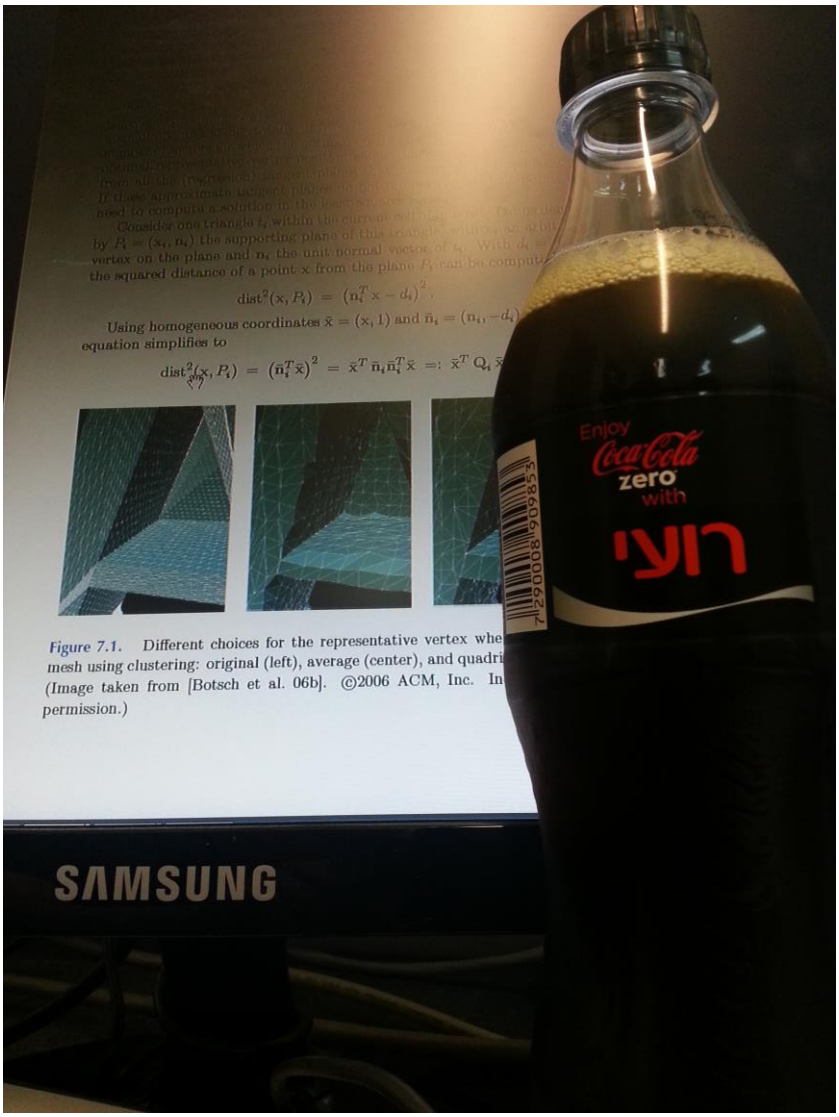


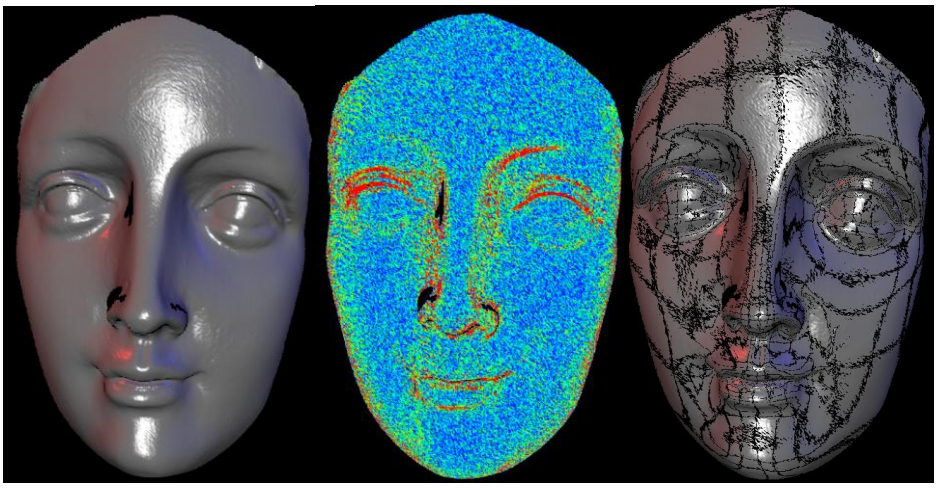
Digital Geometric Processing

Assignment 3 – Smoothing

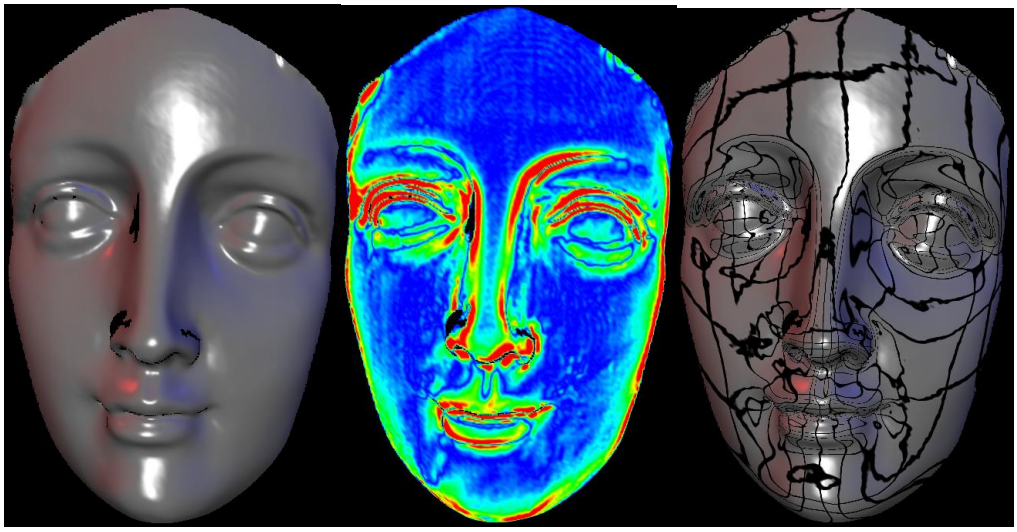
Ben Elazar Doron, ID- 066497256

Uniform Laplace curvature and smoothing

1. Before:

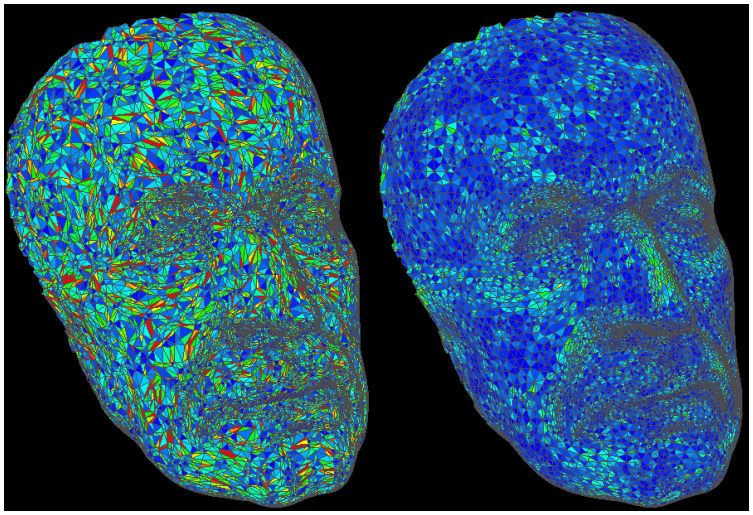


2. After Iterations



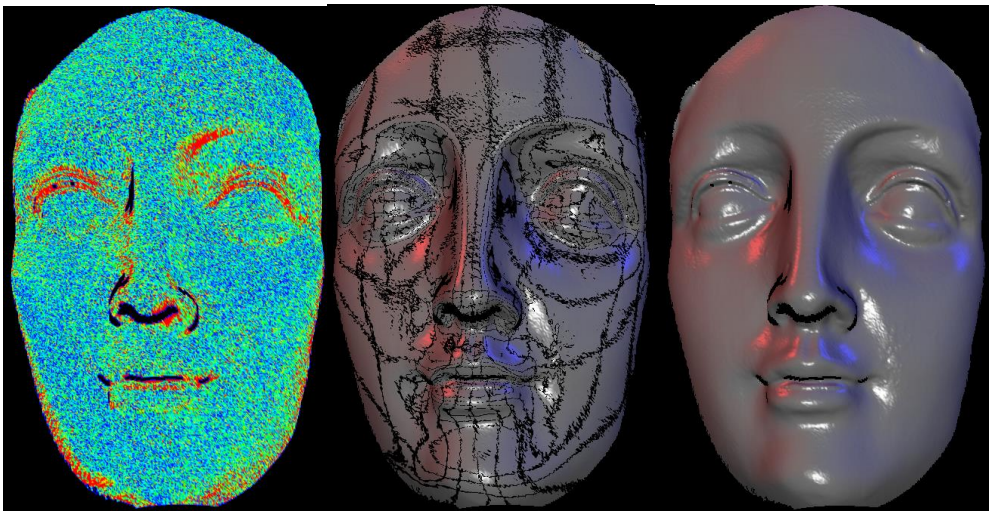
3. Boundary smoothing – in order to avoid contraction after smoothing iteration the actual Laplacian vector tangential part is removed thus making the boundary vertex move only parallel to its normal which is usually somewhat perpendicular to the rest of the surfaces around the vertex. In this way we achieve the ability to flatter "waves" and also we don't contract the object.

