Computer Graphics (EWI3610TU)
TU Delft, EEMCS, Department of Intelligent Systems 2017-2018 Q. 1
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Practical Assignment 1

Task 1 (Colors, Normal Vectors, Barycenters).
This task is concerned with basic drawing routines in OpenGL and the computation of normal vectors and barycenters of triangles. Implement a tool that offers the following functionality:

- Find the barycenter of all triangles of a mesh and draw colored dots at these positions. Come up with a creative choice for the colors.
- Compute the normal vector of each triangle and replace the dot from before by a short line that represents this normal vector. Find a way to define the length of the displayed normals such that they are visually attractive.
- Compute vertex normal vectors of each vertex and draw a represention the normal vectors. As for the triangle normals, find a way to define the length of the displayed normals such that they are visually attractive.
- Color the triangles according to the order in which they are stored.

Task 2 (Mesh Traversal).
Extend the tool from Task 1:

- Write a function that can create a neighborhood structure for the current mesh. Specifically, the structure (vector, table, class, ...) should be able to quickly return the indices of all vertices that are connected to a specified vertex via edges. Write it in a way, that the structure has to be generated once and can then be reused for the task below.

- Write a function that counts the number of connected components of the currently loaded mesh. Implement a way to visualize the output.

Task 3 (Report).
Write a short report that

- describes the algorithms you use and discusses their runtime and efficiency
- describes your tests for correctness of the algorithms and implementation
- provides a manual on how to use the tool's user interface and shows some visualizations (e.g. screen shots) of results

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Software Framework: Both tasks will require you to be able to compile, execute and modify the C++ code that is being provided via brightspace (*CGCourse_Win.zip* or *CGCourse_Linux.tar.gz*).
Your code should go into *myFunctions.cpp*, where you can implement five functions that are called when the user presses the keys 1-5.
There is a default mesh being loaded, to load the other meshes included in the packages, simply put their names as an argument when running the executables.
More information can be found in the *README(.txt)* and in the codes comments.