadSTL
   2. help ReadPLY
5. Render the read meshes using the function **RenderMesh** (code_lab_1) in the folder **render** as triangles and points. Check this function help:
   1. help RenderMesh

Exercise 1:

1. Create a tetrahedron with the following coordinates: (0,0,0); (0,01); (1,0,0); (0,1,0);
   1. Define the list of unique vertices;
   2. Render the vertices using **RenderMesh**;
   3. Define the triangles of the mesh; i.e., define the list of indices to vertices list;
   4. Render the tetrahedron’s triangles using **RenderMesh**;
2. Create a cube with min point in (0,0,0) and max point in (1,1,1);
   1. Define the list of unique vertices;
   2. Render the vertices using **RenderMesh**;
   3. Define the triangles of the mesh; i.e., define the list of indices to vertices list;
   4. Render the cube’s triangles using **RenderMesh**;

Exercise 2:

1. Write a MATLAB function for computing per-vertex normals. This requires to use the function **ComputeFaceNormals** (code_lab_1) in the folder **MATLAB/processing**.
2. Write a MATLAB function for visualizing per-vertex normals. This requires to use the built-in MATLAB function **plot3**.

Exercise 3:

1. Write a MATLAB function for writing a 3D mesh, vertex positions only, as a PLY file:
   1. *function bFlag = WritePLY(xyz, name_file)*
2. Test the function using **ReadPLY** and **RenderMesh**.