Cubic stylization: Improving mesh quality

3DGMP project report on the paper: “Cubic Stylization” by Liu et al., 2019

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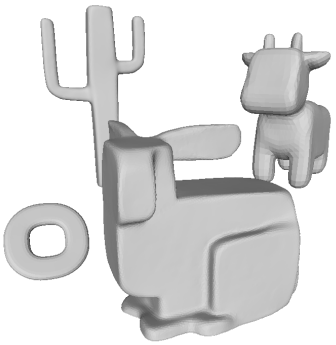
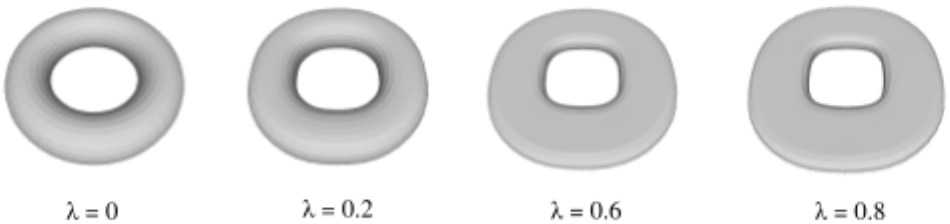


Introduction

Cubic stylization is a tool that can turn an input shape into a cube's style while maintaining the original shape's content based on "Cubic Stylization" by Hsueh-Ti Derek Liu and Alec Jacobson[1].
The purpose of the project is to study the cubic stylization proposed in the paper, implement it via the *C++ VCG library*[2] as a new filter plugin for the 3D mesh processing software *Meshlab*[3] and improve the mesh quality, where it is necessary.

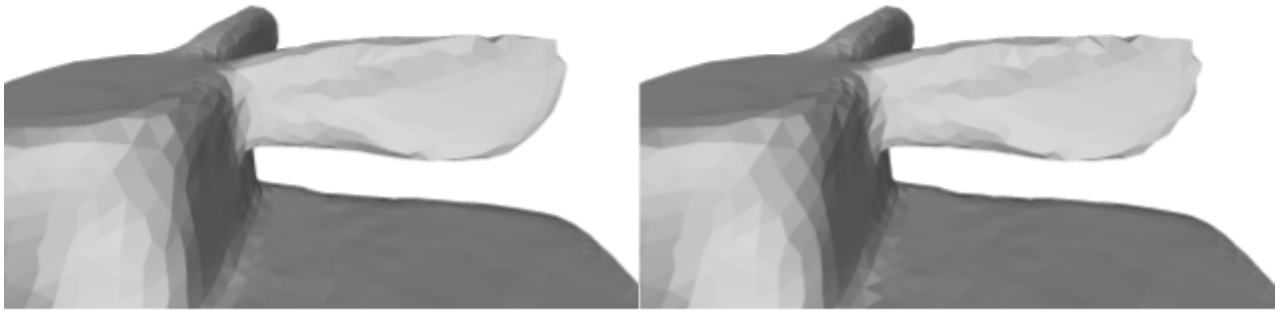
Implementation

The implementation includes its integration into MeshLab as a **filter plugin**[4].
Users can control cubeness of the mesh by tuning λ values, in addition, can choose different approaches. The first one, users can apply the edge flipping optimization to improve the mesh quality during the cubic stylization execution. The other approach can colorize by vertex quality depending on their cubization energy, as described in the paper.

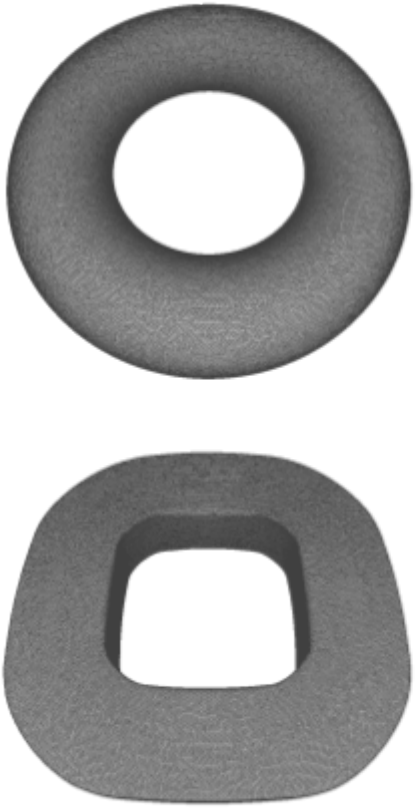


One can control the cubeness by changing the λ parameter.

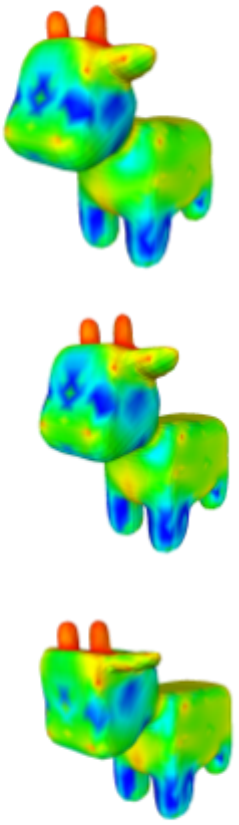
[1] https://arxiv.org/abs/1910.02926
[2] http://www.vcglib.net/
[3] https://www.meshlab.net/
[4] https://github.com/michisco/meshlab/tree/devel/src/meshlabplugins/filter_cubization/



On the left image, it is applied edge flipping optimization. On the right image, it is not applied.



Cubic stylization on a high-res torus with $\lambda = 0.5$



Colorize by vertex quality depending on their cubic energy.