4. Triangles before and after:

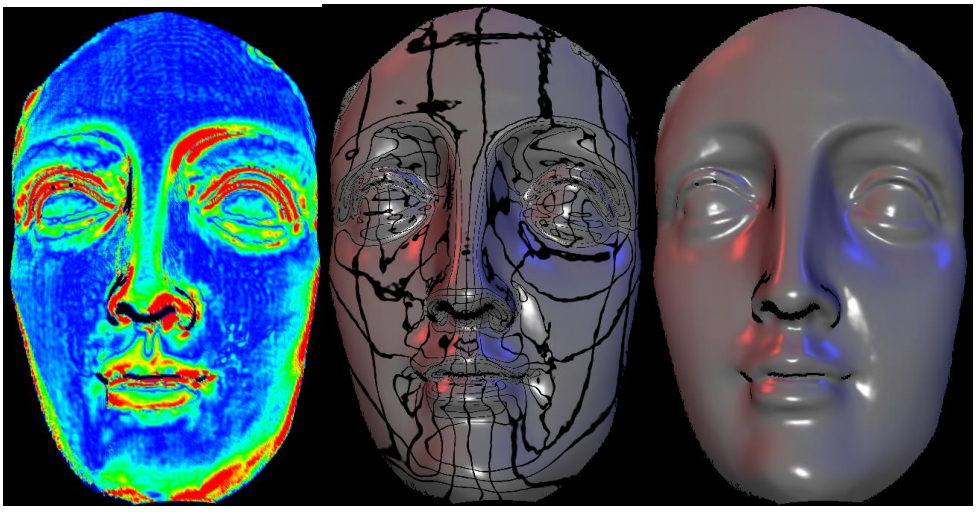


Laplace-Beltarmi mean curvature and smoothing

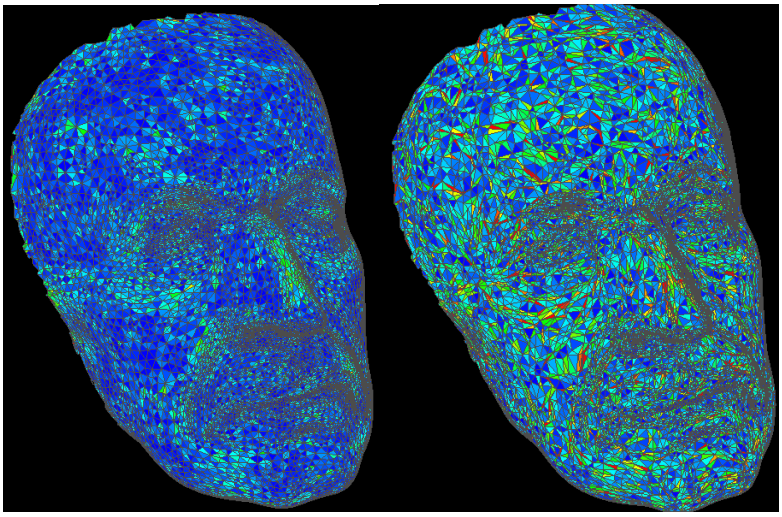
1. Before:



2. After:



3. Comparing The Uniform Laplace and Laplace Beltarmi Triangles:

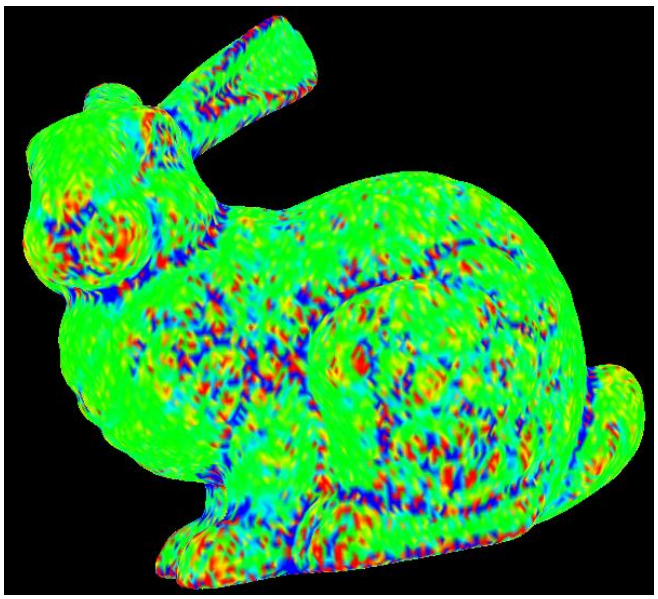


As we can see, the Laplacian Beltarmi doesn't take care of triangle shapes.

4. Boundary smoothing – as not with the Uniform method, the Laplacian Beltarmi is not well defined for vertices which are connected to Boundary edges, the opposite angle doesn't exist. Also, if the neighboring vertex is a boundary one we ignore it.
   For boundary vertices we choose the average Laplacian Beltarmi value of the **internal** one ring neighbors.

Gaussian Curvature

The boundary vertices Gaussian curvature were defined to zero as we can't really define in a 1:1 manner a plane to measure our distance from.



Tangential Smoothing

1. Before and after